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Lessons learned about virtual education during the COVID-19 pandemic

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Editorial

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The COVID-19 pandemic has affected education systems worldwide and led to the closure of face-to-face education in schools and universities. Virtual education has been offered as an alternative to face-to-face teaching in educational centers. Virtual or online education is a type of formal education carried out with the help of electronic resources such as computers and the Internet.(1) In contrast, face-to-face education, in which the teacher is present in the classroom and communicates verbally with the students simultaneously, is held in fixed physical environments.(2)

The Challenges of Virtual Education

Before implementing e-learning, providing the required infrastructure and platforms are necessary. In addition, preparing learners and their success in virtual educational environments

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is critical.[3] E-learning brings about several challenges for learners, especially in developing countries, including poor internet connection, insufficient knowledge of information and communication technologies, and weakly developed concepts.[4] Lack of necessary equipment, such as laptops and tablets, due to social or economic issues can cause students to drop out, especially non-disabled students, due to lack of access, lack of equipment, and failure to attend classes. Face-to-face classes can provide a basis for the emergence of mental disorders, including depression and suicide, so it is necessary to provide the essential platforms before implementing electronic or virtual education programs. On the other hand, even if the necessary platforms and facilities are available for providing virtual education, continuous use of tools such as laptops and tablets by students, teachers, professors, and online business owners can create a sedentary lifestyle, which may expose individuals to higher risks for non-communicable diseases. In addition, the long-term use of tools for virtual classes can increase the risk of vision disorders, especially myopia.[5] Among the other challenges created by e-learning, we can mention the students' shared understanding of course concepts, which causes low motivation for learning. E-learning should be done under specific considerations to avoid cheating and have some practical works involving the applicants. In addition, existing educational weaknesses are not correctly identified due to the lack of face-to-face classes and effective communication between teachers and students.

Among other challenges that the use of virtual education may create, the following can be mentioned:

Due to the need for financial resources, the lack of sufficient space in homes for studying and teaching, the low level of literacy of parents and students in the digital field, the lack of enough ability to manage cyberspace, the impossibility of monitoring students, the presence of hackers in cyberspace and creating disruptions in these networks, insufficient skills of teachers in providing educational content virtually, the inadequacy of budgeting of lessons with class time, incompatibility of face-to-face education curriculum with virtual education, not giving initiative to teachers in class and continuous monitoring by administrators. Systematic planning in schools and universities, the need to prepare content that can be presented in the form of clips or videos, the lack of sufficient motivation in teachers, and the lack of promotion and payment commensurate with the ability of teachers are challenges and problems for society, student's families, and knowledge.

Virtual training opportunities

For those interested and motivated to learn, virtual education can give students access to all educational course materials from any location, regardless of their background. Recording the content of virtual training classes and viewing it repeatedly offers students who need more repetition opportunities to use the clips frequently, improving their academic levels in recent years. There is even an opportunity for teachers to pay more attention to their teaching style, take basic measures to improve it, and follow the teaching style of prominent professors. The COVID-19 pandemic has disseminated science and knowledge in a broad geographical scope through virtual education. Many people from different parts of the world could use the content of a virtual education class simultaneously. The COVID-19 pandemic and virtual education caused science publications to rush, even in the post-COVID-19 era. The need to hold virtual classes on different platforms made teachers, students, and students familiar with these platforms and how to use them optimally. In this situation, the students with a strong relationship with technology knew the applications would enjoy them and did not want to return to face-to-face education. The diversity of the learning environment, discretion in choosing the teacher and teaching method, and optimal use of time to learn the material can be attractive and enjoyable for

many students and create a positive feeling in them. Saving time and money and not having to travel to and from educational places is another opportunity virtual education can provide. Today, many views on virtual education have changed in the era of COVID-19, and it is unlikely that we will go back to the past. The use of virtual education can reduce traffic and air pollution and thus indirectly reduce DALYs caused by respiratory diseases and driving accidents. Creating employment for some people and guilds, such as programmers, creating virtual scientific associations, and launching national platforms for free virtual teaching and learning in a safe place called home and with the family are other opportunities created by virtual education. And in times of illness, bad weather conditions, and impassable roads, virtual education still provides the opportunity for scientific exploitation. Besides, attention to vaccination in virtual education courses during COVID-19 pandemic is the key issue not only for preventing COVID-19 but also the loss of in-present classes because the main reason for losing classes is fear of severe complications following multi-organ failure and even death resulting in COVID-19 development.[6-11]

Finally, due to all the limitations, it is impossible to deal with the expansion of technology and modern educational methods, including virtual education. Even with the spread of the COVID-19 vaccine in communities and the presence of schools, universities, and social interactions, virtual education is not terminated. Government officials and administrators have realized the importance of virtual education and consider it an opportunity for the evolution of education. Some measures should be taken so that the main problems of e-learning do not occur, which are poor access to the internet and related hard/software, not having simple educational platforms (not being user-friendly), being affordable to use the internet for lots of hours, involving participants in the discussion, and considering workloads of learner and participants especially in developing countries because it is somehow a new method. In this era, saving time due to not needing to use transportation to attend class, not paying for vehicle, reducing air pollution, and reducing the possibility of contracting COVID-19, is one of the most important benefits of virtual education, and it should also be used in nursing coursework.

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Multidimensional Frailty and Traumatic Brain Injury among Older Adults: A Literature Review

Original Article

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Multidimensional Frailty and Traumatic Brain Injury among Older Adults: A Literature Review

Abstract

Background. Numerous health conditions in the older adult population can be attributed to falls, including traumatic brain injury (TBI), which can lead to devastating short and long-term sequelae. Older adults are also more likely to experience frailty, which encompasses physical, psychological, and social deficits that may lead to adverse health outcomes. Our literature review synthesizes current evidence for understanding frailty in the context of TBI among older adults using the Integral Model of Frailty as a framework. **Content synthesis.** A total of 32 articles were identified, and 9 articles were included. The results of this review indicate that outcomes resulting from TBI are closely linked to the physical, psychological, and social domains of frailty. **Conclusions.** A small amount of literature currently examines frailty in the context of TBI among older adults. Using the Integral Model of Frailty to

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understand frailty in the context of TBI can help clinicians anticipate patient outcomes and improve care plans. We emphasize the need for a greater understanding of TBI concerning frailty to improve health outcomes among older adult patients.

Descriptors: frail elderly; brain injuries; multiple trauma; accidental falls.

Fragilidad multidimensional y lesión cerebral traumática en adultos mayores: Una revisión de la literature

Antecedentes. Numerosos trastornos de salud en la población de adultos mayores pueden atribuirse a las caídas, incluida la lesión cerebral traumática (LCT), que puede provocar secuelas devastadoras a corto y largo plazo. Los adultos mayores también son más propensos a experimentar fragilidad, que abarca déficits físicos, psicológicos y sociales que pueden conducir a resultados adversos para la salud. Nuestra revisión de la literatura sintetiza la evidencia actual para la comprensión de la fragilidad en el contexto de la LCT entre los adultos mayores utilizando el Modelo Integral de Fragilidad como marco. **Síntesis del contenido.** Un total de 32 artículos fueron identificados, y 9 artículos fueron incluidos. Los hallazgos de esta revisión indican que los resultados de la LCT están estrechamente relacionados con los dominios físico, psicológico y social de la fragilidad. **Conclusión.** Una pequeña cantidad de literatura examina actualmente la fragilidad en el contexto de la LCT entre los adultos mayores. Usar el Modelo Integral de Fragilidad para entender la fragilidad en el contexto de la LCT puede ayudar a los clínicos a anticipar los resultados de los pacientes y mejorar los planes de cuidados. Enfatizamos la necesidad de una mayor comprensión de la LCT en relación con la fragilidad para mejorar los resultados de salud entre los pacientes adultos mayores.

Descriptores: Anciano frágil; lesiones encefálicas; traumatismo múltiple; accidentes por caídas.

Fragilidade multidimensional e traumatismo cranioencefálico em idosos: uma revisão da literatura

Antecedentes. Numerosos distúrbios de saúde na população idosa podem ser atribuídos a quedas, incluindo traumatismo cranioencefálico (TCE), que pode causar sequelas devastadoras a curto e longo prazo. Os idosos também são mais propensos a experimentar fragilidade, que engloba déficits físicos, psicológicos e sociais que podem levar a resultados adversos à saúde. Nossa revisão da literatura sintetiza as evidências atuais para entender a fragilidade no contexto do TCE entre idosos usando o Modelo Abrangente de Fragilidade como estrutura. **Síntese de conteúdo.** Um total de 32 artigos foram identificados e 9 artigos foram incluídos. As descobertas desta revisão indicam que os resultados do TCE estão intimamente relacionados aos domínios físico, psicológico e social da fragilidade. **Conclusão.** Um pequeno corpo de literatura atualmente examina a fragilidade no contexto do TCE entre adultos mais velhos. Usar o Modelo Abrangente de Fragilidade para entender a fragilidade no contexto do TCE pode ajudar os médicos a antecipar os resultados do paciente e melhorar os planos de tratamento. Enfatizamos a necessidade de uma maior compreensão do TCE em relação à fragilidade para melhorar os resultados de saúde entre pacientes idosos.

Descritores: idoso fragilizado; lesões encefálicas; traumatismo múltiplo; acidentes por quedas.

Introduction

Globally, 727 million people were aged 65 or older in the year 2020, and in the next three decades this population is expected to more than double, reaching 1.5 billion by 2050.[1] As older populations increase, geriatric syndromes are becoming an area of particular concern among clinicians and researchers caring for older adults. Care of older adults is complex and often involves multiple overlapping, interacting factors, including aging physiology, comorbidities, polypharmacy, and geriatric syndromes that impact on physical, social, and cognitive functioning.[2] Geriatric syndromes such as frailty, sarcopenia, dementia, and sensory impairment are highly prevalent in older adults across all care continuums.[2] Among them, frailty represents a unique condition of increased risk for adverse health outcomes.[2,3] From a physical and functional approach, frailty is described as a syndrome of decreased physiological reserve and increased vulnerability to stressors due to reduced homeostatic reserves, which increases susceptibility to falls, hospital admissions, disability, and mortality.[4-6]

The most used definitions of frailty among older adults are based on the Fried Frailty Phenotype (FFP), which defines frailty as having equal to or greater than three features, including exhaustion, reduced muscle strength, low physical activity, slow walking speed, and unintentional weight loss.[5] An alternative approach is the Cumulative Deficit Model of Frailty (CDMF), which describes frailty as a state of vulnerability rather than a syndrome and suggests that frailty arises from the cumulative effects of age-related deficits.[7,8] The CDCM has a quantitative approach: the higher number of deficits, the more likely they contribute to an adverse health outcome.[8]

Frailty increases older adults' susceptibility to sustain falls, leading to injuries such as fractures or traumatic brain injury (TBI).[9] TBI is a significant concern for older adults, accounting for 80,000 Emergency Department visits per year in the geriatric population, of which 75% of patients are hospitalized. Of those older adults with TBI, 51% are due to falls.[10] TBI may result in functional decline, cognitive deficits, and affective symptoms such as depression or anxiety.[11,12] A TBI occurs when an outside force causes the brain to move within the skull. In older adults, the management of CPP can be challenging due to the decreased ability of the cardiovascular system to respond to shock in older adults.[13,14] Additionally, older adults are more susceptible to sustaining TBI due to the physiological process of aging, which involves adhering the dura mater to the skull. Older adults are also increasingly likely to be receiving anticoagulant therapy, which increases susceptibility to bleeding and may increase injury severity.[10]

Older adults are susceptible to impaired healing and difficulty recovering from TBI due to immunocompromise and lower brain plasticity.[15] Mortality has been shown to increase in TBI patients over the age of 60.[16] TBI can also have devastating long-term consequences among older adults, including brain atrophy, demyelination, decreased blood-brain barrier function, and impaired neurogenesis, resulting in physical, cognitive, and affective symptoms.[17-18] Geriatric patients are more likely to experience the combined impact of both TBI and frailty. Additionally, TBI has consistently been linked with future neurodegenerative diseases such as Alzheimer's Disease, which increases susceptibility to the health impacts of frailty.[19]

To better understand the complexity of frailty in the context of TBI among older adults, this study uses the Integral Model of Frailty.[20] This model describes the multidomain frailty pathway in which frailty is considered a dynamic process whose development is influenced by several factors. The model defines frailty, such as a dynamic state affecting a person who lives losses in one or more human functioning domains (e.g., physical, psychological, and social), resulting from several factors (life-course determinants in the model), which increases the risk of adverse outcomes.[20-22] When applied to TBI, the Integral Model of Frailty can help understand how TBI is relevant regarding frailty in physical, social, and psychological domains.

Despite the compelling and significant need to explore frailty in the context of older adults suffering TBI, there is limited literature that uses a multidimensional approach to understand frailty. Therefore, the purpose of this literature review is to synthesize current evidence of multidimensional frailty in the context of TBI among older adults using the Integral Model of Frailty as a framework. Determining life-course determinants, domains, and adverse outcomes related to frailty may help guide future efforts and interventions to help decrease the impact of multidimensional frailty in aging populations who have suffered TBI.

Methods

Search Strategy, Eligibility Criteria and Information Sources. A literature review was conducted using the keywords or MESH terms [Brain Injury, Traumatic OR Traumatic Brain Injury OR Brain Trauma OR TBI (Traumatic Brain Injury) OR TBIs (Traumatic Brain Injuries)] AND [Frailty OR frail] AND [Older OR elderly OR aged]. Electronic databases searched included PubMed and Cumulative Index for Nursing and Allied Health Literature (CINAHL). Articles published in English within the past ten years (2011-2021) were selected for this literature review in order to include the most updated information. Commentaries, editorials, and dissertations were excluded. The bibliographic information resources of the University of Miami were used to extract the research articles according to the selection protocol. The methods of this literature review were guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.[23]

Selection and Data Collection Process. The information that emerged from each step of the database search was organized in Microsoft Excel (version 365) and RefWorks. Two independent reviewers (K.G. and E.I.) conducted the selection and data collection process. The first author (K.G.) carried out the initial selection and extraction process. Then, the final study sample selection was carried out by two authors independently (K.G. and E.I.). No arbitrator was required because no consensus differences arose during these processes. A flowchart of the review process based on the PRISMA-ScR is included in Figure 1. Both reviewers (K.G. and E.I.) extracted all factors from the papers that align with the literature review objective. A draft charting table in Excel was developed to record the key information of the sources. Afterward, the following data were extracted for each study included in this review: author, year, study design, setting, sample size, design/variables, and relevant results. Finally, the results identified in the selected studies were grouped according to The Integral Model of Frailty[20] in: a) Life-Course Determinants of Frailty,

b) Domains of frailty (physical, psychological, and social), and c) Adverse health outcomes related to frailty.

Study Risk of Bias Assessment. To evaluate the risk of bias, studies were evaluated for level of evidence (e.g., RCT, quasi-experimental, non-experimental study) using the Johns Hopkins Nursing Evidence-Based Practice Rating Scale.[24] Studies were also appraised for quality, which encompasses components of a given study that strengthen or weaken the study (e.g., study design, and retention of participants), as well as evaluating components of the study such as research question, quality of the articles included, and outcome measurements, each article being given a strong, moderate, or weak overall ranking based upon total quality appraisal score.[24]

Results

The database results were reported using a PRISMA flowchart (see Figure 1). The results yielded from the search criteria included 12 articles from CINAHL and 20 articles from PubMed for a total of 32 studies. After removing duplicates, there were a total of 26 remaining studies. Of these studies, 18 were removed. The final remaining number of analyzed studies was 9 (Table 1). We found that the majority of studies were ranked as a 2 in the level of evidence (on a 1-5 scale, with 1 being the strongest), with either a high or good quality of research. Regarding the quality assessment rating, most studies were evaluated as strong/moderate (n=8; 88.9%) (Table 2).

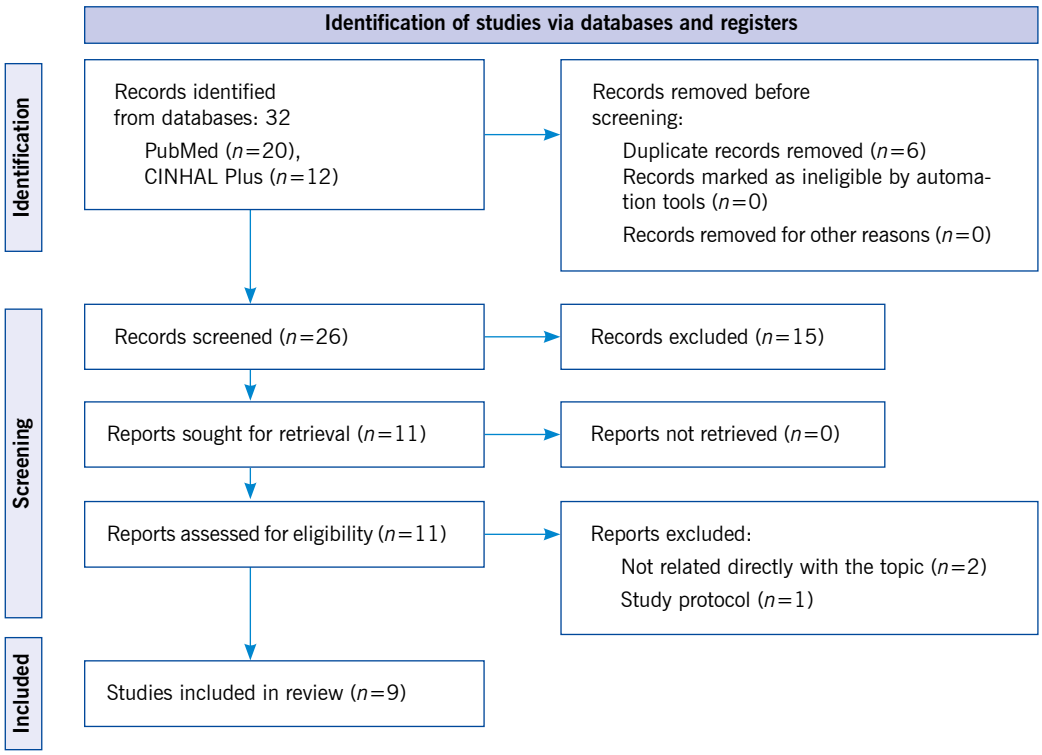

Figure 2. PRISMA Flowchart for the Literature Review

Table 1. Table of Evidence of the Studies included in the Literature Review (n=9)

Authors	Study Site	Study Population	Study Design	Key Variables Examined / Methods	Key Findings	Level of Evidence*
Abdulle *et al*., 2018[25]	Three Dutch hospitals (Level 1 trauma centers)	Adults ≥60 years with mild TBI; *n*=161; mean age 70.8 (SD= 6.3)	Prospective observational cohort	Depression, anxiety, GCS, frailty	Emotional distress: frail 50%, non-frail 20%. Frailty showed to predict long-term outcomes (OR = 2.1 [95% CI: 1.59-2.77]).	IIA
Boye *et al.*, 2014[26]	Data extracted from IMPROve-FALL study, conducted in the Netherlands	Adults ≥65 visiting emergency room due to a fall; *n*=5880; mean age 80 (SD= 8)	Descriptive, cross-sectional	Circumstances surrounding fall (e.g., location, season), injuries (e.g., TBI, open head wound, fractures)	Individuals who visited the emergency room due to a fall (n=254; 4%) sustained TBI subsequent to experiencing the fall. Falls had similar indoor (*n*=92, 52%) and outdoor (*n*=84, 48%) prevalence.	IIB
Brown *et al.*, 2017[27]	Three databases for article extraction	Adults ≥65; *n*=367 studies identified with 13 eligible for inclusion	Systematic review	Functioning (frailty) and health-related quality of life	Older adults had a significant trend toward lower motor FIM scores; cognitive FIM correlated with age. Studies report worse FIM for ≥65 than 18-64 mTBI patients. Poor health years prior to the injury and depression/fatigue shortly after injury are associated with poorer outcomes.	IIIB
DeLuca *et al.*, 2020[28]	Italy; study a part of a larger multi-centric randomized clinical trial examining cognitive telerehabilitation	TBI subjects: *n*=10; mean age 45.7 (SD= 14.4) and caregivers: *n*=10; mean age 43.7 (SD= 13.5)	Preliminary feasibility and usability study	Use of Telerehabilitation System VRRS (Virtual Reality Rehabilitation System), which allows for monitoring of TBI remotely at home by professional	Younger TBI patients had higher usability scores than older TBI patients. Caregivers chose more often than TBI patients to carry out the activity and had higher pressure/tension.	IIB
Harvey *et al.*, 2017[29]	New South Wales (Australia)	Fall-related TBI adults ≥65; *n*=6635 (20.8% (*n*=1383) were for RACF)	Retrospective study of hospital records involving data linkage between 2 time points (2008-2009 to 2012-2013)	Comparison of CD individuals with RACF residents	A higher proportion of falls for RACF when compared to CD were furniture-related (21.4% vs. 9.9%), resulted in hemorrhage (82.5% vs. 73.7%), and death (23.1% vs. 14.9%). 7.7% of hospitalizations for CD resulted in RACF placement.	IIA
Prabhakaran *et al.*, 2020[30]	Retrospective review from American College of Surgeons-Trauma Quality Improvement Project (ACS-TQIP) databank from 2014-2016.	Adults ≥65 who had sustained venous thromboembolism; *n*=354,272 complete records examined, VTE: *n*=4290 (1.1% of patient records); mean age 75.49 (SD= 7.02)	Retrospective review	ICU length of stay, age category, spine injury, use of a ventilator, transfusion of plasma products, severe TBI, frailty	Both frailty ($p<0.001$) and severe TBI ($p<0.001$) were independent predictors of VTE development in the elderly.	IIA

Table 1. Table of Evidence of the Studies included in the Literature Review (n=9) (Cont.)

Authors	Study Site	Study Population	Study Design	Key Variables Examined / Methods	Key Findings	Level of Evidence*
Stein *et al.*, 2011[31]	NR	NR	Literature review	Progesterone and Vitamin D hormone treatment for TBI in elderly patients	Age-related changes influence immune function and induce central nervous system changes/inflammatory response. Frailty in older adults is associated with Vitamin D deficiency. Progesterone has been shown to modulate aquaporins/reduce edema and reduce glutamate toxicity, helping to reduce cell damage/decreased function. Progesterone improves outcomes in TBI patients.	IIIB
Teo *et al.*, 2018[32]	National University Hospital of Singapore, 1200-bed acute-care, tertiary hospital	TBI adults admitted for fall ≥65; *n*=339; mean age 79.7 (SD= 8.0)	Retrospective medical chart review	Subdural hemorrhage, hospitalization prior to TBI, formal dx cognitive impairment or dementia, fall risk index, polypharmacy, fall circumstances (e.g., location, nature of fall), ADLs, outpatient clinic appointments	Fall-related TBI is associated with a decline in ADLs, polypharmacy, and specialist outpatient clinic appointments ($p<0.001$). Mild cognitive impairment or dementia are associated with fall-related TBI admission (3.31 [95% CI 1.68-6.51], $p<0.001$.	IIA
Tracy *et al.*, 2020[33]	American College of Surgeons Trauma Quality Improvement Program (TQIP) registry between fall 2016-spring 2019	Adults who sustained TBI ≥16 years of age; *n*=2352 (27.8% of patients in overall database)	Retrospective review of TQIP registry	Frailty index: patients stratified into no frailty (0), mild frailty (0.1), and moderate to severe frailty (≥0.2).	Higher frailty scores were associated with increasing age ($p<0.0001$), increased rates of SNF/LTAC discharge ($p= 0.0002$) and decreasing injury severity score ($p=0.001$). Moderate-severe frailty increased acute kidney injury (OR = 2.06, [95% CI = 1.07-3.99], $p=0.03$) and any unplanned event (OR 1.6, [95% CI 1.1-2.3], $p=0.01$).	IIB

Note. ADL= activities of daily living; CD= community-dwelling; FIM = modified frailty index; GCS= Glasgow coma scale; ICU= intensive care unit; NR= not reported; RACF= residential aged care facility; TBI= traumatic brain injury; VTE= venous thromboembolism.

Table 2. Quality Assessment Appraisal

Domains for reviews*:															
Study	1	2	3	4	5	6	7	8	9	10					**Overall Score**
Brown *et al*., 2017[27]	Y	Y	Y	Y	N	Y	Y	Y	N	Y					8
Stein *et al.*, 2011[31]	Y	Y	N	N	N	N	Y	N	N	Y					4
Domains for studies:**															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	**Overall Score**
Abdulle *et al.*, 2018[25]	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	14
Boye *et al.*, 2014[26]	Y	Y	N	Y	N	N	Y	N	Y	N	Y	Y	Y	Y	9
DeLuca *et al.,* 2020[28]	Y	Y	N	Y	N	Y	Y	N	Y	N	Y	N	Y	Y	9
Harvey *et al.,* 2017[29]	Y	Y	N	Y	N	N	Y	N	Y	N	Y	Y	Y	Y	9
Prabhakaran *et al.,* 2020[30]	Y	Y	N	Y	N	N	Y	N	Y	N	Y	N	Y	Y	8
Teo *et al.,* 2018[32]	Y	Y	N	Y	N	Y	Y	Y	Y	N	Y	Y	Y	Y	11
Tracy *et al.,* 2020[33]	Y	Y	Y	Y	N	Y	Y	Y	Y	N	Y	Y	Y	Y	12

Note. N= no; Y= yes. Quality Assessment Rating:[53,54] For reviews (*) STRONG, Total score 8-10; MODERATE, Total score 5-7; WEAK, Total Score <4. For studies (**) STRONG, Total score 11-14, MODERATE, Total score 8-10, WEAK, Total Score < 7. The following items were considered for the literature reviews: 1) Research question, 2) Inclusion criteria, 3) Comprehensive search strategy, 4) Adequate number of years, 5) Level of evidence of studies, 6) Quality assessment of studies, 7) Are results transparent? 8) Appropriateness of combining study results (e.g., test of homogeneity), 9) Weighting, 10) Interpretation of results. In terms of each study, the following items were evaluated: 1) Objective clearly stated, 2) Study population, 3) Participation rate at least 50%, 4) Inclusion/exclusion criteria, 5) Sample size justification, 6) Exposure measured prior to outcome measurement, 7) Timeframe, 8) Categories/degree of exposure considered, 9) Independent variables clearly defined, valid, reliable 10) Exposure(s) assessed more than once, 11) Outcome measures clearly defined, valid, reliable, 12) Outcome assessors blinded to exposure, 13) Loss to follow-up <20%, 14) Key potential confounders measured and adjusted for.

Life-Course Determinants of Frailty

Abdulle and colleagues found that when comparing frail with non-frail individuals, there were significant differences in several factors related to mild TBI.[25] Overall, frail individuals were older, had worse injury severity scores, worse pre-mental health, more comorbidities, higher scores in anxiety and depression, worse physical, mobility, and psychosocial impairment scores, lower satisfaction with life scores, and lived alone.[25] These results are concordant with those reported by Tracy et al., who found significant differences based on specific factors related to frailty in TBI.[33] Among TBI patients, 61.6% (n = 1450) were not frail, 19.3% (n = 454) were mildly frail, and 19.1% (n = 448) were moderate to severely frail. Higher frailty scores were associated with increasing age, increasing Glasgow Coma Scale (GCS) scores, and decreasing Injury Severity Scores (ISS).[33] Additionally, Brown *et al. found that* cognitive frailty index correlates with age.[27]

Domains of Frailty

Physical Domain of Frailty. Age-related changes influence immune function and induce central nervous system changes/inflammatory response.[31] Frailty in older adults is associated with Vitamin D deficiency.[34,35] Further, progesterone has been shown to modulate aquaporins/reduce edema and reduce glutamate toxicity, helping to reduce cell damage/decreased function among people with TBI.[36] In addition, Tracy *et al.* found an association between moderate to severe frailty and acute kidney injury (AKI) (OR)= 2.06 [95% CI 1.07-3.99, p= .03] and concluded that frailty is predictive of AKI in people with TBI.[33]

Social Domain of Frailty. Harvey *et al.* found that community-dwelling TBI patients ≥65 years old experienced better outcomes than residential aged care facility (RACF) residents.[29] These outcomes included an increased likelihood of experiencing falls related to furniture (21.4% vs. 9.9%), hemorrhage (82.5% vs. 73.7%), and death (23.1% vs. 14.9%) for RACF compared to community-dwelling, respectively. In addition, Boye *et al.* determined that in a sample of 5,880 individuals who visited the emergency room due to a fall, falls were likely to have occurred indoors compared to outdoor environments, and the prevalence of sustaining TBI post-fall was 4%.[26]

Psychological Domain of Frailty.

Cognition. Mild cognitive impairment or dementia is associated with fall-related TBI admission (3.31 [95% CI 1.68-6.51], $p<0.001$).[32]

Mood. Abdulle *et al.* discovered that emotional distress was present in 50% of frail patients, compared to 20% of non-frail patients, in a sample of patients ≥60 years old at 3 Level 1 trauma centers.[25]

Coping. Coping influences an individual's ability to recover from a TBI. For example, positive psychology can enhance the healing process among people with TBI.[37]

Adverse Health Outcomes

Frail older adults are more likely to experience poorer long-term outcomes from TBI.[25] Abdulle and colleagues identified the effect of frailty and early postinjury measures on the long-term outcome after mild TBI in older patients (>60 years).[25] The researchers learned that frailty (OR = 2.1 [95% CI: 1.59-2.77]) and early complaints (OR = 1.13 [95% CI: 1.01 – 1.27]) were stronger predictors of unfavorable functional outcomes. Together these predictors explained the 46% variance in the unfavorable functional outcomes measured with the Extended Glasgow Outcome Scale (GOSE). Age, early anxiety, and depression were not significant predictors of the long-term outcome within this cohort.[28] Additionally, in recovery post-injury, the majority (72%) of non-frail older patients recovered completely from posttraumatic events compared to 24% of frail older patients.[25]

Tracy and colleagues reported that rates of falls as the primary traumatic mechanism increased as frailty scores increased.[33] Moreover, patients with greater frailty had lower rates of immediate triage to the operating room following initial presentation to the emergency department.[33] Prabhakaran et al. found that in a sample of venous thromboembolism (VTE) patients who were ≥65 years old, both frailty, measured by the modified frailty index ($p <$ .001) and severe TBI ($p <.001$) were independent predictors of VTE development in the elderly.[30] Frailty was the strongest independent risk factor for developing venous thromboembolism after trauma among older adults (OR=2.0, 95 % CI:1.82-2.28]).[30] Furthermore, the study showed that TBI in older adults increased the time to initiate VTE prophylaxis, creating a risk of pulmonary embolism in the study population, in contrast to the early start of VTE prophylaxis in lower extremity injuries.[30]

Brown *et al.* found that poor health years prior to the injury and depression/fatigue shortly after injury are associated with poorer outcomes. Additionally, fall-related TBI is associated with a decline in ADLs, polypharmacy, and specialist outpatient clinic appointments ($p<0.001$).[32]

Discussion

The results of this review indicate that outcomes resulting from TBI are closely linked to the physical, psychological, and social domains of frailty. Using this framework to understand frailty in the context of TBI, especially in older populations, can help clinicians anticipate patient outcomes and improve care plans. Although the quality of the majority of studies was good and received either a moderate or strong rating, there is a low volume of research conducted on this topic, indicating more studies are needed. Additionally, some of the included studies are quite narrow in focus, making it difficult to generalize findings.

According to this literature review, various life course determinants of frailty may influence the occurrence of a TBI (e.g., lifestyle and living environment may increase an individual's susceptibility to sustaining a TBI).[29] Conversely, certain life course determinants may also influence the prognosis of TBI patients (e.g., age and sex). For instance, in frail older adults, old age may impair an individual's ability to recover quickly from TBI and lead to lingering symptoms and functional decline.[25] Thus, TBI is both a risk factor for and a result of frailty.

Examining the symptoms seen of TBI in frail populations can help to determine expected functional outcomes. Additionally, it must be acknowledged that the inconsistent use of measurement tools to determine frailty. A systematic and uniform tool to assess frailty would add more reliability to the research. The neurochemical imbalances observed in TBI (e.g., blood-brain barrier disruption, mood alterations) and frailty (e.g., increased susceptibility to falls, vitamin D deficiency, AKI) have implications for long-term health and rehabilitation outcomes. For example, an increased negative mood has been correlated with poorer health outcomes and the ability to recover from TBI.[38] Frailty increases an individual's likelihood of experiencing depressive symptoms, which has been linked to a reduction in the quantity of monoamines neurotransmitters (e.g., dopamine, noradrenaline, serotonin) in synaptic clefts and depressive pathophysiology.[39,40] Sustained expression of these neurochemical imbalances can enforce and prolong depressive symptoms, leading to increased frailty and poor health outcomes.

TBI results in notable biological and neurochemical alterations. The integrity of the blood-brain barrier (BBB) becomes compromised, resulting in a shift from the normally highly regulated transcellular transport to paracellular transport. Thus, more solutes can readily enter the brain and affect functioning.[41] The aforementioned has implications related to cognition, mood, and motor function. Various biomarkers such as miRNAs (e.g., miR-124-3p) tau, and UCH-L1 that are implicated in the neuroinflammatory process of TBI, have been linked to neurodegeneration.[42-45] The expression of S-100ß, a beta-tau protein, promotes oxidative stress and further exacerbation of injury.[46] S-100ß is also linked with the formation of Aß plaques, which are histologically characteristic of Alzheimer's Disease.[47] Neurodegenerative disease (e.g., Alzheimer's, dementia) has been linked to risk for fall related TBI,[32] and may impair the healing process and ability to rehabilitate from injury.[48] Neurodegenerative disease is also a hallmark characteristic of frailty.[49]

Our results bring to the forefront numerous considerations in frail TBI patients. In the physical domain, the impact of vitamin D deficiency and kidney injury were highlighted as being problematic, and also contribute to the damaging physiological cascade detailed above. Socially, skilled nursing facility placement was also shown to contribute to patient outcomes. Dijkers and colleagues found that older adults had lower motor functioning scores upon rehab discharge despite similar functioning scores upon admission.[48] The previous suggests that frailty may play a role in the impaired healing process and functional improvement.

Psychologically, a patient's cognitive function, ability to cope with the injury (e.g., positive psychology), and mood were all shown to impact findings; however the literature is limited. Other studies, such as Dijkers et al., have found that older adults have low cognitive functioning ability scores upon rehab discharge after a TBI.[48] Mosenthal *et al.* found that functional ability is lower in older adults sustaining mild TBI when compared to adults ages 18-64.[50] Decreased cognitive ability (e.g., mild cognitive impairment or dementia) may also increase the risk for fall-related TBI.[32] From a clinical standpoint, this highlights the importance of monitoring for and addressing each of the domains of frailty and initiating appropriate interventions. For example, extra attention may be given to discharge instructions, teaching, and follow-up to a patient who is more frail. Both cognitive stimulation and monitoring for adverse psychological effects may also be appropriate interventions. From a research standpoint, more rigorous studies in frail TBI patients would enhance the literature (e.g., intervention studies focusing on symptoms or physical/cognitive outcomes).

Mood should be also considered as relevant for psychological frailty among older adults who have experienced a TBI, as emotional distress can be present among frail individuals. Consistent the results reported in this literature review, Kristman and colleagues found that patients reporting depression and fatigue shortly after sustaining TBI went on to experience poorer outcomes.[38] Poorer health (e.g., pre-existing psychological symptoms of frailty) may influence the nature of the brain injury, and after TBI, the psychological compromise may be accelerated.[40] Effective interventions for frail TBI patients may be able to enhance the healing process through promoting positive psychology and assist patients with coping with the sequelae of the injury.

The findings of this review in terms of adverse outcomes are consistent with previous literature on TBI. For example, according to Rothweiler et al, increased dependency, change in living circumstances, and mortality 1 to 2 years after TBI were all linked to increasing age at the time of injury.[51] Testa et al. also concluded that older patients and those with TBI are likely to become physically and financially dependent on others.[52] However, our results also suggest that frailty may be an even stronger predictor of TBI outcomes than age.[28] This antecedent is important for further exploration as it has implications for patient management and understanding of TBI outcomes.

Limitations. This review seeks to understand the multifaceted, multidimensional nature of frailty in the context of TBI in older adults. Our results indicate that physical, social, and psychological considerations are relevant when considering clinical outcomes for TBI patients that are also experiencing the progression of frailty. However, our review also contains limitations. There are potential resources not included in this review that could have contributed to a better understanding of the relationship between TBI and frailty. For instance, gray literature and different language publications could have been included. In addition, the search terms chosen and databases used may have limited the scope of information identified. Furthermore, a small number of final articles was yielded, which may be in part because both TBI and frailty had to be concurrently examined for the review to warrant inclusion in our final results, and there is a shortage of literature on this topic. Thus, more research examining frailty and TBI is needed, especially considering that frailty and TBI may be co-occurring or increase an individual's susceptibility to experiencing the other condition.

Conclusion. TBI and frailty are significant health concerns in older adults that are likely to persist as the population ages. This literature review provides some insights to support the relationship between TBI and frailty and to improve nursing practice and knowledge. Using a multidimensional model to understand TBI that encompasses physical, social, and psychological domains of frailty has the potential to improve outcomes for TBI patients. Further research is needed to test and understand this model in various populations.

Appropriate interventions should be developed to address frail older adults' physical, social, and psychological needs that sustain TBI. Nurses and clinicians caring for older adults can use the multidimensional model of frailty to provide patient care to TBI patients to improve clinical outcomes and recovery from TBI.

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Original Article

Validation to Spanish of nursing assessment scale for early diagnosis of delirium - Nu-DESC

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Descriptors: delirium; intensive care units; validation study; psychometrics.

Validation to Spanish of nursing assessment scale for early diagnosis of delirium - Nu-DESC

Abstract

Objective. This work aimed to determine the validity and reliability of the Colombian Spanish version of the Nursing Delirium Screening Scale (Nu-DESC). **Methods.** A psychometric study was conducted to achieve the goal of this study, which measured face validity, content validity, sensitivity, specificity and predictive values of the Nu-DESC. **Results.** Face validity obtained a total Aiken V of 0.89, and content validity showed a modified Lawshe index of 0.92. When Nu-DESC was applied to 210 adult patients hospitalized in the Intensive Care Unit, it was found that 14.2% had suspected delirium. The instrument showed a sensitivity of 91.6%, specificity of 95.6%, positive predictive value of 73.3%, negative predictive value of 98.8%, good internal consistency with

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Cronbach's α of 0.8 and good concordance according to Cohen's Kappa index of 0.788. **Conclusion.** The Spanish version of the Nu-DESC scale for Colombia has appropriate psychometric values for assessing delirium risk. In addition, this scale is easy to apply, so the adaptation of nursing personnel for its employability favors routine monitoring and timely detection of delirium.

Descriptors: delirium; intensive care units; validation study; psychometrics.

Validación al español de la escala de valoración de enfermería para diagnóstico temprano de delirium - Nu-DESC

Resumen

Objetivo. Determinar la validez y confiabilidad en su versión al español de Colombia de la escala de detección de delirium por enfermería (Nu-DESC, por sus siglas en inglés Nursing Delirium Screening Scale). **Métodos.** Estudio psicométrico, el cual midió la validez facial, de contenido, sensibilidad, especificidad y valores predictivos de la escala Nu-DESC. **Resultados.** La validez facial obtuvo un V de Aiken total de 0.89 y la validez de contenido mostró un índice Lawshe modificado de 0.92. Al aplicar Nu-DESC en 210 pacientes adultos hospitalizados en Unidad de Cuidados Intensivos se halló que 14.2% tuvo sospecha de delirium. El instrumento mostró una sensibilidad del 91.6%, especificidad de 95.6%, valor predictivo positivo de 73.3%, valor predictivo negativo de 98.8%, buena consistencia interna con α de Cronbach de 0.8 y buena concordancia según índice de Kappa de Cohen de 0.788. **Conclusión.** La versión en español para Colombia de la escala Nu-DESC tiene adecuados valores psicométricos para la valoración del riesgo de delirium. Además, esta escala es de fácil aplicación por lo que la adaptación del personal de enfermería para su empleabilidad favorece una rutinaria monitorización y detección oportuna del delirium.

Descriptores: delirio; unidades de cuidados intensivos; estudio de validación; psicometría.

Validação para o espanhol da escala de avaliação de enfermagem para diagnóstico precoce de delirium - Nu -DESC

Resumo

Objetivo. Determinar a validade e a confiabilidade da versão colombiana em espanhol da escala de detecção de delirium em enfermagem (Nu-DESC, por sua sigla em inglês Nursing Delirium Screening Scale). **Métodos.** Estudo psicométrico, que mediu a validade facial, validade de conteúdo, sensibilidade, especificidade e valores preditivos da escala Nu -DESC. **Resultados.** A validade facial obteve um V de Aiken total de 0.89 e a validade de conteúdo mostrou um índice de Lawshe modificado de 0.92. Ao aplicar o Nu-DESC em 210 pacientes adultos internados na Unidade de Terapia Intensiva, constatou-se que 14.2% apresentavam suspeita de delirium. O instrumento apresentou sensibilidade de 91.6%, especificidade de 95.6%, valor preditivo positivo de 73.3%, valor preditivo negativo de 98.8%, boa consistência interna com α de Cronbach de 0.8 e boa concordância segundo o índice Kappa de Cohen de 0.788. **Conclusão.** A versão em espanhol para a Colômbia da escala Nu-DESC possui valores psicométricos adequados para avaliação do risco de delirium. Além disso, essa escala é de fácil aplicação, de modo que a adaptação do pessoal de enfermagem para sua empregabilidade favorece o acompanhamento rotineiro e a detecção oportuna do delirium.

Descritores: delírio; unidades de terapia intensiva; estudo de validação; psicometria

Introduction

Delirium is a neurocognitive disorder that frequently occurs in critically ill patients, characterized by disorientation, memory impairment, psychomotor agitation, confusion and hallucinations;[1] therefore, it is a symptom of brain damage.[2] Its consequences are highly deleterious in patients since it causes more days of mechanical ventilation, longer stay in Intensive Care Units (ICU), higher risk of infections and even higher mortality.[3,4] Thus, it is important to prevent delirium, starting with its timely detection,[5] since this is one of the main measures for its prevention and treatment.[6,7] The Pain, Agitation and Delirium (PAD) guidelines,[8] the ABCDEF bundle[9] and the Humanizing Intensive Care Units (HU-CI) project[10] confirm that the assessment of delirium using validated scales should be performed frequently so that timely preventive measures can be developed, even from the suspicion or probability of its presence.

There are validated tools for delirium diagnosis, like Confusion Assessment Methods in Intensive Care Units (CAM-ICU), and Intensive Care Delirium Screening Checklist (ICDSC). Further, the Prediction of Delirium in ICU patients scale (PRE-DELIRIC) assesses delirium risk in patients hospitalized in ICU. Although the literature presents these tools, not always are not apply due to some ICU boundaries, such as unknowledge of these,[11] delirium naturalization, high workload, mistrust about the results of these tools in sedated, depressed or uncooperative patients,[12] and by believing about their application can disrupt to the patients and their families.[13] The boundaries to using delirium scales reduce nurses' opportunity to detect delirium.

However, the nurse role has a high relevance to measure, prevent and treat patients with delirium because nurses are leadership in the ICU, its participation in decision-making, its permanent communication with patients, family and the health team[14] and its constant presence with the patient that facilitates early identification of the signs and symptoms of delirium. Thus, nurses must continue leading the timely detection of delirium, using other tools such as the *Nursing Delirium Screening Scale* (Nu-DESC),[15] with which most of the barriers that limit its detection can be overcome.

The Nu-DESC scale determines the suspicion of delirium. It has five dimensions, assessment, disorientation, inappropriate behavior, inappropriate communication, delusions/hallucinations, and psychomotor retardation, consistent with the criteria of the diagnostic manual of mental disorders.[1] Thus, this tool is useful for evaluating patients with or without mechanical ventilation and with or without sedation. It was developed by Gaudreau *et al*.[15] in 2005 with adequate reliability values, a sensitivity of 85.7% and a specificity of 86.8%, with only two cases of false positives (FP) and three false negatives (FN). In addition, it is very quick to apply because its administration can take less than two minutes.[16] Based on these considerations, and taking

into account the realities in some ICUs in Colombia where there is a high ratio of patients per nurse (six or more patients per nurse),[15] the routine application of Nu-DESC is considered pertinent to achieve this, it is necessary to have the validation of this scale in Spanish. Thus, this study aimed to determine the validity and reliability of the Spanish version of the Nu-DESC scale in Colombia.

Methods

Type of study. A psychometric, exploratory-observational study was developed, which included the translation into Spanish and measurement of face validity, content validity, sensitivity, specificity, reliability and predictive values of the Nu-DESC scale developed by Gaudreau *et al*.[15]

Populations. (i) For the translation process of the scale, a total of two translators participated, of which one was a specialist in medical translation and interpretation, and two were certified in Colombia; (ii) Five experts participated in the face, and content validation process, nurses and nurses specialized in critical care, with more than five years of experience in ICU, were knowledgeable in the management and prevention of delirium, since they had at least one publication related to the subject, and agreed to participate freely and voluntarily in the study; and (iii) To test the translated and validated version of Nu-DESC, it was applied in a multipurpose ICU that treats patients with all types of pathologies - cardiovascular, trauma, surgical, among others - of a fourth level university hospital. Patients 18 years of age and older hospitalized in the ICU and with a consciousness score according to the Richmond Agitation and Sedation Scale (RASS) between -3 and +3 were included. Those with any cognitive, psychiatric or neurological disorder reported in the clinical history or confirmed by relatives were excluded. Thus, 210 patients were included to whom the nurse applied the Nu-DESC scale, filling out the items based on the observation of the patient's behavior during the shift. In patients with orotracheal intubation, the nurse used nonverbal communication to verify orientation, communication and allusions.

Translation. The Nu-DESC scale was translated from English to Spanish, with its cross-cultural adaptation and back-translation from Spanish to English, following the first six steps recommended by the International Society for Pharmacoeconomics and Outcome Research (ISPOR) guidelines:[17]

(i) Preparation. The authors of the original version were asked for their authorization and participation in the process, and they gave their approval and agreed to participate, thus providing explanations of the Nu-DESC dimensions; (ii) Direct translation. A translator specialized in medical translation, and a non-specialist translator were asked to translate the scale from English to Spanish independently. The two translators were given conceptual information on delirium and specifically on the content of the scale; (iii) Reconciliation between the two independent translations. A 98% concordance was found since, out of 474 words in the specialist translator's version, 465 words coincided with the non-specialist translator's version. Thus, a third translator and proofreader reconciled the nine words for which there was no concordance; (iv) Retranslation. An official translator retranslated the reconciled Spanish version into English; (v) Revision of the retranslation. This process was carried out by the work team that prepared the original English version of the scale; and (vi) Harmonization. A meeting was held with all the translators who participated and the researchers, where the final versions in Spanish and the retranslated version were reviewed, and conceptual aspects were analyzed, leading to the approval of the final version. The retranslated version was returned to the original authors, who approved it without requesting clarifications or modifications. The remaining steps (cognitive report, review of the results of the cognitive report, proofreading and final report) were carried out following the steps of the face and content validity.

Facial validity. We continued with the facial validity process of the Nu-DESC scale as proposed by Sánchez & Echeverry,[18] taking the assessment of the group of experts exclusively. ICU specialist nurses were considered experts for this study since they are the ones who should apply this scale, and these same experts participated in the content validation process; therefore, their inclusion and exclusion criteria are described in that section. Each expert assessed the clarity, coherence, relevance and sufficiency of the scale through Aiken's V method[19] with a minimum acceptable score of 0.826, evaluated on a scale of 1 to 4, with 1 not meeting the criterion, 2 low level, 3 moderate level and 4 high level. Additional space was allowed for observations.

Content validity. Content validity was assessed by categorizing each of the dimensions into three items: essential, useful but not essential, and nonessential. In addition, a space was left for observations in each of the dimensions. The modified Lawshe model was used,[20] whose guidelines indicate that for a judgment of five experts, the minimum accepted value is 0.6. The methodological process of the expert judgment in the face and content validation took into account the following recommendations proposed by Escobar and Cuervo:[21] (i) It was defined that the objective of the expert judgment was to perform the content validation of the Nu-DESC scale translated into Spanish; (ii) Selection of the judges. In this step, the criteria of Skjong and Wentwortht were used.[22] The experts were considered to have experience in evidence-based decision-making or expertise, as evidenced by their studies, research, publications, position, experience, recognition, reputation in the community, availability and motivation to participate. Thus, we included nurses who were specialists in intensive care, of legal age, with at least five years of experience in critical care and who worked in third and fourth-level care institutions. Those whose experience in the ICU was exclusively in administrative activities were excluded; (iii) Explanation of the dimensions and indicators measured by each of the items of the instrument. This allowed the expert to evaluate the relevance of the item; (iv) Description of the objective of the instrument. The objective of Nu-DESC was included in each evaluation form so that the expert was contextualized, an aspect that increases the level of specificity of the evaluation; (v) Design of worksheets. They were designed according to the objectives of the evaluation; (vi) Inter-judge agreement was calculated based on Lawshe's modified content validity model; and (vii) Preparation of the trial conclusions, which are presented in the results.

Criterion validity. Following the recommendations of Sánchez and Echeverry,[18] the criterion validity process was carried out using the Confusion Assessment Method for Intensive Care Unit (CAM-ICU) instrument as the gold standard since this instrument has been validated in Colombia since 2010[23] and is the most widely used for the diagnosis of delirium, and is recommended by the Latin-American and Iberian Guide for the delirium management.[24]

Instruments. Two scales were used: (i) CAM-ICU: this instrument has four criteria, acute change or fluctuating course of mental status, inattention, altered level of consciousness and cognitive alterations. If the first and third criteria are altered, and the patient fails in two or more items of the second criterion, the patient is considered positive for delirium. If only the first criterion is altered and fails in two or more of the second, the fourth criterion is evaluated, and if it fails in more than one point of this, it is considered positive for delirium. Its Spanish version in Colombia has a K index of 0.79, a sensitivity of 79.4%, a specificity of 97.9%, a positive predictive value of 93.1% and a negative predictive value of 93%;[23] and (ii) Nu-DESC (Nursing Screening Delirium Scale) was designed and validated in 2005 by Gaudreau *et al*,[15] who estimated a sensitivity of 85.7% and a specificity of 86.8%. This scale contains 5 dimensions of rapid completion: disorientation, inappropriate behavior, inappropriate communication, delusions/hallucinations and

psychomotor retardation. Each of these is scored 0 if absent, 1 if occasional and 2 if frequent. If the patient obtains a total score greater than or equal to 2, delirium is suspected, as specified by the creators of the original version of the scale.

Collection of information after facial and content validation. The data measurement process was carried out through observation and was performed by two nurses specialized in intensive care, who were trained in the application of the two scales. Nurse M applied the CAM-ICU on the participants, and fifteen minutes later, nurse P applied the Nu-DESC scale on the same patients who were included in the study according to the criteria previously described in the participant's section. Each recorded their results in an independent database since both nurses were unaware of the results of the other scale, and the demographic and clinical information of the patients, taken from the medical records, was recorded in the same database. Subsequently, the two databases were pooled, compared to verify the information and unified into a single database containing all the results.

Data analysis, reliability and internal and external validity of the scale. (i) For face validity, the Simple Concordance Index was used to find the degree of agreement among the evaluators, which reflects the number of agreements as a function of the total number of coding. The Aiken V was also used to establish face validity and the modified Lawshe model for content validity to analyze the study population. Descriptive statistics were used with measures of central tendency and dispersion for quantitative variables and relative and absolute frequencies for categorical variables; (ii) In the reliability analysis of the scale, Cronbach's alpha was calculated, and its internal and external validity with sensitivity, specificity, positive predictive values (PPV), negative predictive values (NPV), receiver operating characteristic curve (ROC) and Cohen's Kappa or concordance index, taking the cut-off point of the Nu-DESC scale > 2 following the specifications of the original version of the scale. The CAM-ICU and SPSS version 29 software were used as gold instruments for data analysis.

Ethical considerations. The international ethical guidelines outlined in the Declaration of Helsinki and the Belmont Report, and those of Colombia according to Resolution 8430 of 1993 and Law 911 of 2004 were followed. Thus, this inquiry safeguarded the principles of justice because all patients had equal opportunity to participate, beneficence because this scale benefited the participants by giving them a better chance of detecting delirium and society in general since the possibility to use in the Colombian population. Furthermore, this study preserved autonomy because all participants (patients and experts who supported the translation and face and content validation) were free to enter and leave the study when they wished, expressed in the consent or informed waiver signature.

The researcher asked patients to sign a consent form to use their health status information and to be assessed by the nurses who applied the instruments. The participation of the actors consisted of the translators contributing their knowledge with the translation of the scale, the experts contributing with the revision of the scale, and the researcher applying the scale to the patients. The data were treated according to the requirements of Law 1581 of 2012 and Decree 1377 of 2013 on data protection. This study was approved by the ethics committee of the institution where the study was applied, Hospital Universitario Nacional, by act No. 201909 of 2020.

Results

The methodology section describes the translation process; It follows the ISPOR guide recommendations. Thus, the preparation and direct translation steps were carried out completely without novelties, the reconciliation step had a concordance between translators of 98%, an

official translator performed the retranslation, the revision of the retranslation was performed directly by the creators of the original scale who did not suggest changes, and the final harmonization step involved the researchers, translators and creators of the original version, resulting in the final approval of the Spanish version published in this article. Subsequently, the facial and content validation process continued.

Face Validity

Five critical care specialist nurses with more than five years of experience in ICU care (experts) participated in the study. They independently assessed the Spanish version of the Nu-DESC, from which this inquiry found that the clarity of all items (disorientation, inappropriate behavior, inappropriate communication, delusions/hallucinations and psychomotor retardation) had an Aiken V between 0.86 and 1, that is, between acceptable and perfect agreement among the experts. The coherence and relevance of the items were rated between 0.93 and 1 Aiken V, i.e. between high and perfect agreement, and the sufficiency was 0.93 for all items, i.e. high agreement (see Table 1). According to the observations of the experts, the word "evidence" was changed to "evidence for item 1, in item 2 an evaluator recommended adjusting the wording as follows: "Inappropriate behavior in space and/or time manifested by: throwing the pipe, pulling clothes, attempts to get off the bed." Another evaluator recommended adding inappropriate behaviors that would allow assessment of hypoactive delirium. On item 3 it was suggested to adjust the wording in the explanation as follows: "slow reaction to a stimulus or no spontaneous action to stimulus, delayed responses, patients evidenced as not resisting". Finally, regarding item 4, the experts considered it appropriate to exemplify illusions and hallucinations.

Content Validity by experts

We determined content validity through an agreement among five experts with the degree of the agreement through the modified Lawshe model. We evaluated consensus among the experts with a content validity rank CVR (Content Validity Ratio) of at least 0.6. Table 1 presents the consolidated Aiken and Lawshe results for the Nu-DESC dimensions.

Table 1. Results of the Aiken and Lawshe V tests of Nu-DESC in Spanish, evaluation by five experts.

Ítem	Categories for determining face validity (V of Aiken)				Categories for determining content validity (Lawshe)		
	Clarity	Consistency	Relevance	Sufficiency	Essential	Useful but not essential	Not essential
Disorientation	1	1	1	0.93	1		
Inappropriate behavior	0.93	0.93	1	0.93	1		
Inappropriate communication	0.93	1	1	0.93	1		
Illusions/Hallucinations	1	1	1	0.93	1		
Psychomotor retardation	0.86	0.93	0.93	0.93		0.6	

The results showed that the content validity index for the Nu-DESC scale was 0.92. For the dimensions of disorientation, inappropriate behavior, inadequate communication and delusions/hallucinations had a Lawshe of 1, while for the psychomotor retardation item had a Lawshe of 0.6. Since an expert opinion generated a lower Lawshe in the psychomotor retardation category, it was not modified. These values corroborate adequate content validity. The validated Nu-DESC scale in its Spanish version is included in the Annex to this article.

Characteristics of the patient population

We applied the scale to 210 adults hospitalized in the ICU of a university hospital in Bogotá. Data were collected between July and December 2021. The patients were mostly men (59.5%), mean age 60±15.2 years, with a predominance of diagnoses of cardiovascular pathologies (75.2%), sepsis (7.2%) and trauma (6.2%), and pathologic antecedents such as arterial hypertension (51.2%) and diabetes mellitus (27.7%). The pharmacological treatment of sedation and analgesia received by the participants was evaluated, with morphine (21.1%) being the most frequent. Other conditions found were the presence of mechanical ventilation in 19.7% and central venous catheter (34.7%) and urinary catheter (34.3%).

Results of Nu-DESC and gold standard CAM-ICU

According to the CAM-ICU scale, 24 patients (11.4%) presented delirium, versus 30 patients (14.2%), according to Nu-DESC. Table 2 shows the results of each dimension, where disorientation and psychomotor retardation were the most frequent, and delusions/hallucinations were less frequent.

Table 2. Results of each Nu-DESC dimension in the study population

Dimension	Absent (0)	Ocassional (1)	Frequent (2)
	n (%)	*n* (%)	*n* (%)
Disorientation	166 (77.9)	38 (17.8)	9 (4.2)
Inappropriate behavior	190 (89.2)	21 (9.9)	2 (0.9)
Inappropriate communication	180 (84.5)	30 (14.1)	3 (1.4)
Illusions/Hallucinations	201 (94.4)	10 (4.7)	2 (0.9)
Psychomotor retardation	174 (81.7)	36 (16.9)	3 (1.4)

Reliability, internal and external validity results

A Cronbach's alpha of 0.8 was estimated, indicating that the Nu-DESC scale's Spanish version is reliable. The ROC curve showed high sensitivity and specificity results according to the Youden index, closer to 1 in the upper left corner (Figure 1).

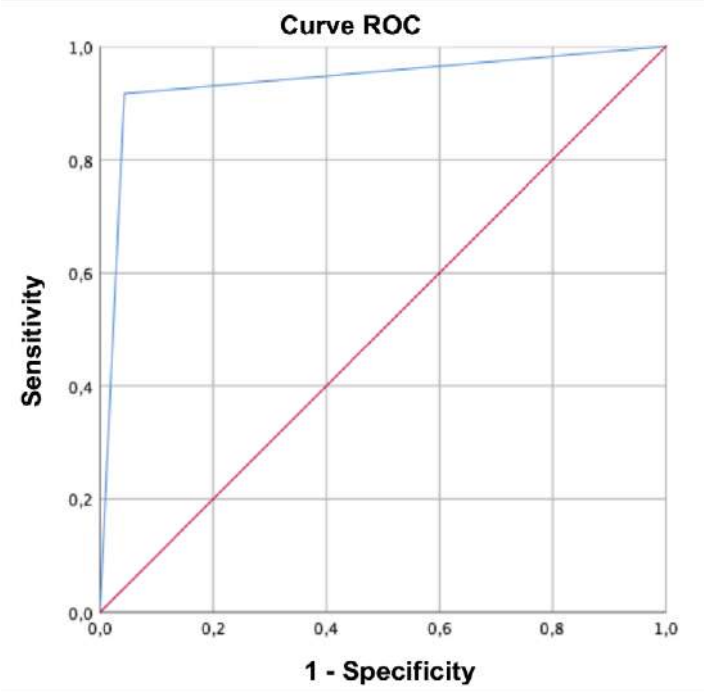

Figure1. ROC curve for the Spanish version of the Nu-DESC scale with a score ≥ 2 points Versus CAM-ICU.

The area under the curve was 0.937±0.034 (p<0.001, 95%CI= 0.87-1), indicating the good ability of Nu-DESC to distinguish between positives and negatives.

In addition, the sensitivity showed that its ability to detect delirium in people with positive CAM-ICU was 91.6%, and the specificity of the scale showed that its ability to classify correctly without disease was 95.6%. The PPV estimated a 73.3% probability that an ICU patient with Nu-DESC score ≥ 2 in Spanish has delirium. In comparison, NPV was a 98.8% probability of not having delirium when the scale score was ≤ 2.

Cohen's Kappa index of the total Nu-DESC scale was 0.788 (p<0.001), i.e. good agreement. The results of Cohen's Kappa for each dimension show that the assessment of disorientation, inappropriate behavior and psychomotor retardation showed moderate agreement, inappropriate communication with good agreement, and delusions and/or hallucinations with poor agreement (Table 3).

Table 3. Cohen's Kappa index results for each dimension of the Spanish version of the Nu-DESC scale.

Dimension	Kappa	*p* value
Disorientation	0.472	<0.001
Inappropriate behavior	0.401	<0.001
Inappropriate communication	0.643	<0.001
Illusions/Hallucinations	0.382	<0.001
Psychomotor retardation	0.531	<0.001

Discussion

The results of this study highlighted the validity of the Spanish version of the Nu-DESC scale. Its face validity showed a total Aiken V of 0.89, and its content validity showed a modified Lawshe index of 0.92. Likewise, Nu-DESC in Spanish has adequate internal and external validity since it had 91.6% sensitivity, 95.6% specificity, 73.3% PPV, and 98.8% NPV. Furthermore, we found Cronbach's α of 0.8 representing good internal consistency in the Spanish version of Nu-DESC, and Cohen's Kappa index of 0.788 indicates good agreement between Nu-DESC in Spanish and CAM-ICU.

We found few differences when comparing the present results with others reported in the literature. In 2017, Spedale *et al*.,[25] published the Italian version of Nu-DESC, who obtained results similar to the present ones, with Kappa index of 0.87 and sensitivity of 100%, values slightly higher than the present ones in their Spanish version, but with a specificity of 76% lower than the present one, and the area under the ROC curve was 0.94, similar to the present one. Thus, the results of both versions are similar (Italian and Spanish), corroborating the overall reliability of the scale.

Moreover, in Denmark, Hägi-Pedersen *et al*.[26] published the Danish version of Nu-DESC from its translation process that followed the ten steps of the ISPOR guide. In contrast, in the present one, the first six were followed. Like the Danish version, the current Spanish version relied on a team of translators and the original author of the scale to establish the final version. Similarly, the face and content validity varied in the number of participants since in the current version; there were five nurses and in the Danish version, 16 nurses and four physicians. There were also differences in the assessment items since the Danish version[26] assessed comprehension and feasibility, and the current Spanish version set clarity, coherence, relevance and sufficiency. Finally, although there was variation in the final validation process, both versions conclude that this scale allows the timely detection of delirium.

We found that the results of the reliability tests of the present Spanish version of Nu-DESC were slightly superior to the German and Polish versions since, Brich *et al*.[27] published the German version tested in 315 older adult participants, finding moderate sensitivity (66%), high specificity (91%), PPV of 7.37 and NPV of 0.37. Regarding the Polish version performed by Krupa *et al*.[28] in 2021, their translation process was similar to the current one, obtaining a version adapted to their language and nation. Subsequently, the authors analyzed each of the dimensions and the global scale during the day and night and in two days of follow-up, finding that disorientation was the dimension with the highest frequency, a result similar to that of the present study.

Likewise, a study in Iran by Amirajam *et al*.[29] performed psychometric tests of Nu-DESC English version in non-intubated ICU patients and found a Kappa of 0.96 and Cronbach's alpha of 0.86, which denote very good concordance and reliability. These results are higher than the present ones, although the differences are not significant, which may be due to the smaller population included in Amirajam's study (96 participants); however, Amirajam's inquiry confirms the efficiency and reliability of the scale.

Compared to the Thai version, translated and validated by Somnuke *et al*.[30] in 2022 in a postoperative population over 70 years of age, it was observed that its sensitivity was low (55%) with a threshold ≥ 2. However, the sensitivity improved (85%) with a threshold of ≥ 1. The findings of Somnuke *et al*.[30] are similar to those reported by Hargrave *et al*.[31] about better internal validity with a threshold of 1; in addition, both authors had a population outside the ICU, which suggests that this scale may have variations in its cut-off point when assessing delirium in adults outside the ICU. Another study with the current Spanish version is needed to corroborate whether the same behavior is followed.

From another perspective, when analyzing the current Nu-DESC results against other

instruments, such as the Recognizing acute delirium as part of your routine (RADAR) scale,[32] it has three simple items based on observation, drowsiness, difficulty following instructions, and slow movements. Nurses applied RADAR every time they administered medication, as they wanted it to be part of the care routine. The results of its validation showed a sensitivity of 73% and specificity of 67%, which are lower than those of the validation of the first English version of Nu-DESC and the current ones.

Another instrument developed was a computerized device called the Edinburgh Delirium Test Box-ICU, which detected and monitored visual deficits and delirium.[33] It consisted of a behavioral assessment and a computerized test, with which patients had to slowly count the lights presented to them. Khan *et al*.[34] compared Test Box-ICU and CAM-ICU results in 30 ICU patients, and the authors found that their scores < 5 achieved 100% sensitivity and 92% specificity for detecting delirium. These figures were partially similar to those of the present study and corroborate the usefulness of other tools for assessing delirium, in the case of Test Box-ICU using modern technology that supports patient valuation.

On the other hand, when applying the Nu-DESC, a prevalence of 14.2% of patients with suspected delirium was found, similar to that found by Brich *et al*.[27] in Germany, who found 14.9% in a population of 315 patients. At the same time, in the study by Krupa *et al*.[28] in Poland, they detected between 24.3% and 67.3% of suspected delirium during two days of follow-up in a population of 202 participants. This result confirms delirium symptoms in adults and the need for measures to guide its prevention or treatment.

One limitation of this study was that the acceptance of the nursing staff for its application was not evaluated, which may be useful in future studies. Likewise, other validations of this version can be carried out in contexts other than the ICU, such as hospitalization or geriatrics, since delirium is also frequent in these services.

The results allow us to conclude that the Spanish version of the Nu-DESC scale for Colombia has adequate psychometric values for assessing the risk of delirium; in addition, it is a scale that is easy and quick to apply. Therefore, the Spanish version of Nu-DESC is valid and reliable for detecting suspected delirium in adult ICU patients. Suppose the scale is equal to or higher than 2. In that case, it should be reported to the physician to confirm the diagnosis and take the respective preventive or early treatment measures, as indicated in the clinical practice guidelines for managing pain, anxiety and delirium. Thus, it is recommended that the nurse should apply it to ICU patients on each shift.

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Appendix. Validated Spanish version of the Delirium Detection Scale for Nurses (Nu-DESC).

Instructions: For each shift, score each of the four behaviors as follows: 0 = Behavior that did not occur during the shift; 1 = Behavior that occurred at some point during the shift but slightly, occasional or mild; 2 = Behavior that occurred at some point during the shift and was marked, frequent or intense. In the end, add the total, and if a total score < 1 is interpreted as NO SUSPECT OF DELIRIUM and a result ≥ 2 is considered SUSPECT OF DELIRIUM, in this case, please apply the method for the assessment of confusion in intensive care (CAM-ICU) to confirm the diagnosis.

Fecha (día / mes / año): Date (day / month / year):	Turno / Shift		
	Mañana Mornign	Tarde Afternoon	Noche Evening
1. Desorientación: manifestación verbal o comportamental de una pérdida de orientación temporal o espacial, o una percepción equivocada de las personas en el entorno **Disorientation:** Verbal or behavioral manifestation of not being oriented to time or place or misperceiving persons in the environment.			
2. Comportamiento inapropiado: Comportamiento inapropiado para el lugar y/o la persona; por ejemplo, halar de mangueras o vendajes, intentar levantarse de la cama cuando está contraindicado y comportamientos por el estilo **Inappropriate behavior:** Behavior inappropriate to place and/or for the person; e.g., pulling at tubes or dressings, attempting to get out of bed when that is contraindicated, and the like.			
3. Comunicación inapropiada: Comunicación inapropiada para el lugar y/o la persona; por ejemplo, incoherencia, falta de comunicación, forma de hablar que no tiene sentido o no puede entenderse **Inappropriate communication**: Communication inappropriate to place and/or for the person; e.g., incoherence, noncommunicativeness, nonsensical or unintelligible speech.			
4. Ilusiones o alucinaciones: Ver o escuchar cosas que no están ahí, distorsiones de objetos visuales **Illusions/Hallucinations**: Seeing or hearings things that are not there; distortions of visual objects.			
5. Retraso psicomotor: respuesta retardada, pocas o ningunas acciones o palabras espontáneas **Psychomotor retardation**: delayed responsiveness, few or no spontaneous actions/words.			
Puntaje total / Total score			

Recruitment, retention, and adherence of family caregivers: Lessons from a multisite trial

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Original Article

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Recruitment, retention, and adherence of family caregivers: Lessons from a multisite clinical trial

Objective. To describe the recruitment, retention of family caregivers, and adherence to a telephone based intervention evaluated in a multi-site trial and provide recommendations for the design of future studies. **Methods.** A descriptive study based on a secondary analysis of a multi-site clinical development in Colombia and Brazil. Recruitment was measured by the number of participants eligible and consented. Retention was assessed by the percentage of participants with outcomes data at two follow-ups. The intervention adherence was measured by the percentage of the caregiver who received the intervention. **Results.** Of the family caregivers assessed, 63% were eligible, and 32.9% declined to be in the study for time restriction or no interest. In Colombia, the total retention rate of caregivers was 63.4% at the first follow-up and 48% at the second follow-up, while in Brazil was

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de 52.8% and 46.2%, respectively. At the end of the study, the sample comprised 28 and 70 caregivers in the intervention and control groups, respectively, for a retention rate of 47%. Of 104 family caregivers allocated to the intervention group, 42 (40.3%) received five sessions. Most reported not completing the Caregiver's Activity Diary. **Conclusion.** The recruitment of family caregivers, participant retention, and adherence to the telephone intervention was unsuccessful. Future studies should apply an assessment tool during the recruitment of family caregivers and replace the term "caregiver" with "care provider" in the material involved in the research; define a retention protocol before starting the study and involve family caregivers in the design of the interventions.

Descriptors: caregivers; nursing; chronic disease; telephone; pragmatic clinical trial.

Reclutamiento, retención y adherencia de los cuidadores familiares: Lecciones de un ensayo clínico multi-sitio

Resumen

Objetivo. Describir el reclutamiento, la retención y la adherencia de los cuidadores familiares en una intervención educativa telefónica evaluada en un ensayo multi-sitio y ofrecer recomendaciones para el diseño de futuros estudios. **Métodos.** Estudio descriptivo basado en un análisis secundario de un desarrollo clínico multicéntrico en Colombia y Brasil. El reclutamiento se midió por el número de participantes elegibles y que dieron su consentimiento. La retención se evaluó por el porcentaje de participantes con datos de resultados en dos seguimientos. La adherencia a la intervención se determinó por el porcentaje de cuidadores que recibieron la intervención. **Resultados.** De los cuidadores familiares evaluados, 63% fueron elegibles, y 32.9% declinaron participar en el estudio por restricción de tiempo o falta de interés. En Colombia, la tasa de retención total de cuidadores fue de 63.4% en el primer seguimiento y de 48% en el segundo, mientras que en Brasil fue de 52.8% y 46.2%, respectivamente. Al final del estudio, la muestra comprendía 28 y 70 cuidadores en los grupos de intervención y control, respectivamente, para una tasa de retención del 47%. De los 104 cuidadores familiares asignados al grupo de intervención, 42 (40,3%) recibieron cinco sesiones. La mayoría no completó el diario de actividades del cuidador. **Conclusión.** El reclutamiento de cuidadores familiares, la retención de participantes y la adherencia a la intervención telefónica no tuvieron éxito. Los estudios futuros deberían aplicar una herramienta de evaluación durante

el reclutamiento de los cuidadores familiares y sustituir el término “cuidador” por “proveedor de cuidados” en el material empleado en la investigación; definir un protocolo de retención antes de iniciar el estudio e involucrar a los cuidadores familiares en el diseño de las intervenciones.

Descriptores: cuidadores; enfermería; enfermedad crónica; teléfono; ensayo clínico pragmático.

Recrutamento, retenção e adesão de cuidadores familiares: lições de um estudo clínico multi-site

Resumo

Objetivo. Descrever o recrutamento, retenção e adesão de cuidadores familiares em uma intervenção telefônica avaliada num estudo clínico multi-site e oferecer recomendações para o desenho de estudos futuros. **Métodos.** Estudo descritivo baseado em análise secundária de um desenvolvimento clínico multicêntrico na Colômbia e no Brasil. O recrutamento foi medido pelo número de participantes elegíveis e que deram consentimento. A retenção foi avaliada pela porcentagem de participantes com dados de resultado em dois acompanhamentos. A adesão à intervenção foi determinada pela porcentagem de cuidadores que receberam a intervenção. **Resultados.** Dos cuidadores familiares avaliados, 63% eram elegíveis, e 32.9% se recusaram a participar do estudo por limitação de tempo ou falta de interesse. Na Colômbia, a taxa de retenção total dos cuidadores foi de 63.4% no primeiro acompanhamento e 48% no segundo, enquanto no Brasil foi de 52.8% e 46.2%, respectivamente. Ao final do estudo, a amostra foi composta por 28 e 70 cuidadores nos grupos intervenção e controle, respectivamente, para uma taxa de retenção de 47%. Dos 104 cuidadores familiares designados para o grupo de intervenção, 42 (40.3%) receberam cinco sessões. A maioria não preencheu o diário de atividades do cuidador. **Conclusão.** Recrutamento de cuidadores familiares, retenção de participantes e adesão à intervenção telefônica não tiveram sucesso. Estudos futuros devem aplicar uma ferramenta de avaliação durante o recrutamento de cuidadores familiares e substituir o termo ‘cuidador’ por ‘fornecedor de cuidados’ em material de pesquisa; definir um protocolo de retenção antes de iniciar o estudo e envolver os cuidadores familiares no desenho das intervenções.

Descritores: caregivers; enfermagem; doença crónica; telefone; cooperação e adesão ao tratamento.

Introduction

Caring for a loved one can be physically and mentally quite taxing; hence, many family caregivers experience human responses that can affect their well-being and quality of life.[1,2] One of family caregivers' most frequent nursing diagnoses is caregiver role strain. The prevalence of this diagnosis in caregivers varies from 73.8% to 98%.[3] Family caregivers with role strain need practical and accessible interventions for coping with caregiving's physical and emotional aspects, like adapting to their role as care providers. In this sense, the telephone has been proposed as a resource for delivering interventions to family caregivers that could increase accessibility[4,5] and affordability.[5]

We conducted a multi-site randomized clinical trial with two arms parallels (ReBEC, number UTN: U1111-1158-6171, RBR-8bvqz2) in Bucaramanga (Colombia) and São Paulo (Brazil) to evaluate the effectiveness of a psychoeducational intervention delivered by telephone to promote the adaptation of family caregivers of people with chronic disease with the nursing diagnosis caregiver role strain. The adaptation was considered to decrease the caregiver role strain and improve the well-being and quality of life.[6,7] The study period began in October 2014 and ended in November 2015. In both cities, there were difficulties in recruiting and retaining family caregivers and a lack of adherence to the intervention. These aspects are the object of analysis in the present paper.

Recruitment refers to identifying or searching for potential participants who may be eligible for research and includes including participants in the study based on eligibility criteria.[8] Retention is the maintenance of the participants included in the study until its completion,[8] and adherence to the intervention is the which a participant follows the recommendations of a prescription or intervention.[9]These three elements are critical to validate the findings of any controlled clinical trial and yield evidence-based practice.[10]

Although the threats against participant recruitment and retention are significant when evaluating a remote intervention,[11,12] studies that have testing interventions delivered exclusively by telephone for family caregivers do not detail the recruitment process[13] or the strategies used for participant retention[13,14] nor do they analyze adherence to the delivered intervention.[14] Reporting these aspects is relevant so that the scientific community learns from the successes and errors of the studies, and consequently, future studies could be planned based on those lessons. Considering the above, this study aimed to describe the recruitment and retention of family caregivers and adherence to a telephone intervention evaluated in a multi-site trial and provide recommendations for the design of future studies.

Methods

This study is descriptive, based on a secondary analysis of a multi-site clinical conducted in Bucaramanga (Colombia) and São Paulo (Brazil). The original study protocol was approved by the Committee of Ethics on Scientific Research of the Industrial University of Santander, code No. 7083; the committee of Ethics in Research of the School of Nursing of the University of São Paulo, code No.435.429; the committee of Ethics in Research of University Hospital-USP, Code No.547.201; and the committee of Ethics in Research the Hospital das Clínicas da Faculdade de Medicina-USP, code No. 776.413. All participants provided their signed informed consent forms before the study.

Recruitment. In the multisite clinical trial context, a sample size of 104 caregivers was calculated by country (52 for the control group and 52 for the intervention group) for a total of 208 family caregivers (104 for the control group and 104 for the intervention group). In Bucaramanga, caregivers were recruited in October and November 2014 in the Santander University Hospital (HUS) outpatient facility and the same institution's radiotherapy and chemotherapy unit. In São Paulo, caregivers were recruited between February and June 2015 in the outpatient facility of six healthcare institutions linked to the University of São Paulo. The inclusion criteria for participants were as follows: being a family caregiver of an adult with chronic disease with some degree of functional dependence, being 18 years or over, being able to read and write, providing care at home to the care recipient for more than one month, have telephone service and to present a minimum score of 14 points on the Caregiver Role Strain Scale. Exclusion criteria were the presence of speech or hearing limitations.

Intervention. In the multi-site clinical trial context, family caregivers were randomly assigned to either control or experimental groups. The control group received the usual care, defined as the standard treatment provided by the health staff at the recruitment sites. The intervention group received the psychoeducational intervention "Taking care of me to take care of the other," consisting of five weekly telephone sessions. The intervention was developed using the Medical Research Council Framework. Topics covered in the sessions included: the meaning of being a caregiver, the deep breathing technique, the effects of care on health and well-being and the caregiver's rights, the feelings that the caregiver could experience due to caregiving, assertive communication, the problem-solving technique, caring for oneself (self-care) and time management. Moreover, each family caregiver received an activity diary containing the main content treated in each intervention session. In this diary, the caregiver should record the techniques taught by the nurses. Details regarded intervention are described in a publication.[7] Eight Registered Nurses (3 Colombians and 5 Brazilians) delivered the intervention. None of them were responsible for usual care. All nurses had a baccalaureate degree and 1-15 years of experience caring for people with chronic diseases or family caregivers. Before implementing the intervention, the nurses received an intervention manual and 16-hour training from the principal investigator. The manual described the structure of each intervention session in detail, along with the nurses' instructions.[9]

Implementation of a retention protocol. In the multi-site clinical trial context, a participant retention protocol was not considered a priori.

Statistical analysis. Descriptive measures of sociodemographic characteristics of caregivers included are reported. Continuous variables are described through position statistics (mean, median) and dispersion (standard deviation and interquartile interval). Absolute and relative frequencies present the categorical variables. The characteristics of the caregivers were also compared between the groups using the Qui-square test for categorical variables, the Mann-Whitney test for the continuous variable Years of

education, and the t-student test for the variable Age. Recruitment was measured by the percentage of participants eligible and consented. Retention was assessed by the percentage of participants with outcomes data at two follow-ups. Also, we compared demographic data between the family caregivers who remained in the study and those who were lost to follow-up. The intervention adherence was measured by the percentage of the caregivers who received 5, 4, 3, 2, or one intervention. We also calculated frequencies/percentages for describing the sessions received by family caregivers and completing the *Caregiver's Activity Diary* of the participants who received five intervention sessions. The means and standard deviations were calculated, and minimum and maximum values for the duration of calls and the number of days between sessions. All analyses were conducted using software R 3.2.2, and statistical significance was tested at level 0.05.

Results

The demographic characteristics of participants are shown in Table 1. Family caregivers were mainly female, 178 (85.6%); daughters of the recipient care, 108 (51.9%); and homemakers, 93 (44.7%). Most caregivers, 152 (73.1%), lived with care recipients. The mean of the global support social index was 6.8 (19.5%). No relevant differences were found between the intervention and control groups at baseline for any sociodemographic, except employment status ($p=0.01$); therefore, homemakers were more frequents in the intervention group than in the control group.

Table 1. Sociodemographic characteristics of caregivers by study group. Bucaramanga, São Paulo 2014-2015

Variable	Control Group ($n=104$)	Intervention Group ($n=104$)	Total ($n=208$)
Nationality; *n* (%)			
Colombian	52 (50)	52 (50)	104 (50)
Brazilian	52 (50)	52 (50)	104 (50)
Gender			
Male	20 (19.2)	10 (9.6)	30 (14.4)
Female	84 (80.8)	94 (90.4)	178 (85.6)
Age (years); mean (SD)	47.8 (13.9)	47.5 (13.4)	47.6 (13.6)
Relation with care recipient; *n* (%)			
Sister-in-law	1 (1)	1 (1)	2 (1)
Grandson	2 (1.9)	2 (1.9)	4 (1.9)
Friend	2 (1.9)	5 (4.8)	7 (3.4)
Daughter-in-law	5 (4.8)	3 (2.9)	8 (3.8)
Nephew	4 (3.8)	4 (3.8)	8 (3.8)
Mother	7 (6.7)	4 (3.8)	11 (5.3)
Sister	9 (8.7)	5 (4.8)	14 (6.7)
Wife	20 (19.2)	26 (25)	46 (22.1)
Daughter	54 (51.9)	54 (51.9)	108 (51.9)

Table 1. Sociodemographic characteristics of caregivers by study group. Bucaramanga, São Paulo 2014-2015 (Cont.)

Variable	Control Group (*n*=104)	Intervention Group (*n*=104)	Total (*n*=208)
Marital status; *n* (%)			
Widowed	6 (5.8)	3 (2.9)	9 (4.3)
Divorced	10 (9.6)	8 (7.7)	18 (8.7)
Single	25 (24)	22 (21.2)	47 (22.6)
Married	63 (60.6)	71 (68.3)	134 (64.4)
Years of education; mean (SD)	11 [6 - 13]	11 [5 - 12]	11 [5 - 13]
Employment status; *n* (%)			
Retired	16 (15.4)	7 (6.7)	23 (11.1)
Unemployed	15 (14.4)	13 (12.5)	28 (13.5)
Freelancer	17 (16.3)	15 (14.4)	32 (15.4)
Employed	21 (20.2)	11 (10.6)	32 (15.4)
Homemarker	35 (33.7)	58 (55.8)	93 (44.7)
Living with care recipient only; *n* (%)	75 (72.1)	77 (74)	152 (73.1)
Index global support social; mean (SD)	65.7 (17.8)	61.9 (20.8)	63.8 (19.5)

Recruitment of family caregivers. Of the 487 assessed, 310 family caregivers were eligible (63%), of whom 102 declined to be in the study for time restriction or no interest (32.9% of eligible). Figure 1 shows a schematic representation of caregivers' recruitment, allocation, and follow-up. *Retention of family caregivers*. In Colombia, the total retention rate of caregivers was 63.4% (38% intervention group and 83% control group) at the first follow-up and 48% (29% intervention group and 67.3% control group) at the end of the second follow-up. The total retention rate of caregivers in Brazil was 52.8% (33% intervention group and 73% control group) at the first follow-up and 46.2% (25% intervention group and 67.3% control group) at the end of the second follow-up. At the end of the study, the sample comprised 28 and 70 caregivers in the intervention and control groups, respectively, for a retention rate of 47%. For both countries, there were statistically significant differences in losses to follow-up between the study groups, with more losses in the intervention group compared to the control group ($p<0.001$). However, there were no statistically significant differences between the number of losses to follow-up of caregivers of Brazilian nationality compared to those of Colombian nationality ($p=0.87$), neither in demographic data between family caregivers who remained in the studies contrasted with those who were lost to follow-up.

Intervention adherence. Of 104 family caregivers assigned to the intervention group, 42 (40.3%) received five sessions, 14 (13.5%) received four sessions, 8 (8%) received three sessions, 8 (8%) received two sessions, 15 (14%) received one session, and 17 (16,2%) did not receive any

intervention. When examining the interventions performed, the average duration of calls was 30 minutes (SD=14 min), with minimum and maximum values of 12 and 100 minutes, respectively. The mean number of days between two intervention sessions was 12 days (SD=11 days), with a minimum of 5 days and a maximum of 84 days between sessions.

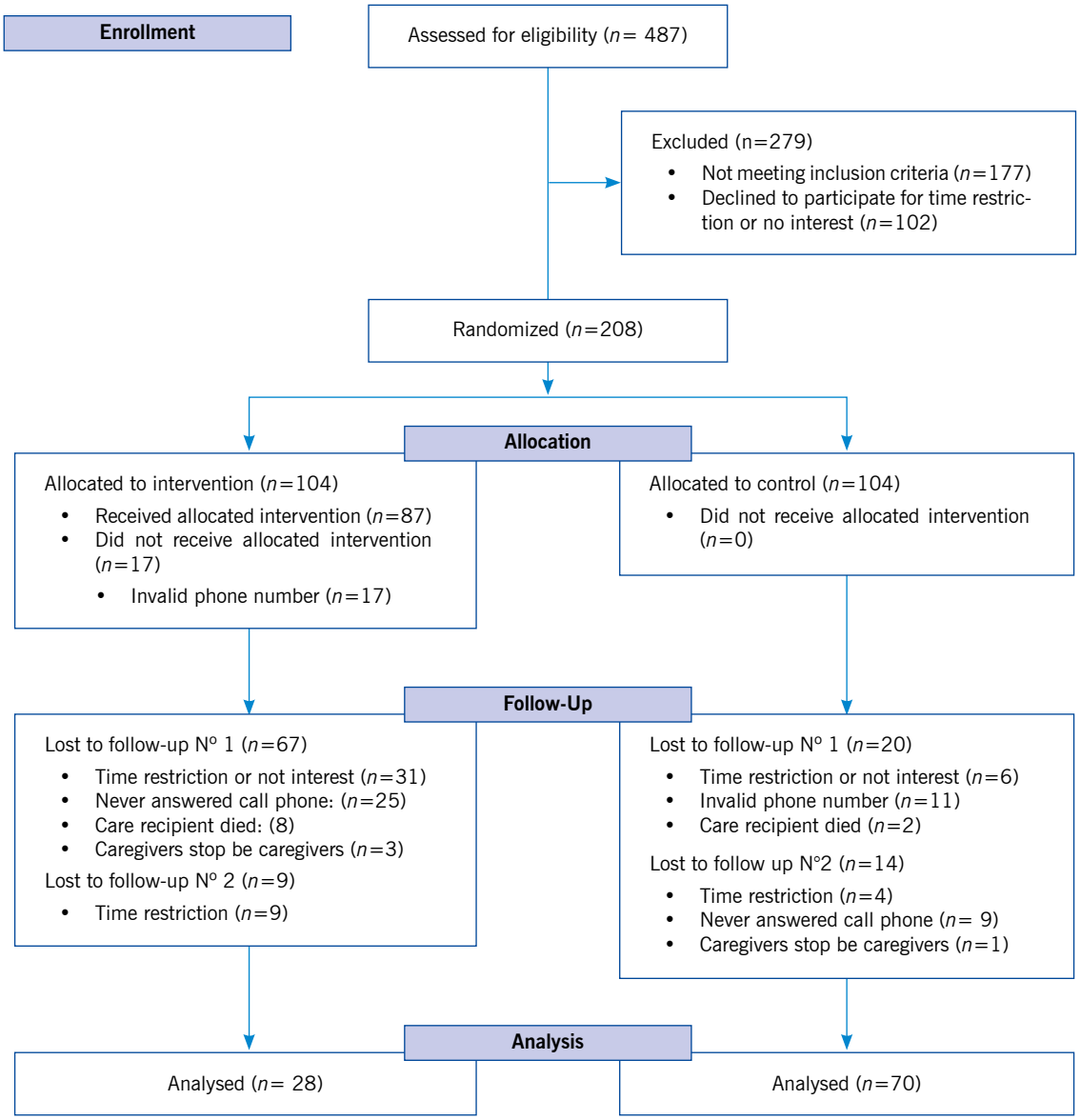

Figure 1. Schematic representation of the recruitment, allocation, and follow-up of caregivers

Family caregivers were instructed to fill out the *Caregiver's Activity Diary* at the first telephone meeting. They should record the content learned during each intervention session and develop some activities on the topics covered in the sessions. The diary filling was evaluated at the beginning of the second, third, fourth, and fifth intervention sessions. As observed in Table 2, most caregivers who filled the five intervention sessions reported not having completed the *Caregiver's Activity Diary* prior to the intervention session.

Table 2. Frequency of filling of Caregiver's Activity Diary of 42 participants who received five intervention sessions

Frequency	Session 1 *n* (%)	Session 2 *n* (%)	Session 3 *n* (%)	Session 4 *n* (%)
Diary filling of the family caregiver				
Never	27 (64)	22 (52)	26 (62)	30 (71)
Rarely	10 (24)	10 (24)	4 (10)	5 (12)
Sometimes	3 (7)	7 (17)	10 (24)	4 (10)
Very often	2 (5)	2 (5)	2 (5)	2 (5)
Always	0 (2)	1 (2)	0 (0)	1 (2)
Practice without diary filling	6 (22)	7 (32)	5 (1)	3 (10)

Discussion

The findings of this study show the challenges faced in a multisite clinical trial regarding the recruitment and retention of family caregivers in the research and their adherence to the evaluated intervention.

Recruitment family caregivers

Although the sample size was reasonable, recruiting caregivers was difficult, especially in the study developed in São Paulo. Among the situations that limited recruitment, it is highlighted that many caregivers did not recognize themselves as caregivers despite reporting offering care to their family members. Many who expressed themselves as family caregivers did not accept participating in the research due to a lack of interest or time. Time limitations have been the leading cause of refusal and dropout reported by other studies involving family caregivers.[15–18] Family caregivers, day by day, must face the demands of caring for their loved ones and others' responsibilities, which cause feelings of overload[19,20] and lack of time,[21] making them restrict participation in research.

One study[22] investigated the factors related to the decision of family caregivers to participate in a relaxation therapy intervention. The authors reported that caregivers who agreed to participate in the research were those who, despite feeling overwhelmed, recognized or admitted their own need to be helped or perceived that the research could benefit them by helping to improve their skills as caregivers or perceived that with their participation they would be contributing to the research on caregivers.[22] In this sense, it is possible that caregivers potentially eligible for the research did not accept to participate because, despite the tension of the role, they did not perceive the need to receive care from nursing professionals or did not perceive benefits resulting from participation in the study. The recruitment of family caregivers in this research showed that they are a population of difficult access.

Other authors state that its recruitment for intervention studies is challenging.[23,24] Therefore, researchers who intend to develop research involving family caregivers must implement strategies that enable their identification and engagement. To facilitate their identification, we suggest applying an assessment tool. Another suggestion to circumvent the lack of self-recognition as a caregiver would be to replace the term "caregiver" with "care provider" in the material involved in the research. This strategy proved effective when implemented in a clinical trial with family caregivers.[25] In the case of engagement, to facilitate it, the team responsible for approaching potential participants must highlight and reinforce the gains that the family caregiver, the care receiver, and other caregivers can obtain from their participation in the research.

Retention of family caregivers

Caregiver in the multi-site clinical trial was low, and in part, it can be explained by the lack of an a priori retention protocol. Hence the relevance of defining, before starting the execution of the research, strategies that avoid the interruption of the participation of family caregivers in the studies and, consequently, the abandonment and loss of follow-up. An interesting aspect to highlight is that despite the caregivers being aware of their right to withdraw from participating in the research, many chose not to answer the calls again, despite agreeing to a telephone meeting. Those who expressed their desire to give up argued did not have time to take the calls.

There is also the possibility that attributes of the therapeutic relationship established between nurses and caregivers have not favored the retention of caregivers in the intervention program. A previous study reported that the caregivers' relationship with the research staff influenced their retention in a large relaxation therapy intervention study.[22] Caregivers who felt respected, cared for and appreciated by the research staff completed the intervention. [22] The evaluation of the intervention's fidelity made it possible to identify that there was variation in the nurses' skills of empathy, sensitivity, the transmission of trust, and credibility, as well as to identify that the specific contents of the Intervention Program Caring for Me to Caring for the Other were offered to most caregivers.[26] It is possible that the nurses' training was insufficient to prepare them for the role of interventionists within the research, thus affecting the nurse-caregiver relationship and, consequently, the retention of caregivers in the intervention program. Hence, the intervention's fidelity should be monitored throughout the study's development and interventionists' training whenever necessary.

Adherence to intervention

During the development of the intervention sessions, it was noticed by the intervening nurses that most caregivers had a little proactive and disinterested attitude. It also evidenced their difficulty in "disconnecting" from their surroundings while answering calls, which generated frequent interruptions during the sessions. Low adherence to the intervention program raises questions about its feasibility and acceptance. Most caregivers do not use the theorized techniques to promote adaptation, such as deep breathing, progressive relaxation, and problem-solving techniques. This may indicate the need for more significant reinforcement for the practice of these techniques than was performed in this study. The participants' adherence to the intervention may be due to caregivers not recognizing the potential benefits of recommended practices and, therefore, not performing them or that the recommendations are not feasible. Unfortunately, the satisfaction of family caregivers with the intervention program or the perception of its usefulness was not evaluated. Data of this type could better inform the interpretation of adherence and clinical trial results.

A limitation of the intervention was the difficulty of agreeing on a time convenient for the caregiver and the nurse to carry out the session. Many caregivers expressed having time for intervention

sessions late at night; in contrast, most nurses who delivered the intervention were available during the daytime. This same limitation was reported in another telephone intervention study.[14] To overcome this difficulty, professionals responsible for delivering the intervention must be available 24 hours a day, seven days a week.

Although the telephone intuitively seems convenient for family caregivers to participate in psychoeducational interventions, it is necessary to investigate whether this medium is adequate for family caregivers in developing countries. It is also necessary to consider the preferences and interests of family caregivers regarding the content and duration of interventions. In this sense, we call on researchers to involve family caregivers in designing interventions and be concerned with obtaining evidence of feasibility, acceptability, and meaning before testing effectiveness. In order to evaluate the effectiveness, the intervention manual must be detailed and provide a script for the intervention application, as in this research. The intervention's fidelity must be measured to identify which elements of the intervention were effectively offered and, in this way, allow more excellent reliability of the results.

For future research, it is necessary to include the care recipient in the intervention development whenever his health status and cognition allow. The finding of a meta-analysis of psychoeducational interventions for people with chronic diseases and their family caregivers showed that couples' interventions positively improved the care recipient's health and decreased the family caregiver's burden.[27]

Conclusion. In the multisite clinical trial context, the recruitment of family caregivers, participant retention, and adherence to the telephone intervention was unsuccessful. In this sense, we highlight that the caregiver's non-recognition of themselves as family caregivers, did not respond to phone calls, had difficulties agreeing on a convenient time for the nurse to carry out the session, and did not use techniques such as deep breathing, progressive relaxation, and problem-solving. To mitigate these difficulties, we recommend applying an assessment tool during the recruitment of family caregivers and replacing the term "caregiver" with "care provider" in the material involved in the research; define a retention protocol before starting the study and involve family caregivers in the design of the interventions and worry about obtaining evidence of feasibility, acceptability, and significance before testing effectiveness.

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Socio-family Factors Predictive of Adaptative Coping Post COVID-19 Pandemic in Nursing Students from a Private University

Original Article

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Socio-family Factors Predictive of Adaptative Coping Post COVID-19 Pandemic in Nursing Students from a Private University

Abstract

Objective. To identify socio-academic and family functionality factors – communication, cohesion, and flexibility – as predictive stimuli of adaptive coping of nursing university students in the post-COVID-19 pandemic. **Methods.** A cross-sectional descriptive study with stratified random sampling, with participation by 416 Nursing students from a private university in Pereira (Colombia), who answered a self-completed sociodemographic characterization survey, the Olson *et al*., communication scale, FACES III scale to assess family cohesion and flexibility, and the Calixta Roy CAPS scale to assess coping and adaptation capacity. Binary logistic regression and Hosmer-Lemeshow goodness-of-fit were performed to determine predictors of success, using SPSS v.26. **Results.** The profiles of the participants showed a

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higher proportion of women (78.4%), ages between 21 and 30 years (57.5%), young people who study and work (60.1%), and those who have an academic session on Friday and Saturday (67.5%). Nursing students perceive that their families communicate efficiently and satisfactorily (85.8%), have strong cohesion with a tendency towards attachment (73.6%) and flexibility, show a tendency towards chaos (70.7%) and have adaptive coping (48.5%). The success predictors for adaptive coping were female sex (p=0.007), academic session Friday and Saturday (p=0.042), occupation, study, and work (p=0.026), socioeconomic strata 4.5 and 6 (p=0.041), good or very good communication (p=0.001), balanced family cohesion (p = 0.048), and balanced family flexibility (p=0.039). **Conclusion.** This study found that good family functionality and having adequate socioeconomic conditions were predictors of higher coping and adaptation capacity during the COVID-19 pandemic in the nursing students who participated in the study.

Descriptors: cross-sectional studies; COVID-19; family relations; adaptation; psychological; students, nursing; socioeconomic factors.

Factores sociofamiliares predictores de afrontamiento adaptativo Postpandemia COVID-19 en estudiantes de enfermería de una universidad privada

Resumen

Objetivo. Identificar factores socio-académicos y de funcionalidad familiar -comunicación, cohesión y flexibilidad-, como estímulos predictores de afrontamiento adaptativo de estudiantes de Enfermería en postpandemia COVID-19. **Métodos.** Estudio descriptivo transversal con muestreo aleatorio estratificado. Participaron 416 estudiantes de Enfermería de una universidad privada de Pereira (Colombia) que respondieron una encuesta auto diligenciada de caracterización sociodemográfica y tres escalas validadas: de Comunicación de Olson *et al.,* FACES III para valorar cohesión y flexibilidad familiar y escala CAPS de Calixta Roy para evaluar capacidad de afrontamiento y adaptación. Los factores predictores de éxito se analizaron con regresión logística binaria y bondad de ajuste de Hosmer-Lemeshow, utilizando SPSS v.26. **Resultados.** El perfil de los participantes mostró mayor proporción de mujeres (78.4%), edades entre 21 y 30 años (57.5%), jóvenes que estudian y trabajan (60.1%), y quienes cumplen jornada académica viernes y sábado (67.5%). Los estudiantes de enfermería perciben que sus familias se comunican en forma eficiente y satisfactoria (85.8%), tienen una fuerte cohesión con tendencia al apego (73.6%) y a la flexibilidad, muestran tendencia al caos (70.7%) y tienen afrontamiento adaptativo (48.5%). Los predictores de éxito para afrontamiento adaptativo fueron: sexo femenino (p=0.007), jornada académica viernes y sábado (p=0.042), ocupación estudia y trabajo (p=0.026), estratos socioeconómicos 4,5 y 6 (p=0.041), buena o muy buena comunicación (p=0.001), cohesión

familiar equilibrada (p=0.048) y flexibilidad familiar equilibrada (p=0.039). **Conclusión.** En este estudio se encontró que la buena funcionalidad familiar y tener adecuadas condiciones socioeconómicas fueron predictores de mayor capacidad de afrontamiento y adaptación durante la pandemia COVID-19 en los estudiantes de enfermería que participaron en el estudio.

Descriptores: estudios transversales; COVID 19; relaciones familiares; adaptación; estudiantes de enfermería; factores socioeconómicos.

Fatores sociofamiliares preditores de enfrentamento adaptativo pós-pandemia COVID-19 nos estudantes de enfermagem de uma universidade privada

Resumo

Objetivo. Identifico os fatores socioacadêmicos e a funcionalidade familiar -comunicação, coesão e flexibilidade-, como estímulos preditivos do enfrentamento adaptativo de estudantes de Enfermagem no pós-pandemia de COVID-19. **Métodos.** Estudo descritivo transversal com amostragem aleatória estratificada. Participaram 416 estudantes de enfermagem de uma universidade privada da cidade de Pereira (Colômbia), respondendo a uma pesquisa autopreenchida de caracterização sociodemográfica e três escalas validadas: Comunicação de Olson *et al.,* FACES III para avaliar a coesão e flexibilidade familiar e a escala CAPS de Calixta Roy, para avaliar a capacidade de enfrentamento e adaptação. Os preditores de sucesso foram analisados com regressão logística binária e Hosmer-Lemeshow, usando SPSS v.26. **Resultados.** Os perfis dos participantes mostraram maior proporção de mulheres (78.4%), com idades compreendidas entre os 21 e os 30 anos (57.5%), jovens que estudam e trabalham (60.1%) e que cumprem o horário letivo de sexta-feira a sábado (67.5%). Os estudantes de enfermagem percebem que suas famílias se comunicam de forma eficiente e satisfatória (85.8%), têm forte coesão com tendência ao apego (73.6%) e flexibilidade, apresentam tendência ao caos (70.7%) e têm enfrentamento adaptativo (48.5%). Os preditores de sucesso para enfrentamento adaptativo foram: sexo feminino (p=0.007), jornada acadêmica sexta e sábado (p=0.042), ocupação, estudo e trabalho (p=0.026), estrato socioeconômico 4.5 e 6 (p=0.041), boa ou comunicação muito boa (p=0.001), coesão familiar equilibrada (p=0.048) e flexibilidade familiar equilibrada (p=0.039). **Conclusão.** Neste estudo, verificou-se que a boa funcionalidade familiar e ter condições socioeconômicas adequadas foram preditores de maior capacidade de enfrentamento e adaptação durante a pandemia de COVID-19 nos estudantes de enfermagem que participaram do estudo.

Descritores: estudos transversais; COVID-19; Relações familiares; adaptação psicológica; estudantes de enfermagem; fatores socioeconômicos.

Introduction

As a result of constant social transference derived from the globalization of the economy, most social formations have incorporated customs, forms, and organizational models that have transformed the traditional notion of family. Since its origins, the family has been conceived as a social cell comprised by individuals with some degree of kinship, as the primary place where the social risks of its members are shared and managed;[1] the idea of family has gone through different moments, consistent with the historical-social development of the peoples, and in each one, the concept has been configured from the different disciplines, from the established hegemonic guidelines,[2] until it is currently read as a diverse, complex, dynamic reality that moves to the rhythm of the social order, with the multiplicity of conflicts and tensions that constitute it..[3] In this sense, it must be considered that each family has its own dynamics and functionality, being that, as proposed by Palacio,[3] there are five issues that cross it, that are tied in the intimate space of the family and make its identification complex: sexuality, procreation, cohabitation, survival and coexistence; these issues, analyzed in numerous manuscripts within the context of the COVID-19 pandemic[4-6] force a concept of family as flexible as the institution itself. Seeking to respond to the complexity conditions described, for the purpose of this study, the interdisciplinary concept of family proposed by Oliva and Villa will be used: "The family is a group of two or more people who live as a spiritual, cultural, and socioeconomic unit, which, even without physically living together, share psycho-emotional and material needs, objectives and common development interests, from different aspects whose priority and dynamics belong to their free will: psychological, social, cultural, biological, economic, and legal." [2:17]

The cohabitation and subsistence capacities of families in all of humanity were widely exposed within the framework of the COVID-19 Pandemic; anxiety, fear, uncertainty, pain, sensations, emotions and feelings found in the reduced spaces of physical confinement, shook, stripped, and made visible the intimacy of their coexistence in the social space; their private world became a public arena for agreements and disputes; family strengths and weaknesses surfaced.[7-9] Numerous authors have characterized the families during times of pandemic. Their writings highlight six analytical categories: (i) Coexistence: modification in family interactions, social interdependence;[7,8] (ii) Reinvention of lifestyles;[9] (iii) Resignification of values;[9,10] (iv) Affective communication: emotion management, expression of affection;[7-10] (v) Support networks: spirituality enhancement, social and family support,[7,10] and (vi) Adaptation to the situation with change of limits, roles, and routines. [7,10] All these categories guide toward the importance of affective communication, family cohesion, flexibility in roles and responsibilities, as well as deployment of different coping mechanisms in subfamily systems, to survive and stay healthy. [8]

Within this context, family health gains strength as one of the performance pillars of the Nursing profession; ethical, legal, and social commitment exists with the comprehensive care of the family. Several nursing theorists have approached the

family as a subject of care.[11] Considering the impact of the COVID-19 Pandemic on higher education in health,[12] and specifically in Nursing,[13] this study explored *a-posteriori* the coping and family adaptation mechanisms used by nursing students during the crisis period, for which elements were taken from Calixta Roy's Adaptation Model.[14] According to this Nursing theorist, the human system is a set of interdependent and connected parts in function of a whole and adaptation is a process and result through which these human systems – capable of thinking, feeling, and interacting – choose to integrate with their environment. Roy considers that people are in permanent interaction with their environment; all kinds of *focal*, *residual*, and *contextual* stimuli enter dynamically into the human adaptive system that trigger two central coping processes: the *regulator* (controls internal processes related with physical-physiological needs) and the *cognator* (regulates self-concept, role function, and interdependence). Depending on the responses triggered, the level of adaptation is assessed; to specifically identify individual nursing intervention needs, Roy differentiates five coping factors: F1: Recursive-centered; F2: Focused physical reactions; F3: Alert process; F4: Systematic processing, and F5: Know and relate. [14]

Taking Calixta Roy's thought as a reference for understanding, the aim is to explore the strength of the relationship between coping and adaptation capacity by nursing students amid the crisis derived from the COVID-19 Pandemic, and the residual and contextual stimuli from their environment: from residual type: some socio-academic characteristics and, contextually, the family functionality. According to Callupe *et al.*,[15] the level of family functioning predicts the degree of resilient coping. Said family functionality is studied from the perspective by David Olson *et al.*, embodied in the Circumplex Model of Marital and Family Systems. To implement this Model, the authors developed in 1980 the Family Adaptability and Cohesion Evaluation Scales (FACES); it has been modified to improve its psychometric properties, thus FACES (1980), FACES II (1982), FACES III (1985), and FACES IV (1990).[16-19] The model is centered on the three principal dimensions of the family system: cohesion, flexibility, and communication. Cohesion refers to the support that family members give each other, the mutual commitment to the well-being of another, that is, how united or separated they are from the rest of the family.[16,17] Flexibility refers to the amount of change the family experiences regarding leadership, control, discipline, negotiation styles; that is how stability and change are balanced.[16,17] Communication is understood as the capacity to transfer information about feelings, needs, and emotions among the family members and prioritizes active listening and attachment, with balanced family systems being those that tend to be more functional compared to unbalanced systems.[18-20]

This initial evaluation is constituted as a starting point to facilitate greater levels of adaptation by strengthening family coping mechanisms. The aim of this study was to identify socio-academic and family functionality factors, like communication, cohesion, and flexibility, as predictive stimuli of adaptative coping by university nursing students, during post COVID-19 Pandemic.

Methods

Cross-sectional descriptive study conducted with a population of 1,360 nursing students from a private higher education institution in the city of Pereira in Risaralda, Colombia, in 2021. The sample was random stratified by academic semester, with 95% reliability and 4% precision error; under these conditions, the minimum sample size was 416 students.

Four instruments were used to collect the information:

Sociodemographic characterization survey that included 10 variables: age, sex, marital status, number of children, living with whom, household strata, occupation, semester in course, scheduled academic session (A: Monday to Thursday and B: Friday and Saturday), and department of

residence. All the variables were categorical and were dichotomized for the multivariate analysis.

Communication scale by Olson *et al*., created in 1982 by Barnes and Olson[17] and has been modified up to the 10-item version in a 1 to 5 Likert scale, formulated in positive, so that, the higher the score obtained, the higher the level of communication. The psychometric properties for its application were analyzed in the Peruvian Institute of Psychological Guidance in 2016, where an internal consistency index of Cronbach's alpha α=0.887 was found.[19] The version used in this study was adapted for Latin America and validated in 2017 with Chilean adult population; a factorial solution of two constructs was found with internal consistencies of 0.895 and 0.854 for each construct.[18] This study reiterated the high reliability of this scale with a Cronbach's alpha of 0.90.

FACES III scale. This version evaluates cohesion and family flexibility; it has 20 items, in a 1 – 5 Likert scale. Odd items value cohesion and even items value flexibility. There are four cohesion levels: detached (disconnected), separate, connected (united) and entangled (amalgamated); the balanced levels are separate and connected. There are four flexibility levels: chaotic, flexible, structured, and rigid; the balanced levels are flexible and structured. The higher the score of the scales, the greater cohesion or flexibility. Proportions permit identifying needs for intervention.[17] Crossing cohesion and flexibility levels in a 4x4 table makes possible 16 family typologies according to functionality, of which four are extremely dysfunctional, eight are moderately functional [medium range] and four are balanced functional. FACES III has been validated in several Latin American countries; the cohesion scale showed high reliability with Cronbach's alpha between 0.70 and 0.90; the flexibility scale showed moderate reliability with Cronbach's alpha between 0.65 and 0.70.[16,7,21-23] For this study, application of FACESIII in nursing students showed high reliability, with Cronbach's alpha of 0.92.

The CAPs scale by Calixta Roy, validated for Colombia by Sarmiento *et al.* [24] permits evaluating coping and adaptation capacity. It comprises 33 items, of which items 4, 8, 9, 14, 15, 16, 22, 23, 27, and 31 are inverted. According to Roy, coping can be effective or ineffective; the largest proportions by coping factor in its high, mean or low measurement permit identifying intervention needs. To interpret the scores, it is considered that a higher score in the scale means a higher adaptation level; it can be integrated, compensatory, or committed. Univariate and bivariate statistical analyses were performed, considering coping and adaptation capacity as dependent variable. A value of $p < 0.05$ was considered significant. To know the success prediction factors, binary logistic regression and Hosmer-Lemeshow goodness-of-fit were performed, using SPSS v.26.

Ethical considerations. For data collection, sensitization was conducted with the selected students, after signing the informed consent, each scale was explained and instruments for self-completion were distributed. Participant anonymity and the right to withdraw from the process were preserved. Approval by the institutional ethics committee was obtained according to the Minutes of May 08, 2022.

Results

The higher education institution selected – and specifically – the Nursing Program gathers students from throughout the Colombian southwest. This research had the participation of 416 students from the Nursing Program, ranging in age between 17 and 46 years; the ages were categorized from the survey. As seen in Table 1, the sociodemographic profile showed predominance of students under 21 to 30 years of age, of female sex, single marital status, and without children. The majority of those surveyed lived with their family nucleus. Their households are in socioeconomic strata I-II and III. It was noted that a high proportion of students worked and studied, were matriculated in academic session schedule B for Friday and Saturday and came to study from Valle del Cauca and Risaralda.

Table 1. Sociodemographic characterization of the 416 nursing students

Variable	Values	Frequency	Percentage
Age group	Up to 20 years	74	17.8
	From 21-30 years	239	57.5
	From 31-40 years	90	21.6
	Over 40 years	13	3.1
Sex	Female	326	78.4
	Male	90	21.6
Occupation	Study	166	39.9
	Study/ work	250	60.1
Socioeconomic level	Strata I-II	247	59.4
	Strata III-IV	161	38.7
	Strata V-VI	8	1.9
Number of children	0	280	67.3
	1	84	20.2
	2	46	11.1
	3 or more	6	1.4
Type of cohabitation	Family nucleus	327	78.6
	Couple	56	13.5
	Alone	13	3.1
	Friend	11	2.6
	Other	9	2.1
Marital status	Married	37	8.9
	Divorced	3	0.7
	Single	276	66.3
	Common law	100	24.0
Semester in course	From 1 to 4	178	42.8
	From 5 to 8	238	57.2
Academic session	Monday to Thursday	135	32.5
	Friday and Saturday	281	67.5
Department of origin	Valle del Cauca	165	39.7
	Risaralda	115	27.6
	Other	136	32.7

Communication

It is taken as an axiomatic assumption that all social relationships are built, acquire meaning and trajectory from the forms of interaction. Communication permits families to construct their social world from the interactions and shared meanings among their members, during the time that they coexist and are maintained as a whole. According to the findings of this study, students perceive that communication between good and very good predominates in 85.8% of their families, which, in addition, is effective and satisfactory. Table 2 shows the proportional distribution of the scores obtained in the scale, the means, and the standard deviation (SD) per item. There is greater dispersion in items 9 and 5 that focus on everyday difficulties to achieve excellent communication when moods are altered.

Table 2. Family communication in 416 nursing students

Items	Communication scale. Proportions					Mean*	SD
	Very deficient	Deficient	Regular	Good	Very good		
1. My family members are satisfied with the way we communicate	3.1	5.5	9.9	45.2	36.3	4.06	0.98
2. My family members are very good at listening	4.1	6.7	15.1	40.6	33.5	3.93	1.05
3. My family members express affection to each other	3.6	5.5	8.7	31.7	50.5	4.20	1.04
4. My family members are capable of asking each other what we want	3.1	5.8	9.9	38.9	42.3	4.12	1.01
5. My family members can calmly discuss our problems	7.2	11.8	14.4	38.9	27.7	3.68	1.20
6. My family members discuss our ideas and beliefs	7.5	6.5	10.6	41.6	33.8	3.88	1.16
7. When family members inquire about something, they receive honest answers	3.4	4.6	7.0	39.9	45.1	4.19	0.98
8. Family members try to understand the feelings of other members	4.8	6.7	10.1	37.5	40.9	4.03	1.10
9. When family members are angry, they rarely say negative things to each other	9.9	13.0	20.2	35.3	21.6	3.46	1.23
10. Family members express their true feelings	4.8	5.0	10.8	30.3	49.1	4.14	1.10
Total	0	3.4	10.8	33.2	52.6	39.60	8.30

* 1: minimum, 5 maximum

Family functionality

Family cohesion. A functional, healthy family is characterized by the effective equidistance between attachment and detachment. Extreme positions can perjudicar the family wellbeing. Excessive attachment restricts freedom and promotes mutual dependence, while extreme freedom leads to loneliness and lack of belonging. It is necessary to have affection, union, trust, support, and for the independent development of each of its members to be encouraged. According to the findings, among the families of the students, the united and the separated ones predominate (57.3%); in the former there is a high level of emotional closeness and the latter are characterized by moderate cohesion, it is not as extreme as divided families; in synthesis, they have a strong bond, with a tendency to attachment. If the

family members request it, support is offered, but not all participate in the decision making. Although there is an opening to share time with friends of family members, people prefer to interact with the closest relatives and enjoy family gatherings. Table 3 shows the frequencies of the scores obtained in the scale, the means, and standard deviation (SD) per perceived behavior.

Table 3. Family cohesion in 416 nursing students

Dimensions	Perceived behaviors	Cohesion scale. Percentages					Mean *	SD
		1. Lower cohesion	2	3	4	5. Higher cohesion		
Emotional bonding	11. My family members feel very united	3.2	4.2	12.7	21.7	58.2	4.28	1.04
	19. In our family, the sense of family union is very important	1.9	2.6	6.7	17.1	71.7	4.54	0.88
Support	1. My family members ask for help when they need it	0	1.9	10.6	22.6	64.9	4.50	0.76
	17. In my family we consult each other when we are going to make a decision	6.3	6.3	20.4	30.8	36.2	3.85	1.16
Family limits	5. We prefer to associate with the closest relatives	5.5	8.2	20.7	37.0	28.6	3.75	1.12
	7. The members of our family feel closer to each other than to other people who are not part of our family	8.9	10.1	17.8	28.8	34.4	3.70	1.28
Time and friends	3. Friends of other family members are accepted	0.7	3.4	16.1	38.2	41.6	4.20	0.86
	9. My family members like to spend our free time together	2.4	5.0	14.7	26.7	51.2	4.19	1.02
Interests and Re-creation	13. When our family carries out an activity, we all participate	4.8	6.5	16.6	31.3	40.8	3.97	1.12
	15. It is easy to think of activities we can carry out as a family	2.6	6.5	18.8	30.3	41.8	4.02	1.05
	Family cohesion scale						40.93	6.6

* 1: minimum, 5 maximum

Family flexibility. A functional family keeps healthy relations in negotiation processes among its members, with respect to discipline, roles, and leadership styles; their flexibility accounts for their capacity to change, yield or impose points of view when faced with solving everyday problems due to regulatory crises. The continuum transits between chaos and rigidity. Extremes are not healthy; chaos is derived from the lack of foresight and lead to non-regulatory crises; on the other hand, rigidity stems from excesses in hierarchy and control. Most of the families of the students were classified in the scale's intermediate levels: flexible and structured (63%); however, a tendency towards chaos is noted, this observation is based on the lack of leadership, no visible head exists to summon the attention and respect of all the members; there is difficulty in assigning responsibilities and excessive patternal control in decision making (Table 4).

Table 4. Family flexibility in 416 nursing students

Indicators		Perceived behaviors	Flexibility scale. Percentages					Mean	SD
			1. Lower flexibility	2	3	4	5. Higher flexibility		
Leadership	6.	There are several people who rule in our family	17.5	19.0	29.3	20.3	13.9	2.94	1.28
	18.	It is difficult to know who rules in our family	47.8	16.8	12.0	14.5	8.9	2.20	1.39
Discipline	4.	When establishing rules of discipline, the opinion of the children is taken into account	2.6	6.5	22.9	32.7	35.3	3.92	1.03
	10.	Parents and children talk about punishment	13.2	11.9	21.9	27.9	25.1	3.40	1.32
Control	2.	When a problem arises, the opinions of the children are taken into account	0.4	4.8	16.4	30.1	48.3	4.20	0.90
	12.	Children make decisions in our family	28.8	19.7	31.2	10.8	9.5	2.53	1.27
	8.	Faced with different situations, our family changes the way it handles them	6.7	7.6	30.1	31.3	24.3	3.60	1.12
Roles and rules	14.	In our family, norms or rules can be changed	11.2	16.8	40.9	19.5	11.6	3.04	1.12
	16.	Among the family members, we take turns on the responsibilities of the house	3.4	6.7	19.5	29.8	40.6	3.98	1.08
	20.	It is easy to say what task each family member has	30.0	21.9	22.8	13.5	11.8	2.55	1.35
		Flexibility scale						32.24	6.42

* 1: minimum, 5 maximum

The cohesion and family flexibility scales, as established by the model proposed by Olson *et al*., permit classifying family typologies according to functionality; the continuum of each scale transits between two poles where the families with extreme dysfunctionality are located, with functional families remaining in the middle. The findings from this study are recorded in Figure 1. The cohesion scale shows tendency to attachment, when adding the united and amalgamated typologies (73.6%), while that of flexibility is inclined toward chaos, when joining the flexible and chaotic typologies (70.7%). The similarity in the proportions for each value of the scales permits interpreting the families of the nursing students as family systems with balance in tension, a fact that, together with the perception of very good and good communication among its members, allows explaining – in part – the findings on family functionality, which are described ahead.

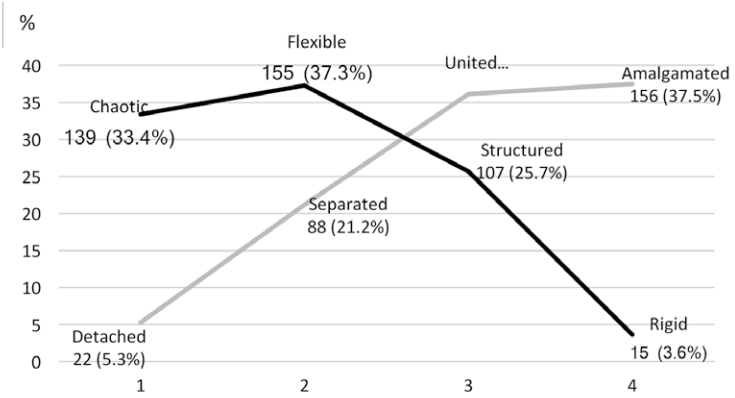

Figure 1. Cohesion and flexibility in families of 416 nursing students

Family functionality. From the combination of the categories of cohesion and flexibility, as proposed by the Circumplex Model for the Interpretation of FACES III in the standard updated for 2017 by Bazo-Alvarez *et al.*,[24] 16 family typologies emerge. The proportions found for each typology are registered in Table 5. The highest proportion corresponded to functional families (41.3%), followed by the middle range (37.5%) and, lastly, extreme dysfunctionality (21.2%).

Table 5. Functionality levels and Family typologies in students

Functionality levels	Family typologies	Frequency	Percentage
Balanced Functional	Separate / Flexible	35	8.4
	United / Flexible	61	14.7
	Separate / Structured	38	9.1
	United / Structured	38	9.1
	Total	172	41.3
Middle Range	Detached / Structured	12	2.9
	Detached / Flexible	2	0.5
	Separate / Rigid	6	1.4
	United / Rigid	4	1.0
	Entangled/ Flexible	57	13.7
	Entangled / Structured	19	4.6
	United / Chaotic	47	11.3
	Separate / chaotic	9	2.2
	Total	156	37.5
Extreme dysfunctionality	Entangled / chaotic	80	19.2
	Detached / chaotic	3	0.7
	Detached / Rigid	5	1.2
	Entangled / Rigid	0	0
	Total	88	21.2

Coping and adaptation. As seen in Table 6, the factors with the highest percentage in high coping capacity were F1 Centered recursive, F4 Systematic processing, and F5 Know and relate. These findings permit characterizing creative families, who seek results based on their knowledge, have a methodical capacity to solve problems with concrete actions, and use effective social interaction strategies. In over half the students, adaptative coping was found at compensatory level.

Table 6. Coping factors and levels of family adaptation (CAPs) in 416 university nursing students

Coping factors	Coping capacity						Mean per factor	Items per Factor	Mean*	SD
	High		Medium		Low					
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage				
Factor 1. Centered recursive	165	39.7	245	58.9	6	1.4	14.02	7	2.0	(0.00)
Factor 2. Physical and focused reactions	93	22.2	301	72.5	22	5.3	20.83	12	1.7	(4.24)
Factor 3. Alert process	78	18.8	274	65.9	64	15.4	11.62	6	1.9	(0.70)
Factor 4. Systematic processing	160	38.5	243	58.4	13	3.1	6.32	3	2.1	(0.70)
Factor 5. Know and relate	150	36.1	257	61.7	9	2.2	9.93	5	2.0	(2.12)
Adaptative Coping - Level										
Integrated	87	20.9							76.49	(6.36)
Compensatory	224	53.8							62.92	(6.36)
Committed	105	25.3							50.9	(2.83)

* Nº items Scale 0 to 3

Relation between sociodemographic variables and components of family dynamics

Significant relations were sought between the dichotomized sociodemographic variables (SD) and the family dynamics variables of communication, cohesion, flexibility, and adaptative coping. To dichotomize the variable of adaptative coping, the total score of the CAPs scale was used. The scale range used is from 0 to 99; in medium coping, scores are between 57 and 70. The midpoint corresponds to 63. A score above 63 was considered adaptive coping.

No significant relations were found with the variables of marital status, family coexistence, and socioeconomic level. Family cohesion was not associated significantly with the variables analyzed in dichotomous manner. Table 7 registers the results of the chi squared test with $p < 0.05$ for each of the significant relations.

Communication was associated significantly with variables of age, having children, occupation, academic session and semestre: of all the students with good or very good communication, the highest proportions were found in: those under 30 years of age (72.5%); in those without children (64.7%), in those who study and work (64.1%), those attending academic sessions on Friday and Saturday (71.7%) and those who are in the 5th to 8th semesters (59.7%).

Family flexibility was associated significantly with variables of sex, academic session, and department of residence: of all the students with functional families (flexible or structured), the highest proportion corresponded to females (82.8%), to those studying in the academic sessions on Friday and Saturday (64.1%).

Adaptative coping was associated significantly with age group, sex, occupation, scheduled academic session, and semester: of all the students with adaptative coping, the highest proportions were found in: those under 30 years of age (70.1%), females (75.4%), who study and work (66.8%), who are registered in 5th to 8th semesters of the carreer (62.7%), and those matriculated in the academic sessions on Friday and Saturday (75%).

Table 7. Significant associations between dichotomized sociodemographic variables and communication, flexibility and adaptative coping in 416 nursing students

Variable	Values	Frequency	Percentage	Communication*	Flexibility*	Adaptative coping*
Age group	< 30 years	313	75.2	0.001		0.001
	30 years and more	103	24.8			
Sex	Female	326	78.4		0.004	0.022
	Male	90	21.6			
Has children	Yes	136	32.8	0.003		
	No	280	67.2			
Occupation	Study and work	250	60.1	< 0.001		0.001
	Study	166	39.9			
Scheduled academic session	Monday to Thursday	135	32.5	<0.001	0.050	< 0.001
	Friday and Saturday	281	67.5			
Semester in course	From 1st to 4th (initial)	178	42.8	0.013		0.002
	From 5th to 8th (final)	238	57.2			

* χ^2 test with $p < 0.05$

Predictive factors of adaptative coping

A binary logistic regression model was applied to estimate the likelihood ratio of each variable against the dependent variable: adaptive coping. From the already-known observations, the model used revealed success of 78.5% to predict relations. A simulation of the model assigning a value of one to communication, assuming that all students had good or very good family communication, yields

a probability of 0.86% that agreement is affected by this variable. Table 8 shows the variables with statistical significance in the model. The success predictive factors for adaptative coping by nursing students, during COVID-19 post-pandemic were the *residual stimuli:* female sex, scheduled academic session on Friday and Saturday; occupation study and work, belonging to socioeconomic strata 4, 5, and 6; and for the *contextual stimuli*: all the dimensions of family functionality: good or very good communication, balanced cohesion and flexibility.

Table 8. Binary logistic regression model for adaptative coping as dependent variable

Variables	B	Standard error	Wald	GL	*p*-value*	Exp(B)	95% CI for Exp(B)	
							Lower	Upper
Female sex	-0.794	0.293	7.342	1	0.007	0.452	0.255	0.803
Schedule B: Friday and Saturday	-0.624	0.306	4.147	1	0.042	0.536	0.294	0.977
Occupation: Study and work	0.276	0.281	0.964	1	0.026	1.318	0.759	2.287
Strata SE: IV-V-VI	1.197	0.614	3.806	1	0.041	3.310	0.994	11.019
Communication Very good or good	-1.058	0.313	11.426	1	0.001	0.347	0.188	0.641
Cohesion United or Separate	0.437	0.231	3.592	1	0.048	1.548	0.985	2.434
Flexibility Flexible or structured	-0.495	0.240	4.263	1	0.039	0.610	0.381	0.975
Constant	4.403	3.509	1.675	1	0.603	0.657		

* Hosmer-Lemeshow test: $\chi^2 = 7.357$, GL = 8, $p = 0.499$

Discussion

Coherent with Roy's Adaptation model, the study participants received focal stimuli from their environment**,** mostly considered negative, like permanent reports on the spread and lethality of the virus, deaths of thousands of people – some close or known to them, permanent use of protection measures, forced confinement, forced transit towards the use of virtual learning environments and others, related in the literature. This study analyzed the contextual stimuli referring to family functionality and found that all are quite significant for coping success, but only 41.3% of the families were classified with balanced functionality. Likewise, the socio-academic residual stimuli, considered decisive factors in the adaptation process, did not predominate in the study population.

The post-pandemic period is a time of family adaptation crisis; although families are demonstrating great effort to maintain a balanced functionality, variables like socioeconomic situation, female sex condition, and academic-work stress expose nursing students to negative socio-familial stimuli that explain – in part – extreme dysfunctionality in 21.2% of their families, and compromised level of adaptation in 25.3% of the students. Effective communication, which

shows satisfaction, listening capacity, expression of affection, interest in the other, mutual support within the family is reaffirmed as the principal component of family functionality for coping success during moments of crisis. It the study by Garcés *et al.,*[8] family communication, in significant manner, was established as a predictor of perceived stress; offensive communication, linked to health concerns and problems in family life, increases high negative stress up to 37.9% of the total variance. In turn, Araújo *et al.,*[25] found that a good level of communication among university adolescents and their parents predicts enjoyment and time spent on joint recreational activities.

Cohesion, in our study, showed balanced families, favorable for family functionality; in other contexts, it revealed variations, according with the specific conditions of the dynamics analyzed. The study by Lebow[26] highlighted the stable coexistence of the couple as a protective factor to control negative stress. Lacomba *et al.,*[27] found relationships among family support, development of emotional regulation strategies, and resilience during moments of crisis. Robles *et al*.,[28] exposed family conflicts related with mourning, violence, invasion of privacy, anxiety, stress, and economic hardship with direct impact on tuition financing and student academic performance.

Flexibility in our study scored for family balance, however, the means obtained in the items were very low and these favored the presence of families with extreme dysfunction. Several studies showed greater capacity to balance stability and change; Aponte *et al*.,[29] observed that family members committed to decision making and obligations of household maintenance; Callupe *et al*.,[15] found significant correlations among flexibility, emotional bonding, family functioning, and resilient coping.

This work concludes that balanced family functionality, good family communication, cohesion, and family equilibrium, as well as good socioeconomic conditions predict adaptative coping in the nursing students who participated in the study during times of COVID-19 post-pandemic. In this group it is necessary to strengthen family cohesion, seeking spaces for more frequent approaches when decisions are to be made involving the entire group and promoting participation by other close family members in joint activities. It is, likewise, important to strengthen family flexibility with respect to leadership, discipline, control, roles, and rules.

For professional nursing care, it is important to bear in mind that each family has a different Dynamic and specific way of coping with different stimuli; hence, family functionality should be examined in comprehensive manner, for which, Olson's Circumplex Model is a good theoretical-methodological alternative.

Study limitations: The Institution where the study was conducted is of private nature and the results are limited to the institutional situation observed.

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Marie Poussepin's Influence on Nursing from Her Vocation of Service and Charity

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Marie Poussepin's Influence on Nursing from Her Vocation of Service and Charity

Abstract

Objective. This work sought to describe the influence of Marie Poussepin on Nursing from her vocation of service and charity. **Method.** Historical-hermeneutic study with participation by 15 Dominican Sisters of Charity in the Presentation of the Blessed Virgin from the city of Manizales and Bogotá, Colombia, who answered semi-structured interviews. The information was gathered and recontextualized via the open and axial coding system through ATLAS.ti9 software. During the interpretation procedure, copying, intensive reading, note taking, analysis, first epigraph of the report, coding, grouping, and determination of categories was made, conducting information triangulation with existing evidence. **Results.** Three categories emerged: *Responding to the call of Jesus through service to the community*; *Under the legacy of charity, respect for life and the dignity of human beings*,

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and *Caring for life as a foundation of nursing*. The second category formulated the description that integrates the course of life and objectives of the institutions where the nuns interviewed work. **Conclusion.** The legacy by Marie Poussepin to nursing care has been manifested since the foundation of the work, influencing the disciplinary work through the vocational commitment of those who make up the congregation, imprinting a character of service and respect for others, in response to the love of God.

Descriptors: nursing care; nuns; history of nursing; hermeneutics.

Influencia de Marie Poussepin a la enfermería desde su vocación de servicio y caridad

Resumen

Objetivo. Describir la influencia de Marie Poussepin para la enfermería, desde su vocación de servicio y caridad. **Método.** Estudio histórico-hermenéutico. Participaron quince Hermanas de la Caridad Dominicas de la Presentación de la Santísima Virgen de la ciudad de Manizales y Bogotá, Colombia, quienes respondieron a entrevistas semiestructuradas. Se recogió y recontextualizó la información mediante el sistema de codificación abierta y axial del software ATLAS.ti9. Durante el procedimiento de interpretación se hizo copia, lectura intensiva, toma de notas, análisis, primer epígrafe del informe, codificación, agrupación y determinación de categorías, y se llevó a cabo la triangulación de la información con la evidencia existente. **Resultados.** Emergieron tres categorías*: Dando respuesta al llamado de Jesús mediante el servicio a la comunidad*; *Bajo el legado de caridad, respeto por la vida y la dignidad del ser humano* y *Cuidado de la vida como fundamento de enfermería*. En la segunda categoría se realizó la descripción que integra el curso de vida y objetivo de las instituciones donde laboran las religiosas entrevistadas. **Conclusión.** El legado de Marie Poussepin, al cuidado enfermero, se ha manifestado desde la fundación de la obra y ha influido en la labor disciplinar mediante el compromiso vocacional de quienes integran la congregación, e imprime un carácter de servicio y respeto por el otro en respuesta al amor a Dios.

Descriptores: atención de enfermería; monjas; historia de la enfermería; hermenéutica.

Influência de Marie Poussepin na enfermagem a partir de sua vocação de serviço e caridade

Resumo

Objetivo. Descrever a influência de Marie Poussepin para a enfermagem, a partir de sua vocação de serviço e caridade. **Método.** Estudo histórico-hermenêutico. Participaram quinze irmãs da Caridade Dominicanas da Apresentação da Santíssima Virgem da cidade de Manizales e Bogotá, Colômbia, respondendo a entrevistas semiestruturadas. As informações foram coletadas e recontextualizadas por meio do sistema de codificação aberta e axial por meio do software ATLAS.ti9. Durante o procedimento de interpretação, foram feitas cópia, leitura intensiva, anotações, análise, primeira epígrafe do relato, codificação, agrupamento e determinação de categorias, realizando-se a triangulação das informações com as evidências existentes. **Resultados.** Emergiram três categorias*: Respondendo ao chamado de Jesus através do serviço à comunidade*; *Sob o legado da caridade, o respeito à vida e à dignidade da pessoa humana* e *o cuidado à vida como fundamento da enfermagem*. Na segunda categoria, foi feita a descrição que integra o percurso de vida e objetivo das instituições onde trabalham as freiras entrevistadas. **Conclusão.** O legado de Marie Poussepin para o cuidado de enfermagem se manifesta desde a fundação da obra, influenciando o trabalho disciplinar através do compromisso vocacional daqueles que compõem a congregação, imprimindo um caráter de serviço e respeito ao próximo, em resposta ao amor a Deus.

Descritores: cuidados de enfermagem; freiras; história da enfermagem; hermenêutica.

Introduction

From everyday female environments, where the domestic tasks prevail, caring for the sick and the helpless has been conducted, in which women intuitively used elements, like water, vapor, fire, animal skins, and medicinal plants to satisfactorily perform their work.[1,2] However, history has granted men leading roles concerning health care and, therefore, made it easier for their work to be paid and hold social recognition.[2] It is known that the first Nursing school began in India 250 years B.C., and only men were sufficiently pure to become nurses. In Athens, around 300 B.C, law banned women from engaging in work related to medicine and obstetrics; therefore, such work belonged to the male gender based on the religious and military spheres.[3] Nevertheless, despite the prohibitions of the times, it has been documented that women dedicated themselves to caring for the sick who had no financial resources, thus, their remuneration was given with food or lodging.[1]

During the Roman Empire, "the Parabalani" were consolidated; these were men belonging to the Christian communities who founded hospitals and cared for the sick.[3] In Christianism, women assume the role in caring for the ill, bringing the exercise of charity to the neediest. For this reason, these communities were pioneers of "nosocomiums", or places where care was offered without distinction of creed, nation or socioeconomic condition. Due to the foregoing, during the Middle Ages, the role of women in care and attention to the sick and disabled was recognized.[4]

In 1952, Peplau established the first conceptual nursing model denominated "Interpersonal Relations in Nursing", which describes the nurse-patient relationship as a means to promote therapeutic interpersonal development, with the behavior and emotions of the professional being relevant to care for the patient until the resolution of the disease is achieved.[5] It designates that, to care, vocation, service and charity are required. Colliére[6] describes four stages of care, starting from domestic, vocational, technical, and professional care; each giving way to the next as a result of the needs, challenges, and evolutions (intellectual, scientific, and social) of each time.

Within this context, by the mid-17th century in Dourdan France, Marie Poussepin was born, founder of the Congregation "Dominican Sisters of Charity of the Presentation of the Blessed Virgin".[7] During her childhood, Poussepin glimpsed the Christian foundations of her project, thanks to her rapprochement with the Daughters of Charity and Ladies of Charity of Saint Vincent de Paul, so from her position as Treasurer and Superior of the Confraternity she decided to dedicate herself completely to charity.[8] Later, she founded a community based on Christian principles and regulations, where girls were educated and taught to work according to their age; a circumstance that raised awareness

of the importance of work. These beneficiaries became the first teachers, nurses and Sisters of the Congregation. With respect to caring for the sick, Poussepin mainly offered her care to the poor. In Sainville, prior to 1698, there were no hospitals, so nuns went to rural areas that needed care interventions or medications. She also created a pharmacy, which provided home remedies based on medicinal herbs, performed cures, and designated nursing care according to the prevailing need.[8]

With Louis XIV's mandate, hospital conformation was regulated; therein, Poussepin instructed the women who were part of the religious community in the exercise of charity and care of the sick, describing that disease should be treated according to each person's social and cultural patterns, values, and beliefs. Additionally, she urged the application of knowledge, skills, and attitudes to dedicate oneself with passion, justice, quality, and intelligence in care.[9] According with the aforementioned, it is valid to relate the domestic and vocational care of nursing with the work by Poussepin, given that for over 300 years it has been impacting the lives of thousands of women with a vocational, selfless, and charitable sense for humanity. Her global influence has promoted the conformation of organizations extended in four continents, which have helped the lives of children, youth, adults, and the elderly who live in precarious and disabled environments. Given this, the present study sought to describe the influence by Marie Poussepin on Nursing, taking as a starting point the perspective of life stories of the Dominican Sisters of Charity of the Presentation of the Blessed Virgin.

Methods

Type of study and sample. Historical-hermeneutical study, conducted in 2022 in Colombia. Oral histories were used as a research strategy to gather information from the Dominican Sisters of Charity of the Presentation of the Blessed Virgin to reconstruct their experiences, anecdotes, customs, and understand the influence by Poussepin on current nursing. To choose the participants, a convenience sampling was used to select the informant nuns and their different roles within the community, following the criterion of intersubjectivity to guarantee the representativeness of the testimonies. As inclusion criteria for the participants, it was established that they should have five or more years as members of the community and function as nurses or educators in the different trajectories during the course of their lives. In all, 15 nuns participated, there were no refusals or withdrawal from the study.

Ethical aspects. In compliance with the ethical requirements, endorsement from the Research Ethics Committee at Universidad Católica de Manizales was obtained, through Agreement 179. The participants were contacted in clinics in Manizales and Bogotá, Colombia, in social works and in a kindergarten in the city of Manizales. All participants signed the informed consent after being explained the purpose of the study and manner of execution and participation. They were told that there were no good or bad answers, and that all information collected would be confidential – hence, each interview was identified with an alphanumeric code and data alluding to the place, the institution and the informants were omitted – participation was voluntary. It must be clarified that neither researchers nor participants had any type of relationship before the execution of this meeting; therefore, there was no conflict of interest.

Data collection technique. To obtain the reports, semi-structured interview was used after an appointment was set up via telephone call. The interviewers were two research-teaching nurses with PhD degrees in Health Sciences and Pedagogy; the third held an MSC degree in Education. The three are recognized as researchers by COLCIENCIAS and, besides being the principal researchers, they also designed and executed the study protocol. The participating nuns were

approached individually with nine descriptive-type questions during a single occasion, no type of recording was made at the request of the participants; the interviewing researcher took notes of what the participants said during and at the end of each meeting. Efforts were made to maintain a warm and trusting atmosphere. The average duration of the interviews was approximately 30 minutes. The notes were read aloud after the interview so that the informants could make the corrections deemed pertinent.

Information analysis plan. After transcribing the interviews, the three researchers began the analysis of the stories. Information was collected and recontextualized through the open and axial coding system using ATLAS.ti9 software. During the interpretation procedure, copying, intensive reading, note taking, analysis, first epigraph of the report, coding, grouping, and determination of categories were made towards analyzing the symbolic efficacy of the stories, triangulating the information with existing evidence, so that the results were contrasted with similar or divergent positions.

Results

The work obtained 15 interviews from nuns belonging to the congregation of Dominican Sisters of Charity of the Presentation of the Blessed Virgin, ranging between 30 and 93 years of age. The participant with the most experience in congregational life had around 60 years and the one with the least experience only had 5 years. Of all the nuns, five were nurses, five were teachers, and the remaining five supported care tasks of the Congregation from their area of expertise.

Table 1. Demographic data of the participants

Number	Age	Years in the congregation	Profession	Institution where they work or worked
1	53	35	Pedagogist	University
2	46	28	Nursing aide	Clinic
3	52	36	Bachelor of Social Sciences	School
4	34	9	Nurse	Clinic
5	30	5	Attorney	School
6	87	60	Bachelor of Social Sciences	School
7	74	46	Nurse	Clinic
8	35	16	Nurse	University
9	78	39	Public Accountant	University
10	93	59	Nurse	School
11	89	60	Nursing aide	Clinic
12	51	34	Nursing aide	Clinic
13	76	38	Pedagogist	Kindergarten
14	39	20	Pedagogist	Kindergarten
15	48	27	Nurse	Clinic

During the analysis process, three categories emerged, grouped as follows: I. Responding to the call of Jesus through service to the community, 2. Under the legacy of charity, respect for life and the dignity of human beings, and III. Caring for life as a foundation of nursing. Each of these is described ahead.

Category 1. Responding to the call of Jesus through service to the community

This category exposes that the heiresses of Poussepin's legacy recognize in their work the connotation of their religiosity, given that they integrate into their congregational act the function of care during a person's illness. Within these actions, it is possible to identify the search for bodily and spiritual healing: *I think that Marie's passion for service to life is impressive, she rescued the particular simplicity she has towards caring for the sick... from her vision of faith, she found the presence of Jesus and that is why she served the sick* (PE1); *She was a prosperous woman, interested in the people devastated by war and the misery in Saint Ville; in her time, she dropped everything to help. She made me question myself, and I began to have those feelings of wanting to be just like her* (PE 4).

Also, the legacy given is aimed at the contributions made to the life project of the nuns, and how this has guaranteed the work of service from the different areas where they operate within their group: *She left me charity and love for Jesus as a legacy; I am here because I have love to serve our Lord through service to others* (PE 2); *I joined the Congregation because I heard the call of God. The Christian formation in my family and the testimony of the nuns greatly influenced on the desire to serve* (PE 10); *I discovered that on a vocational level, the charisma of our foundress is the second greatest gift that God gave me* (PE6).

Under this philosophy, care work is perceived as integral because it not only calms bodily pain. Interventions take into account different human needs. In addition, care work is not always given from the degree, because the service spirit is essential to achieve success: *Many of us are not nurses, but we have soothed the souls of children, collaborators; you are not a nurse just to respond to a physical health situation, but to take care of a person's soul, and that is what we do* (PE7); *The truth is that Marie taught us something that we all must have and we have seen it since the time of Jesus: being moved by compassion and having a fervent charity for people* (PE11).

Category 2. Under a legacy of charity, respect for life and the dignity of human beings

This category recognizes that care work framed-worked within Poussepin's legacy is not only limited to providing bodily or spiritual needs. This panorama dignifies human life during illness and health. On the other hand, in the different scenarios where the nuns carry out their work, life and its respect are the center of the entire work.

Community social work: *We conduct guidance through home visits. I recruit pregnant women, the elderly or children and refer them to foundations where they can be provided help* (PE8); *We support morally and spiritually the people who come to us* (PE8). The presence of the nuns in the in the works linked to care and education, it can be seen in the works that they lead and whose beneficiaries are at different moments of their life course.

Kindergarten: *We live Marie's spirituality, we transmit to children the tenderness and love our mother had for them* (PE7); *Next to health care, schools were formed. Marie taught the girls to read and to care for others* (PE12).

Clinical care: *Marie taught that it is about being concerned for the care of life and a deep sensitivity towards the vulnerable state of human beings in their moment of illness.* (PE4); *She highlighted from nursing not only the technique, but also that of providing careful treatment to patients* (PE 13).

Educational community: *The Nursing Program is the essence of the gospel (PE10); For Marie, everything became a possibility to heal the body, the heart, the spirit, the soul. She tells the nuns who are nurses that sometimes more good is done by healing the spirit because of that association between illness and interiority* (PE5); *The entire strategic platform of the clinic is based on Marie's charisma: vision, mission, and corporate values* (PE10); *At university, everything is related to the word care, whenever we get close to a person, we consider them sacred ground* (PE5). The contributions referred to indicate the close relationship among religious work, care, and education. These assignments are representative and widely recognized inside and outside the Congregation.

Category 3. Caring for life as a foundation of nursing

For this category, care is recognized as the essence of nursing and, at the same time, it is typified as the extension of Poussepin's missionary work through a series of links established in the moments of care practice. The institutions in which the participants work are places of service to others in different ways: *The health care worker is a continuation of Marie Poussepin's charisma* (PE12); *The exercise of health in an institution is a ministry within the church. We make an announcement to our patients: through humane treatment and warm service* (PE12); *The strategy we have is the interpersonal relationship... that relationship born deep within our being because it is God's gift to each one and He himself helps us to put it into practice* (PE13).

Discussion

Marie Poussepin's legacy, given through the activities carried out by the Congregation, has deepened the foundations in the academic and practical aspects of nursing, as well as in the moral, spiritual, and human foundations necessary to execute nursing care in today's society, strengthening the technical and professional era of a practice that emerged empirically. It should be noted that the congregation of the Dominican Sisters of Charity of the Presentation of the Blessed Virgin constitutes an organization that promotes the active life of its nuns, favoring their spiritual development in the light of the Gospel and opting for their academic and professional enrichment. Hence, within the organization, there are three fields of action related to health, education, social, and parish ministry that are consistent with the life course approach defined by the Ministry of Health as "an approach that addresses moments of life, recognizing that human development and health outcomes depend on the interaction of cumulative experiences and present situations of the individual influenced by the family, social, economic, environmental, and cultural contexts.[10]

The findings coincide with a study on anthropology and care, which explained how the development of the culture of care was not only carried out through Christianity, but through all religions that showed concern for the sick. In this aspect, it is worth mentioning that the Christian culture of care addressed the idea of hospitality.[11] It should be stated that, regarding the notion of hospitality established by nursing over centuries, not only the technical functions of its work were addressed, but also the skills for the exercise of charity, considering that care should be exercised by consecrated individuals.[7] In other words, and bearing in mind the current practical and moral development of the profession, comprehensive care arises when a genuine relationship is established between the caregiver and the person being cared for. Hence, Christian charity is based on the execution of actions, passing the care of the poor and sick to an important social level, that is, what was once an occupation of slaves became a sacred vocation. Service, through caring for the neediest, went on to be seen as a duty of men and women who profess a faith.

History recounts Marie Poussepin's childhood around the wars and plagues that left the

population in precarious conditions of job insecurity, health, and economy. Poussepin, thanks to her mother and her closeness with the gospel, set out to serve the sick from a very young age, learning to visit them and provide them with food.[8] The foregoing is similar to the foundation upon which the participants have based their work within the congregation, where the presence of these workers is representative, not only in the domestic scenario of the needy, but in those scientifically endorsed, such as they are: the hospital, the school, and the university.

Nursing participates actively in caring for patients, and when it is aimed at strengthening the family environment, it improves people's self-esteem and level of confidence, being able to potentiate their possibilities and the positive consequences.[12] This condition is consistent with the work by the participants in contexts unrelated to illness, and where it is possible to generate greater social responsibility. In this regard, a study exposes the emotional support provided by the nursing staff to hospitalized patients as relief to the soul. Reiterating that nurses require a high level of sensitivity to interpret the patient's verbal and non-verbal manifestations associated with their perception regarding the illness, the hospitalization and treatment process, and refer that emotional support should be understood as a form of careful.[13]

Moreover, Fernandes and Siles[11] consider that female social work arose as a response to social emergencies, which at the time produced the fulfillment of care for free or "volunteer work". Said antecedent impregnated it in his course, mainly under the leadership of the church, as an unpaid activity carried out by those who perceived a group of people in deprived situations, who demanded charity.[14] This evidence is viable and latent in the discourse used by the participants, given that they support their function and philosophy on this vocational principle that seeks to overcome discomfort or vulnerability. For this reason, the Congregation is the non-profit group in charge, in the city of Manizales, of visiting areas and attracting individuals in vulnerable conditions (women heads of household, people with disabilities, children or the elderly in social abandonment), to refer them to institutions that have the pertinent economic and social conditions to favor their integral state of health. In its social works, it promotes continuity in health care to the community through the dispensary, which provides medications under a medical formula to people who do not have the resources to obtain them.

Likewise, it is highlighted that the labor of care in the diverse settings of missionary work is not disassociated from health regulations. On the contrary, the function of the Congregation is viable because it recognizes the family as subjects of care and health care as a permanent process, focused on disease prevention. Such an act permits providing optimal tools for each person from their community to manage their self-care,[15] thereby, it is worth highlighting this organization for its contribution in promoting health and strengthening self-care in the community. That is, the missionary work, provided around care, recognizes that health problems are generated or enhanced by multiple factors that must be intervened from childhood, to promote adequate development through optimal educational conditions that offer strategies for the correct physiological, mental, emotional, and spiritual development of people. This discovery is true compared to the educational work that has historically been conducted and that has been linked to health care.

Another fact found and of interest is that the missionary work around care has sought, over the years, to recognize that health care must be comprehensive and not fragmented. Authors, like Castro *et al*.,[16] refer to the vitality of committing and getting involved in the process and never leaving aside the humanization of the task in favor of improving health results. Thus, the data analysis of the present study is aligned with that described in the literature, given that through

reports by the participants, caring becomes visible when someone's life becomes important for the other, and they decide to participate in it. It is through acts that result from understanding of the state of others and the purpose of helping them.[17]

Although the humanization of health services presumes being an elemental component during the individual's health restoration process, Castillejos *et al.*,[18] express that the relationship of emotional intelligence with the care provided by nurses contributes to the emotional, spiritual, and aid components. Added to the fact that it is a determinant to improve the quality of care for people hospitalized. Then, the work by Poussepin corresponds to the emerging trends in human healthcare, despite adversities present during this commendable work and which indicate the workload, imposition of administrative activities that prioritize indicators, costs and protocols, development of individualistic thinking, inconsistency between theory and practice, and lack of recognition are barriers that have made us think that values and principles, among others,[19,20] have deteriorated care, mainly institutionalized care. Consequently, vocation, will, patience, respect for the dignity of others, charisma, warmth and compassion are requested from the environment where the study phenomenon was addressed.[21]

Nursing epistemology encompasses the comprehensive care of humans through health promotion, disease prevention, and timely diagnosis and treatment in the required dimension. In response to the aforementioned, the individual's physiological, spiritual, and emotional well-being is favored if the vulnerability of life is considered when the required care is not received.[22]

This study concludes that Marie Poussepin's contribution to nursing care has been experienced since the foundation of the work. It is evident that said work is not clearly limited to the institutionalization of care; on the contrary, care is present in various contexts where nuns execute their mission. In this sense, the legacy in mention has influenced nursing from the religiosity, responsibility, and vocation of those comprising this congregation, imprinting a character of service and respect for others, in response to the love of God. Historically, it has not been limited to a degree in the area, given that, from the very formation in the community, women have been taught and based on care; it is then a professional act and responsibility towards others that deserves an exhaustive practice.

The limitation in this study lies in that not all the participants were nurses; nonetheless, under the religious legacy, the act of caring is a primordial part of their work.

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Original Article

Effectiveness of telesimulation on cardiorespiratory arrest for nursing students

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Efficacy of telesimulation on cardiorespiratory arrest for nursing students

Abstract

Objective. To evaluate the effectiveness of telesimulation on cardiorespiratory arrest to improve the performance of nursing students. **Methods.** This was an experimental study, whose sample consisted of 30 undergraduate nursing students from a Brazilian university. It was structured from two groups: an experimental ($n=15$) and a control ($n=15$). For both groups, expository classes and skills training were held. For the experimental group, a virtual clinical simulation scenario was implemented. Before the beginning of the interventions, a pre-test was applied and, after the end of this, a post-test was applied to evaluate the students' gain of knowledge and skills. **Results:** From the analysis of the total correct answers and the scores obtained in the pre-test and post-test, it was found that there was an improvement in the performance of both study groups. Regarding the averages of the

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points obtained, there was a statistically significant difference between the groups (p=0.001). The post-test score was significantly higher than the pre-test score in the intervention group (p=0.001). **Conclusion.** The virtual scenario developed proved to be superior in improving the performance of nursing students in managing cardiorespiratory arrest when compared to traditional teaching methods.

Descriptors: educational technology; simulation training; students, nursing.

Eficacia de la telesimulación del paro cardiorrespiratorio para los estudiantes de enfermería

Resumen

Objetivo. Evaluar la eficacia de la telesimulación del paro cardiorrespiratorio para mejorar el rendimiento de los estudiantes de enfermería. **Métodos.** Estudio experimental cuya muestra consistió en 30 estudiantes de pregrado de enfermería de una universidad brasileña asignados a uno de dos grupos: uno experimental (n=15) y otro control (n=15). Para ambos grupos se realizaron clases expositivas y entrenamiento en habilidades. Para el grupo experimental se implementó un escenario de simulación clínica virtual. Antes del inicio de las intervenciones se aplicó un pre-test y, tras el final de la intervención, un post-test para evaluar la ganancia de conocimientos y habilidades por parte de los alumnos. **Resultados.** A partir del análisis del número total de respuestas correctas y de los puntajes obtenidos en el pre-test y en el post-test se encontró que hubo mejoría en el desempeño de ambos grupos de estudio. En cuanto al puntaje promedio obtenido hubo una diferencia estadísticamente significativa entre los grupos (p=0.001). La puntuación post-test fue significativamente mayor que la puntuación pre-test en el grupo de intervención (p=0.001). **Conclusión.** El escenario virtual desarrollado demostró ser superior en la mejoría del rendimiento de los estudiantes de enfermería que se enfrentan a una parada cardiorrespiratoria, en comparación con los métodos de enseñanza tradicionales.

Descriptores: tecnología educacional; entrenamiento simulado; estudiantes de enfermería.

Eficácia da telessimulação sobre parada cardiorrespiratória para estudantes de enfermagem

Resumo

Objetivo. Avaliar a efetividade da telesimulação sobre parada cardiorrespiratória para a melhora do desempenho de estudantes de enfermagem. **Métodos.** Tratou-se de um estudo experimental, cuja amostra foi composta por 30 estudantes de graduação em enfermagem de uma universidade brasileira. Foi estruturado a partir de dois grupos: um experimental ($n=15$) e um controle ($n=15$). Para ambos os grupos, foram realizadas aulas expositivas e treino de habilidades. Para o grupo experimental foi implementado um cenário virtual de simulação clínica. Antes do início das intervenções, aplicou-se um pré-teste e, após o término desta, aplicou-se um pós-teste para avaliar o ganho de conhecimentos e habilidades por parte dos estudantes. **Resultados.** A partir da análise do total de acertos e das notas obtidas no pré-teste e no pós-teste, constatou-se que houve melhora no desempenho de ambos os grupos de estudo. Referente às médias dos pontos obtidos, houve diferença estatisticamente significante entre os grupos ($p=0.001$). A nota do pós-teste foi significativamente maior que a nota do pré-teste no grupo intervenção ($p=0.001$). **Conclusão.** O cenário virtual desenvolvido mostrou-se superior, na melhoria do desempenho de estudantes de enfermagem frente à parada cardiorrespiratória, em comparação aos métodos de ensino tradicionais.

Descritores: tecnologia educacional; treinamento por simulação; estudantes de enfermagem.

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Introduction

The advancement of Communication and Information Technologies (ICTs) has brought numerous changes to the way of living, thinking and acting of today's society, especially in the area of education.[1] With the incorporation of these technologies in the formatting of traditional classes, higher education has achieved great evolution. Mainly, during the confrontation of the COVID 19 pandemic, where institutions had to adapt to the new remote teaching model.[1] In this space, the educational strategies associated with ICTs gained even more strength, such as telesimulation, which is considered a distance education strategy capable of allowing access to Clinical Simulation (CS), maintaining the characteristic of the controlled and safe environment.[2]

There are several benefits associated with its implementation, especially the possibility of using it for the training of technical and practical skills.[2] Its realization seeks to simulate the characteristics of a given clinical situation, aiming to reach the understanding of the real conditions of the clinical situation studied. The assembled environment seeks to recreate a reality, so that the student can practice, learn, test and evaluate.[3] Given the dynamism of the knowledge acquisition process, the use of a single educational theory and a single teaching model is sometimes insufficient to advance learning.[4] In order to design active courses and produce maturing clinical and reflective awareness of students, the educational spectrum and existing teaching models must be integrated.[4]

Simulation technologies, adapted to nursing education, were first introduced in the 1950s with low-fidelity models and gradually evolved into modern high-fidelity tools. Since then, these technologies have been widely adopted to support the acquisition of knowledge and technical development skills.[5] Considering that the nurses are the professionals responsible, within the nursing team, for interpreting human responses and drawing up a care plan directed to the patients, nursing students must be trained and qualified, scientifically and intellectually, to properly manage real clinical situations.[4] There are several clinical situations that require rapid and effective nursing and multiprofessional interventions, especially those classified as emergency, such as Cardiorespiratory Arrest (CRA).

Cardiorespiratory arrest (CRA) is an emergency of vascular nature, responsible for a high rate of morbidity and mortality in the world. It can be understood as the interruption of circulatory and respiratory activity, leading the subject to present absence of palpable central pulse, irresponsibility and apnea.[6] Thus, it is of paramount importance to provide fast and qualified care to the affected patient, because every minute in CRA, the patient has a 10% reduction in survival.[7] Clinical simulation can be used, in nursing education, in order to raise the quality of training of new professionals, since it enables real

experiences, from the interaction of the student with a controlled scenario that mirrors the reality of a clinical situation for the participant.[8] In addition, it enables the participants to develop and improve their clinical reasoning, techniques and skills.[9,10] In this context, the present study aimed to evaluate the effectiveness of telesimulation on cardiorespiratory arrest to improve the performance of nursing students

Methods

This is a quantitative experimental study, consisting of two groups; an experimental group and a control group; formed by nursing students from a Brazilian educational institution. In the experimental study, subjects are randomly allocated to one or more treatment or comparison groups. The study seeks the relationship between phenomena, seeking to know if one is the cause of the other.[11] Data collection was carried out in March 2021. The research took place at a private university in the state of Ceará, located in the Northeast of Brazil. The study population was composed of nursing students, from the third year, enrolled in the university chosen to carry out the study. The choice of educational institution was due to the convenience of the researchers. The sample size was estimated using a formula based on McNemar's Chi-square test. After applying the test, the values of 86.9% of study power and 30 participants were obtained. Initially, all students in the fifth semester were invited to participate in the study. After acceptance, they were sent to a reserved room for further clarification about the research and its stages. Subsequently, the inclusion and exclusion criteria were applied, and written consent was given.

The inclusion criteria were: being regularly enrolled in the third year of the nursing course of the university selected to carry out the study, being aged 18 years or older, and without previous practical experience in the management of CRA. The exclusion criteria were: not complying with all stages of the study and/or not fulfilling the research instruments in their entirety. All students in the fifth semester were invited to participate in the study, of which 34 met the eligibility criteria. However, four students were excluded, according to the exclusion criteria presented. Of the 30 students selected for the study, 15 participated in the experimental group and 15 in the control group.

Data collection was performed through four stages. The first stage consisted of a prior appointment to meet with students, present the research and sign the ICF. The students received an identification number and were randomized, simply by computer program, into two groups, namely: Control Group (CG), which participated in the training with traditionally used teaching strategies – dialogued expository class and simulated skills training; Intervention Group (IG), which also participated in the dialogued expository class and simulated skills training, however followed by the simulated virtual scenario – telesimulation. Then, the second stage was carried out, which consisted of a face-to-face meeting to instrumentalize the study and distribute the previous bibliography. The third stage dealt with the training of the data collection team, carried out before the teaching intervention. The data collection team consisted of the researcher, a nurse and the laboratory technician.

The fourth stage dealt with the performance of the experiment. Initially, an instrument was applied to identify the prior knowledge of all students about CRA (pre-test). Then, the experiment itself was carried out, detailed below. For both groups, the expository classes and skills training were built from the contents available in the discipline of Clinical Nursing I with themes of CRA and CPR, following the theoretical framework of the American Heart Association and the Ministry of Health of Brazil. For skills training, practical classes were made available with teachers of the aforementioned discipline in laboratories equipped with medium fidelity simulators (torso with feedback device). For this moment, the students were divided into groups of six and the duration was approximately 60 minutes.

For the experimental group, in addition, a virtual scenario of medium-fidelity clinical simulation was implemented, with the SimSave *software*, *with* a subscription acquired by the authors. For this, all simulation design guidelines were followed regarding teaching-learning objectives, fidelity, problem solving, student support and debriefing. [5] The simulation implemented with the IG was carried out in the institution's nursing laboratory, with a controlled CRA scenario, in a hybrid manner (using low-fidelity mannequins and a simulated patient). In the scenario, information was passed on about the clinical case and the expected conduct. In other words, students should conduct the simulated CRA scenario according to their previous knowledge (briefing). After the procedure, the simulation itself was performed, which consisted of a patient on CRA requiring resuscitation. This moment lasted up to ten minutes. Afterwards, we discussed the strengths and weaknesses in the provision of nursing care (debriefing). After the intervention, the assessment of the development of cognitive skills (post-test) was carried out. We chose to do so to minimize the factors that could influence the test (for example, the acquisition of knowledge through specific studies for the resolution of the post-test).[12]

It is important to note that both groups performed the tests (pre and post), which consisted of the same questions and order with 25 items on Basic and Advanced Life Support. The items of the instruments were taken from the American Heart Association reference,[13] which were evaluated by the participants as true (V) or false (F). The data were organized in a Microsoft Office Excel 2013 spreadsheet and analyzed using the Statistical Package for the Social Sciences (SPSS) software, version 23.0. Analysis by protocol, descriptive analysis, and inferential analysis were performed. Data normality was verified using the Shapiro-Wilk test. To evaluate the intergroup mean differences, the Mann-Whitney test was applied. The hypothesis of differences in pre-test and post-test scores was tested using the Wilcoxon marked rank test. For all analyses, the significance level of $p<0.05$ was adopted.

The study was approved by the Research Ethics Committee (CAAE: 16140619.5.0000.5576). All research participants signed the Informed Consent Form, after being verbally informed about the objectives and procedures of the study.

Results

Thirty nursing students of the seventh semester participated in the present study, of whom 20 (66.6%) were female, with a mean age of 20.6 years. Regarding the educational profile of these students, eight (26.6%) took an extracurricular course on the subject and five (16.6%) had taken a nursing technician course and had no previous professional experience in the role. Regarding the virtual scenario, SimSave *software* was used, with controlled environments on Basic Life Support (BLS) and Advanced Life Support (ALS). Thus, figure 1 presents the characteristics of student use.

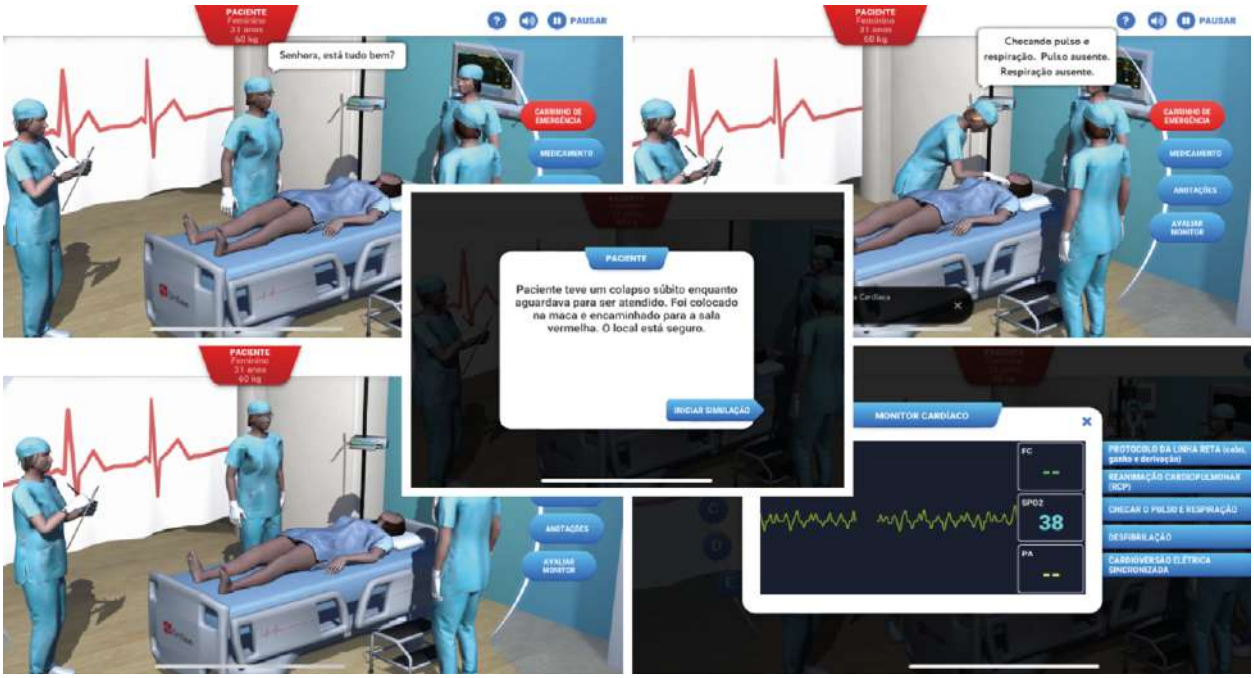

Figure 1. Virtual simulator screens in CRA scenario
Source: SimSave *Software*

Regarding the number of correct answers and errors in the pre-test and post-test, there was a minimum of 12 and a maximum of 14 correct answers in the pre-test; and in the post-test there was a minimum of 14 and a maximum of 24 correct answers. The topics with the highest error rates addressed the respiratory system and the compression *versus* ventilation ratio. And the topics with the highest rates of correct answers were the CRA, the automatic external defibrillator (AED) and the cardiovascular system. The correct answers and errors of both groups, as well as their scores, in the pre-test and post-test, were organized in the following table (Table 1). Considering that the groups were independent, the Mann-Whitney test was applied to verify whether the difference between the means of the groups was significant. There was an improvement in the performance of both groups based on the comparison of the total correct answers and the scores obtained in the pre-test and post-test, as shown in Table 1. In addition, the mean/median values and minimum scores of the intervention group were higher than those of the control group. Based on the results still presented in Table 1, there was a statistically significant difference between the intervention and control groups regarding the means of the posts obtained in the post-test ($p=0.001$).

Table 1. Intergroup performance for the CG and IG of the study

Variables	Groups		*p*-value	ΔVar
	Intervention	Control		
Total pre-test hits	14.97	12.97	0.039	1.26
Total post-test hits	24.07	16.90	0.001	12.3
Pre-test note	6.22	5.78	0.039	
Post-test note	9.01	6.24	0.001	

Once a statistical difference in intergroup performance was identified in Table 2, the intragroup performance was analyzed, which is presented below. Based on the information described in Table 2, it is possible to state that there was a statistically significant difference between the intervention and control groups with regard to the means of the posts obtained only in the post-test (p=0.001). In both groups there was a positive evolution, which is when the post-test score is higher than the pre-test. In the intervention group, all participants had a positive evolution. In the comparison group, there were two negative outcomes and six ties when the correct answers and errors were compared in the pre-test and post-test, that is, three students obtained a post-test score lower than the pre-test and three obtained the same score in the pre and post-test. The Wilcoxon nonparametric test revealed that the post-test score was significantly higher than the pre-test score in the intervention group (p=0.001).

Table 2. Intragroup performance for the CG and IG of the study

Variables		Groups			
		Intervention		Control	
		n	Mean	n	Mean
Note 2 – Note 1*	Negative evolution†	0		2	3.50
	Positive evolution‡	15	8.49	7	6.04
	Tie§	0		6	
Statistics	Z¶	-2.919		-2.345	
	p-value	0.001		0.09	

*Note 2: Post-test; Note 1: Pre-test; †Note 2 < Note 1; ‡Note 2 > Note 1; §Note 2 = Note 1; ||Wilcoxon test; ¶Result based on the averages of the posts with negative evolution.

Discussion

Cardiorespiratory arrest CRA is one of the most important and prevalent emergencies faced by nursing professionals in their work environment, whether intra- or extra-hospital. The survival rate of individuals is closely related to the speed with which care is started, as well as to the qualification of professionals involved in care, so that the assistance provided is effective to reverse the patient's clinical condition.[14] It is in this context that the development of clinical skills of nursing students is extremely relevant, since, most of the time, it is this professional, a nurse, who performs the first care, identifies that the patient is on CRA and already starts the cardiopulmonary resuscitation maneuvers.[2] Nurses' clinical competence is crucial for providing accurate care to patients on CRA, and education plays a key role in improving this competence. In this sense, it is important to use interactive learning modalities, such as virtual clinical simulation, with valid scenarios, to encourage students to actively engage in patient care, in addition to providing significant benefits, such as improved knowledge, self-confidence, clinical performance, communication, critical thinking and clinical decision-making. Virtual clinical simulation provides a realistic and safe environment for students to practice and hone their skills.[14]

In this study, the successful implementation of an educational course based on telesimulation was described, which originated from the need to improve the teaching-learning of nursing students during clinical practice for patient care in CRA. This type of approach is an innovative method and distinct from the traditional teaching of nursing practices, arousing greater interest in students. It is a type of technology that favors student learning in different clinical situations, but in a controlled and safe scenario, which allows to err without causing negative repercussions to the patient.[12] The results of this survey revealed a positive overview regarding content learning. Participants reported that this teaching experience added educational value above their learning when compared to traditional lectures, while it is more effective than standard learning exercises, being superior to conventional teaching methods. Corroborating these findings, a study found that most students agreed that the simulation contributed to the development of logical reasoning, the execution of teamwork, nursing techniques and procedures, in addition to assisting in autonomy and professional posture.[14] This improvement after clinical simulation can be identified mainly among younger students, aged between 18 and 28 years, especially with regard to the acquisition of cognitive and practical knowledge, as well as self-confidence.[15]

Thus, the simulation is not only relevant to improve learning, it is able to raise the levels of satisfaction and self-confidence of nursing students who have or have not previous clinical experience, but it is important to note that the use of simulation does not exempt the student from clinical experience and contact with the real patient.[16] In addition, it is noticed that as the semesters progress, students become more aware of the importance of experience in the clinical context, which may reflect on the ethics and responsibility of the student to seek to improve triple knowledge, skill and attitude.[14] In view of this, clinical simulation is essential during the training process of nursing professionals assisting them in decision-making.[17] The simulation is an experience that proves the need for it to be inserted in undergraduate courses so that there is early training of students, ensuring quality in teaching, as well as in patient care and professional training.[18] In addition, it provides the opportunity to review errors that can be avoided in similar scenarios during professional practice, contributing to patient safety when in the real scenario.[19]

When considering that each student takes a different amount of time to assess the situation and make decisions about the conduct that will be necessary, the realistic scenario must be built based on the students' previous experiences, so the teacher needs to plan and organize the scenario based on a script that guides him in structuring the clinical simulation,[20] especially when it comes to urgent and emergency situations. It is also noteworthy that the debriefing, used in this study, when carried out properly, after the simulations, has enabled nursing students to carry out associations with various knowledge, mainly

related to the affective, cognitive and psychosocial dimensions, favoring the development of skills necessary for professional practice.[21] In addition, through the debriefing, a study found that it was possible to work on nursing undergraduates to develop skills, as well as reflect on the simulated situation and the actions taken, improving skills, communication and professional attitude in the face of the emergency scenarios that were simulated.[22]

Thus, debriefing is important as it synthesizes, without judging the participants, the main topics that should occur during a given clinical simulation, favoring the assimilation of knowledge and the development of technical and interpersonal skills.[23] Therefore, it is a phase of clinical simulation that comes to aggregate and consolidate teaching-learning about the simulated clinical scenario. Although this method has been shown to be beneficial for teaching, it was possible to observe in the present study, barriers and challenges during the implementation of the telesimulation course, mainly related to the minimum requirements that must be achieved or the resources that must be obtained to carry out a course of this magnitude, namely: telecommunications equipment, simulation resources and personnel experienced in conducting a simulation-based course, choice of the software to be used and connection to the internet.

Other challenges pointed out by the literature are related to the lack of financial resources for the structuring of scenarios and realistic makeup, information on the relevance of evidence-based practice, timely during the work to carry out the training, more commitment of educational institutions, as well as problems of technological infrastructure and lack of continuing education for the improvement of educators, in order to make teaching in undergraduate courses in health increasingly better.[22-24] In view of this, to alleviate these challenges, greater engagement of universities is necessary to implement this method and to train teachers and those responsible for conducting the simulations, in addition to partnering with other institutions to try to reduce the production costs of the realistic scenario. Thus, the application of telesimulation in cardiorespiratory and cerebral arrest is an effective active methodology in the teaching-learning of students, providing a safe practice in the face of the clinical emergency scenario. In this sense, nursing students can test their clinical reasoning, in addition to improving their knowledge, skills and attitude that make them more self-confident to act in the professional environment, since they have already experienced a certain clinical situation through simulated practice.

In recent years, mainly due to the COVID-19 pandemic and the restrictions that face-to-face teaching has had, several innovative and alternative teaching methods have been developed and improved to assist in the teaching-learning of students, especially those in the health area, one of them being clinical simulation.[25] Thus, this study contributes to the planning of clinical simulations by teachers for the teaching of nursing students, given that this strategy is able to immerse the students in the scenario of their future professional experience, enabling the improvement of their critical-reflective reasoning and their decision-making capacity.

As a conclusion of the study, it is clear that the scenario of telesimulation focused on cardiorespiratory arrest was superior to the conventional teaching methods adopted, being, therefore, a plausible tool to be used by teachers in teaching in the health area, especially in nursing education. This technology proved be favorable in the acquisition of technical skills and abilities of nursing students, sharpening their critical reasoning, providing greater security for the students and the patients, in addition to making the students the protagonists of their learning.

As for the limitations of the study, obstacles stand out for the implementation of the telesimulation course due to the unavailability of equipment in the educational institution and people qualified to operationalize the system of the software used. For future studies, it is suggested the integration of nursing students with those from other areas such as medicine, to simulate the dynamics of interaction between these professionals in a clinical scenario of cardiorespiratory and cerebral arrest.

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Clinical simulation in health education: a systematic review

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Review

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Clinical simulation in health education: a systematic review

Abstract

Objective. To summarize the most recent scientific evidence on the usefulness and implementation of simulation training programs for health science students. **Methods.** A search and systematic review were conducted of the literature through the use of the PRISMA guidelines using the terms MESH Simulation AND healthcare AND Professional Training, including 42 articles. **Results.** The bibliometric analysis revealed that most of the studies were local in nature, that is, conducted in a single center, or in a few centers in the same region, from the English-speaking world, and using a mixed methodology with pre/post-test measurements. As for the educational aspects, most of the studies were conducted at universities or in the area of continuous education, used multidisciplinary teams as the student target, and used role-playing games as the simulation method. Also, these programs were especially successful in the acquisition of competencies,

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such as teamwork, communication, and trust. **Conclusion.** Clinical simulation is a teaching methodology implemented in the last twenty years, mainly in English-speaking countries; it utilizes techniques for its execution and assessment that have been validated in contrasted in many scientific studies, and lastly, it was also observed that it is useful for providing training on general competencies for multidisciplinary groups.

Descriptors: simulation training; educational technology; students, health occupations.

La simulación clínica en la enseñanza sanitaria: una revisión sistemática

Resumen

Objetivo. Resumir la evidencia científica más reciente sobre la utilidad e implementación de programas de formación mediante simulación en estudiantes de ciencias de la salud. **Métodos.** Se ha desarrollado una búsqueda y revisión sistemática de la literatura mediante la guía PRISMA empleando los términos MESH *Simulation* AND *healthcare* AND *Professional Training,* incluyéndose 42 artículos. **Resultados.** El análisis bibliométrico reveló que la mayoría de estudios eran de ámbito local, es decir, desarrollados en un único centro o en unos pocos centros de una misma localidad, procedentes del mundo anglosajón, y utilizaban una metodología mixta con pre/post-test. En cuanto a los aspectos educativos, la mayoría de estudios se desarrollaron a nivel universitario o en el ámbito de la formación continua, tuvieron como alumnado objetivo equipos multidisciplinares y utilizaron el juego de rol como método de simulación. Además, estos programas fueron especialmente exitosos en la adquisición de competencias como el trabajo en equipo, la comunicación y la confianza. **Conclusión.** La simulación clínica es una metodología docente que se ha ido implantando progresivamente durante las últimas dos décadas, mayoritariamente en países anglosajones, que utiliza técnicas para su ejecución y evaluación validadas y contrastadas en múltiples estudios científicos, y que resulta útil para el entrenamiento de competencias genéricas y equipos multidisciplinares.

Descriptores: entrenamiento simulado; tecnología educacional; estudiantes del área de la salud.

Simulação clínica na educação em saúde: uma revisão sistemática

Resumo

Objetivo. Resumir as evidências científicas mais recentes sobre a utilidade e implementação de programas de treinamento de simulação em estudantes de ciências da saúde. **Métodos.** Uma busca sistemática e revisão da literatura foi realizada usando o guia PRISMA usando os termos MESH *Simulation* AND *Healthcare* AND *Professional Training,* incluindo 42 artigos. **Resultados.** A análise bibliométrica revelou que a maioria dos estudos foram locais, ou seja, desenvolvidos num único centro ou em alguns centros de uma mesma cidade, do mundo anglo-saxão, e utilizaram uma metodologia mista com pré/pós- teste. Quanto aos aspectos educacionais, a maioria dos estudos foi realizada no nível universitário ou no campo da formação contínua, os alunos-alvo eram equipes multidisciplinares e usaram a dramatização como método de simulação. Além disso, esses programas foram especialmente bem-sucedidos na aquisição de habilidades como trabalho em equipe, comunicação e confiança. **Conclusão.** A simulação clínica é uma metodologia de ensino que tem vindo a ser progressivamente implementada ao longo das duas últimas décadas, maioritariamente em países anglo-saxões, que utiliza técnicas para a sua execução e avaliação validadas e contrastadas em múltiplos estudos científicos, e que é útil para o treino de competências genéricas. equipes multidisciplinares.

Descritores: treinamento por simulação; tecnología educacional; estudantes de ciências da saúde.

Introduction

Simulation training is an experience-based teaching methodology for rehearsing events in a safe environment.[1,2] The use of simulators in any area is based on two principles: guaranteeing safety and preventing critical errors.[3] In the case of clinical simulation, the manufacturers of medical equipment were the first to promote its initial development,[4,5] but during its evolution, more attention has been paid to the underlying pedagogy.[6] All simulation programs follow a well-defined structure, with clear pedagogic objectives, and following a series of stages: (a) *Prebriefing*: an initial informational session in which guidance is provided to students on the objective of the simulation, the environment, and the tools that will be utilized.[4] (b) Scenario: this is the simulation experience itself, designed in agreement with the learning objectives, in which the students will perform various procedures, and make decisions that are similar to real clinical contexts.[4,7] (c) *Debriefing*: time dedicated for reflecting on the events that took place during the simulated situation. This is the moment in time in which to confront and discuss the errors, as well as the technical and cognitive skills of students.[3,8] Experiential learning is acquired in the *debriefing* phase, thanks to the reflection performed on the experience itself.[9] Thus, many simulation programs include various scenarios in which different students participate, while the rest become observers. Likewise, some programs record the development of the scenario to later make comments and discuss it in the *debriefing* phase. Given its importance, many specific tools and guides have been developed to structure the *debriefing*, such as "The Diamond"[9] and "Promoting Excellence and Reflective Learning in Simulation" (PEARLS).[10]

The simulation scenario can be developed through different tools, which result in many different simulation methods. Thus, we can differentiate between scenarios based on role playing, in which the students enter a controlled physical space, and which can be classified as simulation with manikins or anatomical models[11,12] and simulations with actors, standardized patients or role-playing;[13] and methods based on Information and Communication Technologies (ICT),[12] which can be sub-classified as computer-based simulations[14] and virtual reality methods.[15]

An important aspect in the design of training programs based on simulation is fidelity, which refers to the degree in which the simulation reproduces reality.[12] The degree of fidelity depends on many aspects, mainly the realism of the simulator, the equipment used, and the degree in which the students are able to overcome their disbelief and act in the simulation as if they would in the real world.[12] Having this in mind, clinical simulations are classified as low, medium, and high fidelity, with the latter being the *gold standard* in the field of simulation.[16] Recently, a step forward was been taken with *in situ* simulation programs. These simulations take place in the space in which real clinical activities take place, thereby allowing health professionals to practice their skills in the work environment itself.[17]

The general objective of the present study is to analyze the most recent scientific evidence on the usefulness and implementation of training programs through

simulations for Health Professionals. The specific objectives are: (i) to describe the scientific literature in the field of clinical simulation as an education method; (ii) to discover the characteristics of the most-utilized simulation methods and their efficacy, and (iii) to study the degree of implementation of simulation as a teaching methodology in different areas of healthcare.

Methods

For the development of the search and systematic review, the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) method[18] was used on large databases, *Web of Science* and *Scopus*, with the following combinations of keywords: (*Simulation* AND *healthcare* AND *Professional Training*) OR (Simulación AND Formación profesional). The inclusion criteria that the articles had to meet to be included in the review were: (a) complete original scientific articles, in English or Spanish, published in scientific journals, (b) articles published in the last 5 years, (c) articles that describe a simulation in the area of Health care, as well as a method of evaluation of its quality of training and the results of this evaluation, highlighting the pedagogic point of view, and (d) the study subjects must be Health Professionals, that is, health sciences students.

The following filters were applied during the search: (a) the words selected must be found in the article's abstracts, (b) articles published between 2017 and 2021, (c) original scientific articles published in scientific journals, (d) articles published in English or Spanish (Figure 1).

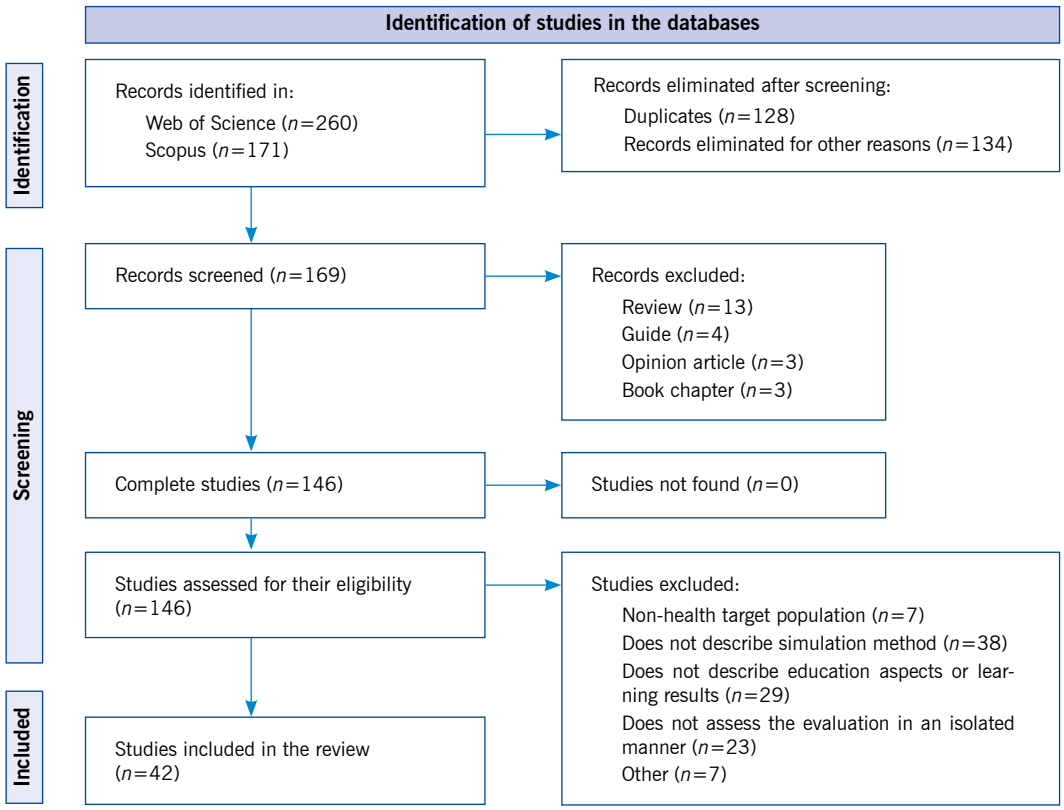

Figure 1. Summary of the articles identified in the systematic search, excluded and included in the review

For the evaluation of the studies obtained, a registration and analysis template was designed. The variables for which a specific number of options were available, were categorized, while the others were maintained with empty fields, for a qualitative study. After the systematic reading of the articles and the collection of data, the quantitative variables were analyzed with the graphics and statistical package Excel 2016. The numerical variables are presented as mean and standard deviation (SD), while the categorical ones were analyzed based on their frequency, and are therefore presented as percentages (%) of the total or absolute value (*n*). A thematic analysis was performed with the qualitative variables.

Results

Bibliometric analysis

Most of the studies included were accepted in 2020.[19-24,25,26-31] With respect to the geographical distribution of the studies, most of them were conducted in the United Kingdom (29%) and the United States (21%), and were local, that is, they were conducted in a single center, or at different centers in the same city (81%), no international studies or studies conducted in collaboration between more than one country were found, while only three were conducted at the national level.[19,20,32] Only one article from a Spanish-speaking country was included (Argentina).[30]

Methodological characteristics of the studies

A predominance of pre/post-test and mixed studies was observed. The most-utilized data collection instruments were: questionnaires ($n=19$) specifically designed by the research team, and composed by various types of questions, and externally-validated questionnaires ($n=14$ that assessed the students' perceptions about their learning. The use of Likert-type scales was underlined in both types of questionnaires.

Within the qualitative studies ($n=21$), most used a thematic analysis of the data collected from one or many of the following sources: Open-ended questions included in the questionnaires ($n=16$); *Focus groups* or in-depth interviews ($n=8$), and *debriefing* sessions recorded on video ($n=2$).[32,33] Some studies ($n=15$), also included data for the external assessment of the competencies acquired, such as the recording of events at hospitals, or assessments by their peers, the research team, or those in charge of the students, through the use of *checklists*, tests, and parameters collected by the instruments or manikins used. Among the main limitations of the studies, the most common aspects were related with the sample (small, convenience, low follow-up, previous experience with simulation, voluntary participants, or lack of a control group), and data collection (lack of validated instruments, data collection through the phone or online, lack of long-term data, and assessment of the impact of the program beyond the assessment by students).

Characteristics of the students

Most of the articles analyzed (60%, $n=25$) presented proposals framed within non-formal education, more specifically, continuous education, as an improvement strategy for professional qualifications. The rest of the works had formal education proposals (40%, $n=17$), with all of them conducted at the university level. In this area, it is important to underline that 67% of the studies were directed to more than one target professional. In this group of articles, the objective in most of them (75%) was the training of interprofessional teams, that is, the target was a team of professionals, instead of a specific type of professional, underlining the need and importance of multidisciplinary collaboration in complex tasks. Likewise, seven studies were identified,[19,22,34-38] whose objective was the training of diverse types of professionals, with nursing personnel represented in all of them.

Methodological trends in simulation training

Most of the studies reviewed (64%) were only based on the role-playing methodology. On the other hand, about 15% of the works described a combination of more than one simulation method, with the role-playing one present in all of them, along with another method (computer simulation, virtual reality, and simulation with anatomical models). Only 17% ($n=7$) of the studies presented proposals that included the use of simulations via computer or virtual reality, and within them, almost half ($n=3$) were combined with role-playing.[30,34,39] In most of them, the *prebriefing*, scenarios, and *debriefing* structure was followed. More specifically, nine articles used structured or validated *debriefing* models.[22,31,35,40-45]

As for fidelity, most of the article had high-fidelity simulation proposals (67%), while in 21% ($n=9$) of the articles, the type of fidelity could not be determined, as it was not specified in the text.[2,24,27,33,38,45-48] With respect to the locations selected for the simulation to take place, 31% were conducted in simulation centers, and 24% at universities. It must be underlined that up to 19% ($n=8$) of the studies described simulation projects that took place *in situ*.[2,28,31,38,49-52] As for the types of competencies that were worked on in the different simulation proposals, most of the studies included the acquisition of general or cross-sectional competencies, either in combination with the acquisition of specific competencies (43%, $n=18$), as well as in an isolated manner (36%, $n=15$). Thus, teaching methods with simulation seem to be evolving from technical competencies, to general ones. More specifically, three works[33,34,53] aimed at training students on the use of the communication tool SBAR (*Situation, Background, Assessment and Recommendation*).[54] This tool is becoming important in the area of health, for communication between professionals and patients. Also, in two studies,[34,47] the simulation consisted in students experiencing the point of view of the patient and the complexity of the procedures they are subjected to, to stimulate empathy with people who are sick.

Results of learning through simulation

Most ($n=32$) of the studies described positive results in their objectives and hypotheses. Ten articles showed partially negative results with respect to their learning objectives. The negative results were associated with: (a) Simulation proposals based on ICT: one of them was not effective,[20] while the bad execution of the rest was due to a connection problems, software, or the lack of awareness about the importance of learning through the use of these technologies.[34] (b) Acquisition of knowledge: two studies showed the same efficacy between presentation-based methods, or conventional independent work,[29,55] while in others, no differences were observed in this specific area between the pre- and post-test. (c) Target students: in the studies with groups of heterogeneous professionals, some of the learning results were not met in certain types of professionals, although they were obtained in the group of students as whole. The studies with a long-term assessment observed a decrease in the knowledge or skills acquired, which indicates the need for constant updating in this area, and justifies the planning of repeated training sessions.

The results of the qualitative analyses from most of the studies stressed improvements in: leadership and communication, teamwork, critical thinking, reflective learning, making of decisions, trust, and clinical skills. It is important to note that in all the studies that assessed the perception of the students on the simulation methodology, the responses were favorable towards the use of this training method, and the importance of learning by doing. In one study, only a minority of the students indicated their preference for presentation-type methods, as compared to computer-based simulations.[55] On the other hand, the thematic analysis of a study whose simulation proposal was developed at a large scale, also revealed the theme of the complexity in organizing and developing a simulation with these

characteristics.[28] Additionally, the intervention developed in four studies promoted the assessment of errors and risks, and changed the management of the medical services themselves, where the interventions took place.[31,49-51]

Discussion

There is a large body of scientific bibliography on the field of simulation as a teaching-learning method for Health Professionals. However, publication in high-impact scientific journals predominated in English-speaking countries, and were immersed in university education and continuous education. Teaching through simulation is a well validated methodology.[2] It has repeatedly been shown that it improves competency in many skills,[56] as well as the trust perceived, the behaviors of speaking out loud, communication, and teamwork,[57] so that simulation as an teaching method is deemed to be an excellent tool for addressing the skills required in multidisciplinary teams.[56] The results of this systematic review indicate that the simulation methods did not increase the level of knowledge acquired, although they benefited the acquisition of skills and competencies, the central axes of modern education.[58] Most of the works analyzed showed that these skills were acquired in a more significant manner in the high-fidelity simulation method through role-playing, in which person-to-person interactions are produced in a space with high-fidelity. The posterior *debriefing* sessions stimulate self-criticism, supported or not by watching the recorded scenarios, so that this methodology successfully combines experiential and reflective learning.[59] Likewise, most of the simulation programs were positively evaluated by students, although only a few studies assessed the efficacy of this methodology beyond the first evaluation model by Kirkpatrick.[60]

On the other hand, although simulation through the use of virtual reality seems to be a very attractive area in the field of health education,[15] the present review indicates that currently, there is little evidence on this respect. It is perhaps that this development is hampered by the technological difficulty inherent in simulation programs through virtual reality, together with its associated costs. Thus, the methods based on role-playing are still the *gold standard* in Healthcare. Also, the design of simulation programs must consider the need to repeat it in the long term, as our analysis pointed to the existence of a decrease in the knowledge or skills acquired through time; the modification of programs at the educational level and the training of the students, especially in the case of interdisciplinary groups, to obtain good results;[61] or the costs and logistic complications derived from the organization of large simulation training programs.[28]

Among the limitations of the study, we must consider those from the included studies themselves. Most of the studies were local in nature, and with small samples selected by convenience. However, most of the studies included utilized a mixed methodology and assessed the learning of the individuals through repeated measurements before and after the event (pre/post-test), and their systematic analysis offered very homogeneous results with respect to the advantages of learning through simulation.[4]

In conclusion, clinical simulation is a teaching methodology that has been progressively implemented in the last two decades, mostly in English-speaking countries, that utilizes techniques for its execution and assessment that have been validated and contrasted in many scientific studies, and which is useful for the training of general competencies and multidisciplinary teams.

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Stress levels and coping strategy of nursing students in online learning during COVID-19 Pandemic. A mixed-methods study

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Stress levels and coping strategy of nursing students in online learning during COVID-19 Pandemic. A mixed-methods study

Abstract

Objective. To explain the stress level and coping strategies of nursing students in online learning during Covid-19 pandemic. **Methods.** Explanatory sequential mixed method QUAN-QUAL study conducted at a private university in Bandung, Indonesia. Of the 260 nursing students, 157 consented to participate and answered a Depression Anxiety Scale-42 (DDAS-42) and The Ways of Coping in the Indonesian version. The participants of the quantitative phase with the indicative of stress were interviewed individually ($n=17$) to provide an in-depth understanding of the students' experiences of stress and coping strategy in online learning. **Results.** Almost one out of two students (47.1%) had some level of stress (16% between severe and extremely severe). Most nursing students (45.9%) used emotion focused coping strategies. Stress level was

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significantly higher among female students and internship academic level ($p<0.05$). Nursing students' sources of stress were new experiences and hindrances to online learning. Coping strategies included seeking support and positive acceptance. **Conclusion.** A high proportion of nursing students experienced stress during their education process in COVID-19 times; they used specially emotion-focused coping strategies to reduce barriers to online learning.

Descriptors: COVID-19; students, nursing; anxiety; depression; adaptation, psychological; internet-based intervention.

Nivel de estrés y estrategias de afrontamiento de los estudiantes de enfermería por el aprendizaje en línea durante la pandemia COVID-19. Un estudio de métodos mixtos

Resumen

Objetivo. Describir el nivel de estrés y las estrategias de afrontamiento de los estudiantes de enfermería en el aprendizaje en línea durante la pandemia de Covid-19. **Métodos.** Estudio secuencial de método mixto QUAN-QUAL realizado en una universidad privada de Bandung, Indonesia. De los 260 estudiantes de enfermería, 157 consintieron en participar y respondieron las escalas de Depresión y Ansiedad-42 (DDAS-42) y la de Formas de Afrontamiento. Se entrevistó individualmente a los participantes que en la fase cuantitativa mostraron indicios de estrés ($n=17$) para conocer en profundidad sus experiencias y las estrategias de afrontamiento empleadas. **Resultados.** Casi uno de cada dos estudiantes (47.1%) presentó algún nivel de estrés (16% entre severo y extremadamente severo). El 45.9% de los estudiantes utilizo estrategias de afrontamiento centradas en las emociones. El nivel de estrés fue significativamente mayor en el sexo femenino y en el nivel académico de internado ($p<0.05$). Las fuentes fueron las nuevas experiencias y los obstáculos para el aprendizaje en línea. Las estrategias de afrontamiento incluyeron la búsqueda de apoyo y la aceptación positiva. **Conclusión.** Una alta proporción de estudiantes de enfermería experimentó estrés durante su proceso de formación en tiempos de COVID-19, ante lo cual utilizó estrategias de afrontamiento centradas en las emociones para reducir las barreras al aprendizaje en línea.

Descriptores: COVID-19; estudiantes de enfermería; ansiedad; depresión; adaptación psicológica; intervención basada en la internet.

Nível de estresse e estratégias de enfrentamento de estudantes de enfermagem devido ao aprendizado online durante a pandemia de COVID-19. Um estudo de métodos mistos

Resumo

Objetivo. Descrever o nível de estresse e as estratégias de enfrentamento de estudantes de enfermagem no ensino online durante a pandemia do Covid-19. **Métodos.** Estudo sequencial de método misto QUAN-QUAL realizado em uma universidade particular em Bandung, Indonésia. Dos 260 estudantes de enfermagem, 157 consentiram em participar e responderam às escalas de Depressão e Ansiedade-42 (DDAS-42) e Formas de Enfrentamento. Os participantes que na fase quantitativa apresentaram sinais de estresse foram entrevistados individualmente ($n=17$) para conhecer a fundo as experiências de estresse e as estratégias de enfrentamento utilizadas. **Resultados.** Quase um em cada dois alunos (47.1%) apresentou algum nível de estresse (16% entre grave e extremamente grave). 45.9% dos alunos usaram estratégias de enfrentamento focadas na emoção. O nível de estresse foi significativamente maior no sexo feminino e no nível acadêmico do internato ($p<0.05$). As fontes de estresse dos estudantes de enfermagem foram novas experiências e obstáculos para o aprendizado online. As estratégias de enfrentamento incluíram a busca de apoio e aceitação positiva. **Conclusão.** Uma alta proporção de estudantes de enfermagem experimentou estresse durante seu processo de formação em tempos de COVID-19, para os quais eles usaram especialmente estratégias de enfrentamento focadas na emoção para reduzir as barreiras ao aprendizado online.

Descritores: COVID-19; estudantes de enfermagem; ansiedade; depressão; adaptação psicológica; intervenção baseada em internet.

Introduction

Online learning is defined as learning experiences in synchronous or asynchronous contexts employing a variety of devices with internet connection, such as cell phones, computers, and other devices.[1] Students can learn and engage with professors and other students from anywhere. While synchronous environment of learning needs a live and real time interactions between educators and learners, an asynchronous is more in another learning system and forums that promote learners independence learning management.[2,3] Likewise in nursing education, the importance of technology is well understood. Teaching has successfully incorporated technology into the learning process in order to prepare nursing students to function in a technology-driven health setting. Blended learning, distance learning, e-learning are an evolution in nursing education that incorporate technology in learning.[4-6]

The Coronavirus 2019 (Covid-19) pandemic globally had various impacts on the higher education climate. Social distancing initiatives were undertaken by education sectors. Online learning system was implemented in most higher education institutions.[7] Data presented by UNESCO showed that around 1.5 billion students enrolled worldwide are forced to at-home distance learning. Several countries initiated to undertake this method include Indonesia.[8] Since the first two positive cases reported in Indonesia on March second 2020, the fatality rate has continuously increased. Thus, the president of Indonesia Joko Widodo suggested "red zone" epicenters and national lock down. The educational system was corroborated with Indonesia Ministry of Education advisory No 262/E.E2/KM/2020 released on March 23, 2020. The Ministry of Education advisory suggested the online learning alternatives during COVID-19 pandemic must ensure the learning activities.[9]

Undoubtedly, this period of Covid-19 pandemic has been stressful for nursing students. Significant levels of stress among higher education students have been reported worldwide, given that during the years of Covid-19 pandemic, particularly stressful (44.4%) and also very stressful (47.2%).[10] Specifically, online learning is a learning system that is not commonly implemented in Indonesia. Nursing students may experience a great deal of stress as a result of abruptly switching from traditional to online learning.[11] Stress occurs when a person thinks that the demands are greater than his or her personal and social resources. As a result, whether or not a situation is frightening is determined by the individual's perception of it. Nursing students experience challenges as classes go online, such as being unable to concentrate and having difficulty participating, writing projects, taking tests, and achieving academic deadlines.[12] In addition, that challenges faced by students include lack of in-person interaction, distractions and time management, lack of a systematic schedule, stress and psychological pressure, missing the traditional university environment and lack of access to external learning resources.[13]

Coping strategy refers to an individual's responses to stressors. Coping strategies are stabilizing techniques for assisting individuals in maintaining psychological adaptation during stressful situations.[14] In addition coping techniques defined as either problem-based or emotion-based. In the face of a stressful event, both coping mechanisms are applied, although their effectiveness varies. Problem-focused coping seeks to alleviate distress by actively managing a stressor. Obtaining information about the stressful circumstance and its potential implications is required for this method.[15] People that employ this method attempt to prioritize their activities based on their importance and to manage their activities on a timely basis.[16] On the other hand, emotion-focused coping is aimed at dealing with the stressor's emotions and feelings. Finding techniques to manage emotions and being hopeful when confronted with stressful events are two of these strategies. People who use this approach to manage their emotions may express emotions such as rage or disappointment.[17]

Previous studies have indicated that while engaging in online learning, nursing students often used coping strategies in different ways. Nursing students have demonstrated remarkable resilience as one of their coping methods throughout Covid-19 outbreak. The learners have used humor, which studies associate with lower to moderate anxiety levels.[18] Additionally, diverse coping strategies adopted by nursing students included being married, use of emotional social support, acceptance positive reinterpretation and growth and behavioral disengagement.[19] Prior studies have explored the experience of nursing students in online learning using a qualitative research design and the stress level and coping strategies of nursing students in response to the online learning using cross-sectional design.[20] Therefore, this study used a mixed method design to explore the stress levels and coping strategy of nursing students in online learning during Covid-19 outbreak in a private nursing school.

Methods

Design. This study used an explanatory sequential mixed-method design. Separate quantitative and qualitative data were assessed, but they were combined and discussed. While the quantitative phase was based on surveys, the qualitative phase was based on in-depth interviews using semi-structure questions to explore the various stress sources and coping strategies adopted in the online learning environment.

Setting and participants. Nursing students were recruited from one nursing school of a private university in Bandung, Indonesia, which was expeditiously running online learning due to Covid-19 outspread provision from March 2020. The inclusion criteria were students in bachelor nursing program both in academic and internship stage who experienced online learning in full semesters of 2020/2021 academic year, understood the study purpose, agreed to participate in this study and signed the consent form. A total of 260 nursing students from the bachelor nursing program, and 157 nursing students completed the questionnaire, while 17 bachelor students participated in face-to-face interviews.

Data Collection. Questionnaires of quantitative measurement in this study included basic characteristics, the Depression Anxiety Stress Scale-42 (DASS-42) and The Ways of Coping. DASS-42 was adopted from Psychology Foundation of Australia and The Ways of Coping was adopted from Folkman and Lazarus. Both questionnaires were translated to the Indonesian version and the scales have been shown to have good reliability in many populations. While the reliability of Chronbach's alpha stress dimension of DASS-42 was 0.89, The Ways of Coping was 0.81. Score indicator for DASS-42 was normal (0-14), mild (15-18), moderate (19-25), severe 26-33) and extremely severe (>34). While coping indicators are described by coping focused on problems, emotions and used together in a balanced way.[21,22] Using semi-structured questions, a qualitative

data guide was created. The participants were encouraged to share freely about their experience of stress and coping strategy used during the period of online learning amid Covid-19 pandemic. The interview questions were: (1) What are the main stressors in online learning during the Covid-19 pandemic? (2) How do you manage stress while engaging in online learning during Covid-19 pandemic? (4) Could you describe how you expect the stress to be reduced?

Data Analysis. Variables were analyzed using descriptive statistics which included: percentage, frequencies, mean and standard deviation (SD) for gender, age stress levels and coping strategies utilization. Nursing student's *t*-test were used to test the differences in means of stress and coping strategies scores by gender and academic levels. The significant level was set at $p<0.05$. Whilst the qualitative data were analyzed using content analysis according to Creswell.[23] The qualitative data was read numerous times in order to fully comprehend the responses. Units that met the objectives were identified and grouped together into shorter passages. To summarize the text further, they were coded together and grouped into categories and subcategories. After qualitative data analysis, a theme developed.

Rigor. Credibility involves establishing the truth of the qualitative research study's findings. In this study, researchers used a peer debriefed strategy to ensure the trustworthiness of the qualitative data gathered. During and after the data gathering and analysis process, the peer debriefed was asked for some inputs for general methodology, transcripts and final report. Afterwards, researchers provided the feedback to enhance credibility and ensure validity of the investigation.

Ethical Consideration. This study was conducted in accordance with national and international standards for research involving human subjects, including approval by the Institutional Review Board (IRB) of Faculty of Nursing Science (KEPK No: 158/EKS-SU-VIII/20). All participants signed an informed consent form.

Results

The results of the quantitative phase

Univariate analysis shows the description of characteristics of the respondent, distribution of stress level and distribution of coping strategy. The number of respondents was as many as 157 students, the mean age of bachelor nursing student was 21.7 years, and most of the respondents were female (67.5%). Meanwhile, based on the academic year, more respondents were at the internship level (32.5%). Analysis on stress levels distribution, the finding showed almost one out of two students (47.1%) had some level of stress (16% between severe and extremely severe). Based on the score ranges from the stress level (DASS-42), the mean scores of stress for all students were found at moderate level 23.42 (SD=1.78). Analysis on coping strategy distribution, most nursing students (45.9%) used emotion focused coping strategies with the mean score at 20.48 (SD=4.23). Bivariate analyses showed the relationship between gender and academic level among nursing students with their mean of stress and coping strategies are shown in Table 1. Statistically significant relationship was found between mean stress level with gender and academic level, where the mean scores were higher in the female group than that in male group. Likewise in academic level, internship level was found highest in the mean score among academic level groups. The ways of coping were not significantly different by both gender and academic level.

Table 1. Mean scores of Stress Levels and The Ways of Coping scales by gender and academic level

Variables	*n* (%)	Stress Levels Mean-± SD	The Ways of Coping Mean-± SD
Gender			
Male	51 (32.5)	13.13 (7.43)	19.32 (6.92)
Female	106 (67.5)	24.67 (7.09)	20.56 (7.05)
p-value		0.005	0.092
Academic level			
Sophomore	28 (17.8)	13.13 (7.28)	21.90 (6.79)
Junior	33 (21.0)	14.66 (8.28)	19.62 (7.62)
Senior	45 (28.7)	13.40 (7.35)	23.80 (8.75)
Internship	51 (32.5)	26.27 (6.14)	22.83 (6.63)
p-value		0.012	0.441

The results of the qualitative phase

The participants ranged in age from 18-33 years (9 females and 8 males.) The results of the qualitative data were classified into two topics: Stress Sources and Coping Strategies. The themes that emerged from each of them, with their respective categories and subcategories, are detailed below and are also available in Table 2.

Table 2. The results of qualitative data analysis

Theme	Category	Subcategory
Topic: Stress sources		
New experience	Ineffective learning process	Virtual media replacing clinical practice
		Less interactive learning
		Lack of concentration
	Ineffective interaction	Lack of cooperation
		Ineffective communication
Hindrances to online learning	External impediments	Academic workload
		Technology impediment
		Remote area
	Internal factor declined	Internal learning motivation weakened

Table 2. The results of qualitative data analysis (Cont.)

Theme	Category	Subcategory
Topic: coping strategies		
Seeking support	Government support	Effective use of quota support
	Faculty support	Trying to get closer with faculty
		Enjoying the learning process
	Peer support	Seeking cooperation and collaboration
		Joke with each other
	Family support	Receive support from family members
Positive acceptance	Personal adaptation	Respond positively
		Behave positively

Topic of Stress Sources

New Experience Theme

This theme contained experiences of bachelor nursing students' stress while engaging in online learning during COVID-19 pandemic era. In the interviews, nursing students in the internship phase expressed that the learning process during online learning was not effective. The virtual media replacing clinical practice was expressed by nursing students at the internship phase. They revealed that clinical practice should be directly involved in those activities on behalf of clients, yet replaced by online learning. They also worried that they are disadvantaged if their practical skills are inadequate compared to those who practice more in hospitals. Students also feel that online learning is less able to fulfill competencies and demands of clinical learning.

On the other hand, nursing students in the academic phase described an ineffective learning process such as less interactive learning. This subcategory is exemplified by statements such as: *Like before, we couldn't see the lecturer's expression directly, the lecturer couldn't observe whether we understood it or not, that's what I heard from lecturers like that (Participant 2)*. Students in the academic phase also revealed that online learning tends to make students passive. One student explained: *Anyway, if a lecturer asks, sometimes if you want to answer, you have to switch on the microphone first, so we're kind of lazy, so we're more passive in my opinion (Participant 7)*.

In the subcategory "lack of concentration," it was expressed that nursing students could not focus on learning. One nursing student at academic phase stated: *This online system is also difficult for us to adapt at the beginning, we couldn't meet friends, and maybe sometimes when the lecturer is teaching, I play on my cell phone and then chat with friends who are here, just like that so I can't focus (Participant 11)*. One internship phase nursing student reflected: F*or me, it's quite reduced, because the concentration is not fully there. Because we can do other things, so we don't focus as usual, which is normal (Participant 16).*

In the theme "new experience," the other category namely "ineffective interaction" was found. It was due to the lack of cooperation among students as told by one nursing student at the academic stage: *But for some people it's more difficult because I don't know them, meaning we've never met and then being asked to say how it's like all out is a bit difficult, so I think it's like that, the collaboration isn't that good (Participant 1).* While one nursing student at the internship stage expressed: *For students, in my opinion, collaboration is reduced online, we students are complicated to zoom in, spending quota, it's different from offline, we can get together to work together (Participant 13).*

In the subcategory of students who remarked "ineffective communication," students experienced barriers in communicating as stated: *Because we don't meet face to face, there is sometimes a misunderstanding between what the lecturer wants and what the students get. If we want to ask, it's really complicated, we have to raise our hand first" (Participant 4).* Another student reflected: C*ommunication between lecturers and students is a bit interrupted, that's because it might be difficult to read the gestures, for example in offline class, maybe the lecturers can directly see, if in online classes this is more limited (Participant 6)*. In addition, the nursing student and lecturer interaction was constrained. One student at the academic stage stated: *So far, there has been less interaction in online classes, sometimes the lecturers call out like that, so it's like we are quiet and dry (Participant 5).*

Hindrances to Online Learning Theme

This theme was due to challenges experienced by nursing students in online learning during Covid-19 pandemic era. The "external impediments," and "internal factor declined," were found as a category of theme. In the subcategory of "academic workload," it was shown that nursing students complained about difficulties in handling assignments. One nursing student at an academic stage expressed: *The assignments are so many, then the deadline for collecting assignments is not far or tight, and sometimes doesn't understand what the lecturer explained (Participant 8*). Another nursing student also reflected: *It was at first so stressful, I was given a lot of assignments, sometimes also a lot of materials (Participant 10).*

The sub category of "technology impediment," explained how technology has limitations in facilitating online learning. Various technology challenges in the form of limitations of its technological tools and also the limitations of the technology users. One nursing student at an academic stage stated: *Gaining knowledge is difficult. Then sometimes on the internet, whether it's the lecturer or us, the internet has errors, so the lecturer's voice becomes very small. Yes, if you go directly or face to face, it's different (Participant 2).* Another nursing student also expressed: *There are lecturers who are not very good at using technology, for example we use Moodle right, sometimes their materials can't be opened because they are locked, they haven't opened the date (Participant 4).*

Moreover, the sub category of "remote area" also became a stress source to the nursing student. The network is also burdensome for nursing students as stated by one nursing student: *Poor network often makes it difficult for us to catch the material or we can't go to class because the signal is not good, it makes our understanding go down, maybe because of my place in the village (Participant 9)*. Another nursing student stated: S*ometimes maybe because of my location, which makes when I'm asking our signal broken, so the questions and answers don't connect (Participant 15).*

The category of "Internal factor declined," contained experiences of nursing student's individual responses to the new online learning system. Nursing students' motivation weakened during the online learning period, as it is reflected by one nursing student: *Learning feels very relaxed, don't have to take a shower first, just wear a t-shirt, sometimes gets too lazy, motivation to study decreases (Participant 17)*.

Topic of Coping Strategy

Seeking Support Theme

This theme contained experiences of seeking support from government, faculty, peers and family. In the category of "government support," the minister of education supported it as a form of quota support for education. Nursing students explained their coping strategy such as: *Use the learning quota facility from the government effectively. We get quota assistance from the government and it goes on time every month to our cell phones (Participant 11)*. In addition, in the category of "faculty support,"

nursing students experience of coping strategies by seeking support from faculty. Their coping strategies included maintaining relationships with the faculty. Though using technology, nursing students are trying to get closer with the faculty, as stated by one nursing student: *Trying to get closer, use effective communication via chat, if there is something I don't understand, I chat with the lecturer and the lecturer immediately answers my chat (Participant 12)*. Another nursing student in the internship stage expressed: *This is for me personally, so for example, zooming in was not clear, while the time is up, I'm going to chat again, chat again, chat again (Participant 14)*. On the other hand, the sub category "enjoying learning," nursing students were able to use some situations for leisure. Therefore, some students reflected: *The relaxed situation in online learning such as lying back while off camera or eating is not a problem for some lecturers (Participant 1).* Another nursing student at the internship stage stated: *Although online learning is a source of stress, students can use some learning situations as a means of fun, take it easy and relaxed, want to start class, just open the laptop (Participant 11).*

In the category "peer support" nursing students were seeking support from classmates in seeking cooperation and collaboration with friends, as reflected by a nursing student at internship stage: *Inviting friends to discuss cases, its cooperation, right, sharing and discussing the exercises or questions given by the lecture (Participant 10).* Another nursing student expressed: *For example, the lecturer divides groups in doing assignments, or while zooming in with the lecturer, also chatting with friends to discuss what the lecturer means (Participant 1)*. Moreover, the sub category "Joke with each other" was experienced by the nursing students to seek peer support while encountering stress on online learning. Nursing students state that they joke with each other before starting a zoom class or during a zoom class. Some lecturers give students the opportunity to throw jokes at each other in zoom.

In the category "family support" means that nursing students receive support from family such as parents or brothers and sisters in engaging in online learning. This is considered by nursing students as a means to reduce stress in online learning. One nursing student at academic stage shared: *When studying at home, there are mama and papa, so if I don't know, I can go to them, if you're offline, you can't (Participant 2)*. Another nursing student reflected: *Closer to the family, more time to rest, even though there are many tasks, you can relax, right (Participant 9).*

Positive Acceptance Theme

This theme is described by the experience of nursing students as an effort to cope with stress due to a drastic change from traditional learning to online learning. Students at the internship stage show more meaningful adaptation in dealing with the stress of online learning. Most of them gave a positive response and behavior in dealing with the online learning environment. In regard to positive responses, some reflected that though online learning, they still gain knowledge. One example statement: *I think there are more positives, because even in this situation, even though we are online, we can still gain knowledge online, right? (Participant 13).* In regard to positive behavior, some revealed that they keep on learning with enthusiasm and gratitude, and take valuable experiences in online learning. One example statement: *For example, we take the positive things, we accept the situation we live in with God's help, everything can be done (Participant 17*).

Discussion

The findings of this study showed that almost one out of two students had some level of stress (16% between severe and extremely severe) range of stress levels, they were encountered with various forms of stressors. Nursing students in both the academic and internship stages were faced with changes in the learning system from traditional learning to online learning. This agrees

with a previous study who found nursing students considered online learning very stressful during the COVID-19 outbreak. Several factors associated were found as devices used, stability of internet connection, income status, and geographic area.[24] These all contribute to the stress level of nursing students in online learning.

The academic stage of the bachelor nursing program is not surprising that at this stage it is more towards academic completion. Students are expected to meet learning outcomes that refer to the National Higher Education Standards 2015, for level 6, bachelor degree. The learning outcomes encompasses aspects of general attitudes and skills as contained in the Nurses Education Curriculum.[25] On the other hand, the internship stage of the bachelor nursing program is a professional nursing education in Indonesia. It is an advanced stage of education from academics in the undergraduate nursing program. The students will experience an adaptation process of professional nursing that is able to accept delegation of authority to carry out nursing care. Based on the Nurses Education Curriculum, the internship program is a clinical practice based. Nursing students expected to be able to apply theories and concepts obtained during the academic stage in the form of practice. However, in the COVID-19 pandemic era, it was replaced with online learning. Undoubtedly, stress perceived by the nursing students.[26]

The three coping strategies utilized by the nursing students in both academic and internship stages in this study were emotion focused, problem focused and used together in a balanced way. While most nursing students utilized emotion focused coping strategies, fewer nursing students utilized both the problem and combination of the two coping strategies. This finding is suitable to previous studies that validated emotion focused and problem focused coping strategies. While emotion focused coping encompasses the processes that serve to reduce emotional distress, problem focused strategies look to change the situation for the better. The emotion focused coping covers the acceptance, positive restructuring, and humor, whilst problem-focused coping covers generating alternative solutions, planning and taking action to resolve or circumvent the stressor.[27] In the qualitative results, the theme of stress source "new experience" emerged from the two categories "ineffective learning process," and "ineffective interaction." The other theme of stress sources, "hindrances to online learning," emerged from the category "external impediments," and "internal factor declined." A prior study found that students' experiences of the transition from face-to-face to e-learning in the context of COVID-19 pandemic.[28] Another study showed that nursing students experienced technological challenges, academic relationship changes, role stress/ strain and student resilience.[29] Another study highlighted the students' responses about online learning experienced by students in the COVID-19 pandemic era. Several aspects found including the positive and negative impact of online learning, economic conditions and anxiety during online learning.[30] These studies described earlier supported the recent qualitative findings.

The qualitative finding of coping strategies utilized by nursing students covers the theme "seeking support," that emerged from several categories including government, faculty, peer and family support. The theme "positive acceptance," emerged from the category "personal adaptation." These results are consistent with the findings of previous studies. Seeking information and consultation were found as a possible coping strategy for nursing students while encountering stress in online learning during COVID-19 pandemic era. In addition, this study noted that maintaining a positive attitude in seeking information and consultation was a positive coping strategy associated with better mental outcomes among nursing students.[31] Another study validated the viable strategy for positive coping is accepting attitudes towards online learning positive coping strategies including active coping, positive re-framing, planning and acceptance.[32,33]

In conclusion, the findings of this study showed that most nursing students were at the normal range of stress level, yet could not be denied they encountered the stressors while engaging in online learning in COVID-19 pandemic era. Nursing students both in the academic and internship stage preferred to utilize emotion focused coping strategies. The new experience and hindrances to online learning became the source of stress in online learning. While new experience stressors came from ineffective learning process and ineffective interaction during online learning, hindrances to online learning came from external impediments and internal factors declined. The coping strategies such as seeking support and positive acceptance were used to deal with stressors during online learning. The government, faculty, peer and family support gave students strength to survive while encountered with stressors. In addition, personal adaptation was used as a positive coping strategy to deal with stress.

Relevance to clinical practice. This study provides relevant information on what could help improve teaching and learning process in online learning for students and thus have positive impact on the quality of care for patients. While there is a growing body of research on stress and coping mechanisms in online learning, a need to continue to study it through thoughtful, well-designed studies to serve as a guide to scholars and educators in online learning and beyond.

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Review

Multilevel Self-Management in Nursing Research: An Approach to Decrease Health Disparities in Chronic Diseases

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Multilevel Self-Management in Nursing Research: An Approach to Decrease Health Disparities in Chronic Diseases

Abstract

Objective. To discuss multilevel self-management intervention research in nursing to decrease health disparities among people living with chronic diseases. **Content synthesis.** Multilevel interventions have become the core of nursing research in the last decade. However, a critical limitation of existing interventions targeting health disparities among those living with chronic diseases is the tendency to address single or individual-level factors solely. **Conclusions.** Nursing research is creating knowledge that may be translated into clinical practice and promoting evidence-based and innovative self-management practices to decrease health disparities and promote health equity among people living with chronic diseases.

Descriptors: chronic disease; self-care; health status disparities; healthcare disparities; nursing research.

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Intervenciones de autogestión multinivel en la investigación en enfermería: Un enfoque para disminuir las disparidades de salud en enfermedades crónicas

Resumen

Objetivo. Analizar la investigación realizada por enfermería en intervenciones multinivel de automanejo con el fin de disminuir las disparidades de salud entre las personas que viven con enfermedades crónicas. **Síntesis de contenido.** Las intervenciones multinivel se han convertido en el núcleo de la investigación en enfermería en la última década. Sin embargo, una limitación crítica de las intervenciones existentes que se enfocan en las disparidades de salud entre quienes viven con enfermedades crónicas es la tendencia a abordar factores individuales o de nivel individual únicamente. **Conclusiones.** La investigación en enfermería está creando conocimiento que puede traducirse en la práctica clínica y promueve prácticas de autocuidado innovadoras y basadas en evidencia para disminuir las disparidades en la salud y promover la equidad en la salud entre las personas que viven con enfermedades crónicas.

Descriptores: enfermedad crónica; autocuidado; disparidades en el estado de salud; disparidades en atención de salud; investigación en enfermería.

Intervenções multiníveis de autogerenciamento na pesquisa em enfermagem: uma abordagem para reduzir as disparidades de saúde em doenças crônicas

Resumo

Objetivo. Analisar a pesquisa realizada pela enfermagem em intervenções multiníveis de autogestão para reduzir as disparidades de saúde entre pessoas que vivem com doenças crônicas. **Síntese de conteúdo.** As intervenções multiníveis tornaram-se o núcleo da pesquisa em enfermagem na última década. No entanto, uma limitação crítica das intervenções existentes que visam as disparidades de saúde entre aqueles que vivem com doenças crônicas é a tendência de abordar apenas fatores individuais ou de nível individual. **Conclusões.** A pesquisa em enfermagem está criando conhecimento que pode ser traduzido para a prática clínica e promovendo práticas de autocuidado inovadoras e baseadas em evidências para diminuir as disparidades de saúde e promover a equidade na saúde entre pessoas que vivem com doenças crônicas

Descritores: doença crônica; autocuidado; disparidades nos níveis de saúde; disparidades em assistência à saúde; pesquisa em enfermagem.

Introduction

Changes in healthcare management have allowed more people to live with chronic diseases (CD) that were once acute and life-threatening.[1] A CD is a physical or mental health condition that extends for more than one year leading to functional restrictions and increasing medical care needs.[2] CD have become a significant U.S. public health issue, where 60% of adults live with one or more[3] and 27.2% have multiple CD, representing over 85% of annual health care costs, or 3.8 trillion dollars.[1,2] The consequences of CD significantly impact the social, mental, and physical health of people living with them. Usually, CD are reflected in poor quality of life and negative consequences for individuals, caregivers, families, and communities.[4] Cancer, diabetes, hypertension, stroke, asthma, and HIV are examples of CD leading to hospitalization, long-term disability, and mortality.[4]

Diverse CD share common challenges associated with their management, including symptom recognition, medication adherence, and complex regimens.[5] Individuals must also develop strategies to maintain proper nutrition, exercise, adjust to psychosocial demands (e.g., lifestyle regimens), and engage in effective relationships with healthcare providers over time.[5] Therefore, self-management offers promise for a better understanding of the disease's symptoms and management.

In addition, a CD self-management approach helps inform the development of strategies for evaluating health outcomes focused on decreasing health disparities and increasing the wellness of people facing CD.[6,7] Health disparities usually result from social determinants of health (SDOH), or the conditions in places where people live, learn, work, and play, affecting a wide range of health-related outcomes and, consequently, individuals' quality of life.[8]. In the last decade, approaches to decreasing health disparities and improving people's quality of life with CD have increasingly become the core of nursing research.[1,9]

A critical limitation of existing interventions among those living with CD is the tendency to solely focus on single or individual-level factors. Multilevel intervention research are studies that include interventions targeted at various levels of the socio-ecological models and individual and biological factors closely related to individual health outcomes.[10] This article aims to discuss multilevel self-management approaches in nursing to reduce health disparities among people living with CD.

Self-management as a Science

Conceptual clarity regarding self-management and its integration into clinical practice is still a concern in the nursing community.[11] As a general health concept, self-management is an individual's ability, in collaboration with their family, community, and healthcare providers, to manage symptoms, treatments, lifestyle changes, and the consequences of health conditions.[12] Self-management also implies monitoring the illness and using cognitive, behavioral, and emotional strategies to maintain or manage health changes.[5] A recent definition encompassing all the previous concepts describes self-management as an intrinsically controlled ability to live with the medical role and emotional consequences of CD in partnership with social networks and healthcare providers.[11]

Historically, nursing science has explored self-management for its impactful role in disease prevention, health promotion, and symptom management. For 30 years, The National Institute of Nursing Research (NINR) in the U.S. has been focused on supporting and promoting research into the development and broader application of self-management. The science of self-management supported by the NINR is based on the individuals' and families' responsibility as active participants in maintaining the well-being of those living with CD.[1,9]

Recently, with the leadership of the new NINR Director, new research priorities have been established.[9] These new priorities include decreasing racism, using multilevel perspectives to implement interventions to address SDOH, and using nursing science approaches to advance precision health.[9] This approach targets individuals, families, and the health system as a whole. Identifying upstream SDOH at the structural (e.g., policies, services, and environments) and individual levels (e.g., behaviors, epigenetics) are the hallmarks of this new paradigm. Moreover, this approach intends to identify all these factors to develop, test, and implement interventions to address SDOH involved in the CD self-management process, consequently contributing to decreasing health disparities among individuals with CD.[9]

Health Disparities and its Relationship with Self-management and Multilevel Intervention Research

Health disparities are a difference in the outcome or the incidence/prevalence of disease, earlier onset or faster progression, poorer daily functioning or quality of life, mortality, and burden of certain diseases and other adverse health conditions among disadvantaged groups.[8] Health disparities can be further pronounced when characterized by race/ethnicity, income, insurance status, education, occupation, and other social factors.[8] Although health disparities are manifested at the individual level, other contexts, such as community and public policies, should be considered when investigating the associations between disparities and clinical outcomes.

Recognizing SDOH is the first step to combating health disparities. SDOH impact self-efficacy, health literacy, social support, health beliefs, motivation, and coping, which are relevant antecedents of self-management.[11] Altogether, these factors impact healthcare and education access, the social environment, and health outcomes, affecting individuals' ability with CD to self-manage their condition. Therefore, a holistic approach to self-management and health disparities should have an integral perspective and include interventions that address these factors together.

The focus of multilevel intervention research is to reduce the health disparities for affected populations.[6,7] Therefore, multilevel interventions target the causes of health disparities by focusing on different levels of influence that affect health, including individual (intrapersonal), microsystem (interpersonal), mesosystem (institutional), exosystem (community), and macrosystem (public policy).[13] According to Agurs-Collins and colleagues, multilevel intervention research

requires action targeting at least two or more levels of influence simultaneously or in close temporal proximity.[14] However, the approaches implemented at each level may vary in type and interaction with other levels through synergistic effects.[6]

For instance, multilevel interventions for self-management among people living with CD can be based on the socio-ecological approach. The model shows that interventions targeting factors at the individual level, such as education related to medication adherence, can be facilitated by upstream factors such as peer educators (interpersonal level) and social media campaigns to impact CD prevention (community level). At the institutional level, increasing testing sites (e.g., for diabetes mellitus, HIV, and hypertension) and promoting changes in the delivery of health services, including follow-up visits for high-risk populations, are effective options to prevent and manage typical CDs. The public policy level may include policy interventions, such as decreasing medication-related costs and increasing access to early diagnosis and treatment. This example covers potential intervention strategies that are complex and beyond the scope of a one-level intervention. In addition, it illustrates possible factors within and between levels that could be addressed through multilevel interventions to reduce health disparities and facilitate CD self-management.

Challenges and Opportunities of Multilevel Intervention Nursing Research in CD Self-management

Nurses have a leading role in proposing innovative strategies and developing training opportunities for researchers focused on CD self-management multilevel intervention studies (Table 1). Training programs on research methodology and multimethod approaches are potential areas of improvement in multilevel interventions.[14,15] As such interventions address multiple SDOH, they involve intricate levels of design, analysis, implementation, and evaluation.[14,15]

Table 1. Training Opportunities to Promote Multilevel Nursing Research Studies on CD Self-management

Stage	Training Opportunities
Design and framework	• Novel and systemic theoretical frameworks addressing multiple levels • Integration of the multimethod approaches, including quantitative, qualitative, and mix-method research • Community-based participatory research • New metrics incorporating elements from theoretical frameworks to evaluate multilevel relationships • Effectiveness of multilevel research designs to assess mechanisms associated with the self-management of chronic diseases
Statistical analysis and approaches	• Research methodology and statistical techniques available, including advanced analytical tools (e.g., structural equation modeling, multivariable logistic regression models) • Convergence of different research designs • Analysis of the variables to understand causal pathways and mechanisms affecting self-management of chronic diseases • Analysis of the temporal effects of policies in the socio-ecological context and their impact on self-management of chronic diseases
Implementation and evaluation	• Reporting the context of research studies: transparent reporting of setting, site, and clinician selection • Reporting the integration of theory, models, and interventions • Measures for outcomes at different levels • Use of transdisciplinary teams and community involvement • Assess health care system policies and practices to incentivize and promote a multilevel approach

Note. Table developed by the researchers based on Agurs-Collins *et al*.,[14] Paskett *et al*.,[7] and Stange *et al*.[15]

Nurse researchers have begun to address these challenges and demonstrate the importance of this type of research and have identified a substantial need for additional methodological development to advance the field of health disparities research surrounding self-management of CD.[14] In this context, using theoretical frameworks to guide multilevel studies is fundamental.[14] The selection of an appropriate framework will support selecting appropriate measures and culturally appropriate interventions. One strategy is to develop interventions based on socio-ecological and bio-behavioral frameworks to identify the mechanisms linking SDOH of CD and health-related outcomes.[9]

Another challenge is the adequate selection of methodological approaches to address multilevel intervention research. It would be crucial to provide the resources and strategies to train more nurses on self-management and on utilizing the appropriate statistical techniques available, including the convergence of different research designs.[7] Weak analytic plans, inadequate sample sizes, and statistical approaches that do not account for the complexity of data across levels are recognized as limitations when designing multilevel intervention studies.[14] Further, strengthening innovative methods through the implementation of expert-led review panels, utilization of common data elements such as standardized data collection tools, and data collection in large populations are strategies for designing multilevel intervention studies.[1]

The lack of transdisciplinary teams needed to design and evaluate multilevel interventions and the lack of sufficient time and resources are critical challenges to consider.[14] Multilevel interventions require significant monetary effort for which researchers and potential grants must be prepared. Multilevel intervention designs must also consider the time frame, which is usually more extensive than single-level interventions, and the larger sample sizes with extended follow-up periods that are often required to see synergistic effects between and within levels.[15]

The use of multimethod approaches that integrate quantitative and qualitative research across multiple levels is essential for outcomes of interest in health disparities research.[15] Simultaneous data collection using both approaches may provide opportunities to work with small groups and identify specific interlevel processes. It is relevant to mention that community-based participatory research and implementation science approaches can also provide opportunities to execute successful multilevel research among people living with CD.[9]

Statistical challenges for multilevel studies include analyzing outcomes at each targeted level and examining mediators and moderators involved in these relationships.[6,16] Nurse researchers should be cautious about the lack of independence between the variables due to the correlation or clustering of data. Robust research methodology and available techniques' training on advanced analytical approaches and power assessment are necessary to evaluate outcomes.[6,16]

A relevant challenge faced by researchers during the implementation of multilevel research is the historical lack of engagement at the public policy level. Vital SDOH disparities often lie within upstream ecological levels.[14] Achieving long-lasting improvements to individuals and communities will likely require buy-in from politicians and others at the policy level.[7] Adding public policy-level changes to the interventions might result in greater proximal and distal outcomes.

Unfortunately, few detailed reports have described how multilevel interventions have been implemented in a successful way.[15] Although multilevel interventions are contextual, most reports fail to report the studies' process adequately.[15] This situation can result from uncontrolled and unpredictable changes in contextual variables (e.g., transportation, access to medical care) within and across levels.[14] Such changes may be more remarkable among people living with CD because these intervention-

relevant factors can be less stable and change over time.[14] Consequently, a more detailed report of the setting, site, researchers, context and range of applications is needed.[15]

Further, training grant reviewers who focus on assessing the accuracy of the setting for this approach and on the empirical evaluation of interventions is critical. Parameters such as fidelity or acceptability can be challenging to maintain in low-resource settings with competing health and welfare priorities.[14] Remarkably, the National Institutes of Health in the U.S. emphasizes the need for researchers to describe the feasibility, generalizability, acceptability, sustainability, and accessibility of research findings of available interventions, especially for underserved and vulnerable populations.[9]

Conclusion. Self-management is a complex phenomenon that implies intersectoral work to target health disparities among disadvantaged groups, especially those living with CD. Given that a broad range of factors make up the CD self-management process, nursing research utilizing multilevel interventions is needed. Despite challenging concerns, multilevel intervention studies may be most effective at reducing health disparities, having a broader public health impact among underserved populations than interventions focusing on only one or two levels. These may help not only to prevent CD but also to encourage and inform individuals on effectively self-managing their CD.

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Original article

Smartphone addiction and its impact on quality of sleep and academic performance among nursing students. Institutional based cross-sectional study in Western Rajasthan (India)

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Smartphone addiction and its impact on quality of sleep and academic performance among nursing students. institutional based cross-sectional study in Western Rajasthan (India)

Abstract

Objective. To explore the smartphone addiction and its impact on quality of sleep and academic performance among the nursing students. **Methods.** A descriptive cross-sectional study was conducted among the nursing students ($n=160$) in tertiary care teaching hospital in western Rajasthan (India) by using standardized Smartphone Addiction Scale Short Version (SAS-SV), the quality of sleep was assessed by standardized Pittsburg's Sleep Quality Index scale (PSQI) and academic performance was assessed by self –made Academic Performance Scale. **Results.** In this study 38.1 % students were having moderate smartphone addiction. The smartphone addiction is directly associated with hours daily spend on smartphone ($p<0.001$), time check smartphone after wake up in the morning ($p<0.001$), and frequency of smartphone pickups in a day ($p=0.003$) of students. The quality of sleep is inversely associated with duration of smartphone use ($p=0.004$), hours daily spend on smartphone ($p=0.002$), time check smartphone after wake up in morning ($p=0.010$), of students The academic performance is significantly associated with hours daily spend on smartphone ($p=0.003$), time check smartphone after wake up in morning ($p=0.001$), and frequency of smartphone pickups in a day ($p=0.015$) of students. **Conclusion.** A high proportion of nursing students have moderate smartphone addiction. This addiction was associated with an increased risk of poor sleep quality and poor academic performance. Educational activities on the healthy use of smartphones are needed in the studied group.

Descriptors: academic performance; sleep quality; smartphone; students, nursing; cross-sectional studies.

Adicción a los teléfonos inteligentes y su impacto en la calidad del sueño y el rendimiento académico entre los estudiantes de enfermería. estudio transversal de base institucional en el oeste de Rajastán (India)

Resumen

Objetivo. Explorar la adicción a los teléfonos inteligentes y su impacto en la calidad del sueño y el rendimiento académico entre los estudiantes de enfermería. **Métodos.** Se realizó un estudio descriptivo transversal entre los estudiantes de enfermería ($n=160$) en el hospital universitario de atención terciaria en el oeste de Rajastán (India). Se empleó la escala estandarizada Smartphone Addiction Scale Short Version (SAS-SV), la calidad del sueño se evaluó mediante el Pittsburg's Sleep Quality Index (PSQI) y el rendimiento académico se evaluó mediante la Escala de Rendimiento Académico de elaboración propia. **Resultados.** En este estudio, el 38.1% de los estudiantes presentaban adicción moderada a los teléfonos inteligentes. Esta

adicción se asoció con las horas diarias dedicadas a los teléfonos inteligentes ($p<0.001$), el tiempo de revisión de los teléfonos después de despertarse por la mañana ($p<0.001$), y la frecuencia de uso durante el día ($p=0.003$). La calidad del sueño se asoció inversamente con los años de uso del teléfono inteligente ($p=0.004$), las horas diarias de uso ($p=0.002$) y el tiempo de revisión del teléfono después de despertarse por la mañana ($p=0.01$). El rendimiento académico también se asoció en forma inversa con las horas diarias de uso del teléfono ($p=0.003$), el tiempo de revisión del teléfono después de despertarse por la mañana ($p=0.001$), y la frecuencia de uso del teléfono en un día ($p=0.015$). **Conclusión.** Una alta proporción de estudiantes de enfermería tienen adicción moderada a los teléfonos inteligentes. Esta adicción se asoció a un mayor riesgo de mala calidad del sueño y de bajo rendimiento académico. Es necesario llevar a cabo actividades educativas sobre el uso saludable de los teléfonos inteligentes en el grupo estudiado.

Descriptores: rendimiento académico; calidad del sueño; teléfono inteligente; estudiantes de enfermería; estudios transversales.

Dependência de smartphones e seu impacto na qualidade do sono e desempenho acadêmico entre estudantes de enfermagem. Estudo transversal de base institucional no oeste do Rajastão (Índia)

Resumo

Objetivo. Explorar o vício em smartphones e seu impacto na qualidade do sono e no desempenho acadêmico entre estudantes de enfermagem. **Métodos.** Um estudo transversal descritivo foi realizado entre estudantes de enfermagem ($n = 160$) em um hospital universitário terciário no Oeste Rajasthan (Índia). Foi utilizada a escala padronizada de dependência de smartphones, Scale Short Version (SAS-SV), a qualidade do sono foi avaliada usando o Pittsburg's Sleep Quality Index (PSQI) e desempenho acadêmico foi avaliado por meio da Escala de Desempenho Acadêmico de nossa própria elaboração. **Resultados.** Neste estudo, 38.1% dos alunos apresentaram dependência moderada de smartphones. Esse vício foi associado a horas diárias gastas em smartphones ($p<0.001$), tempo verificando telefones após acordar pela manhã ($p<0.001$) e frequência de uso durante o dia ($p=0.003$). A qualidade do sono foi inversamente associada à duração do uso do smartphone ($p=0.004$), horas diárias de uso ($p=0.002$) e tempo gasto checando o telefone após acordar pela manhã ($p=0.01$). O desempenho acadêmico também foi inversamente associado com horas diárias de uso do telefone ($p=0.003$), tempo gasto verificando o telefone após acordar pela manhã ($p=0.001$) e frequência de uso do telefone num dia ($p=0.015$). **Conclusão.** Uma alta proporção de estudantes de enfermagem tem um vício moderado em smartphones. Esse vício foi associado a um risco aumentado de má qualidade do sono e baixo desempenho acadêmico. É necessária a realização de atividades educativas sobre o uso saudável de smartphones no grupo estudado.

Descritores: desempenho acadêmico; qualidade do sono; smartphone; estudantes de enfermagem; estudos transversais.

Introduction

In the modern world highly revolving technology, the use of smartphones has become a very necessary gadget. According to studies, there are 5.22 billion smartphone users in the world. This accounts for 66.6 % of the global population data according to 2021. Moreover, the number of smartphone users has increased by 1.8% from January 2020 to January 2021 during the covid-19 pandemic period.[1] On average, a person spends 6 hours and 54 minutes on the internet. A person accesses their phone 160 times a day, or once every 9 minutes, according to 2020 statistics. In class, 49 percent of pupils are using their smartphones as a distraction. As a result, 76.19 percent of professors think that students' use of smartphones during class is distracting.[1] It has been seen that students preoccupied while on a smartphone, get decreased awareness of what is happening around their surroundings, he/she is not aware of what she is speaking, doing, or eating as their eyes and mind is focusing on their smartphone. According to Hassan et al. said that utilised for online learning or other types of learning, smartphones have a detrimental impact on students' academic performance. Students spend the bulk of their time on their smartphones, which severely lowers their ability to communicate and work in groups.[2] People use their smartphones more frequently during COVID -19 periods because all universities provide online courses. The majority of people have demonstrated smartphone addiction. 69.7% of respondents said they could not focus on their homework at home, 97.6% of them said they had nomophobia, and 45.1% said they were addicted to their smartphones.[3]

Overuse of smartphones reduces sleep quality, which has an impact on students' learning, focus, memory, and ability to make decisions.[4] Students at universities require enough, high-quality sleep for optimal academic success. Despite having a strong understanding of the value of sleep and how it affects their academic performance, students often neglect their sleep schedules.[5] Sleep quality has significant impact on cognitive ability and physical strength, the consequences of poor sleep quality and also have some serious problem such as depression, impaired work performance, and poor overall quality of life.[6] Students spend more time browsing social media and gaming apps on their smartphones, which results in excessive smartphone use, time spent on the device other than for studying, and low academic achievement.[7] The nursing profession is the backbone of the health care system and nursing students are one of the upcoming healthcare givers whose own health wellbeing is very important to provide health services. This topic is chosen because very few studies are performed in India on undergraduate nursing students. This study is giving a picture depicting addition of smartphone and its impact on quality of sleep and academic performance in student nurses who are undoubtedly a pillar of a successfully working community healthcare system.

Methods

In this cross-sectional descriptive research design, we evaluated the mobile addiction and its impact on quality of sleep and academic performance among nursing students in from March to May 2022. The study participants were selected by using the total enumerative sampling technique. The sample size calculation is based on a similar study found through the review of literature done by Noruzi Kuhdasht[8] where d=confidence interval, that is 7% (0.07) t=1.96, it is standard deviation score for 95% set interval *p*=assumed or estimated proportion so p=0.24 q=(1-p) = 1-0.24 q=0.76, the sample size was calculated as 143, while considering 10% non-response rate, a total sample size of 160 participants were considered for present study.

Nursing students who have smartphone and using for last 6 months were included in the study. Those Students who already suffer from sleep issues and are using sleep medicine and not available at the time of data collection were excluded from the study. Based on the objective of the study self-structured questionnaire and standard tools were used to gather information regarding smartphone addiction, quality of sleep and academic performance. It consists of following part: (i) *Demographic data*: It includes 10 questions related to socio demographic data such as age, gender, education, living area, duration of smartphone use, daily hours spent on smartphone, when you wake up in the morning at what time you check your smartphone, use of smartphone, frequency of smartphone use, and family history of sleep disorder; (ii) *The Smartphone addiction scale short version (SAS-SV)*: this scale is a self-reported, standardised questionnaire that measures smartphone addiction. Short-version of SAS consists of 10 items on six-point Likert's scale named with strongly agree to strongly disagree. All 10 items are positive items. The Cronbach's alpha reliability of SAS-SV is 0.911,[9] *(iii) Pittsburgh Sleep Quality Index (PSQI)*: standardized and self-rated questionnaire which assesses sleep quality and disturbances over month time interval. Quality of sleep includes quantitative aspects of sleep, such as sleep durations, sleep latency or number of arousals, as well as more purely subjected aspects, such as depth or restfulness of sleep. The PSQI contains 19 self-rated questions which are included in the scoring the 19 self-rated items are combined to form seven component scores. The index has score for 7 items: quality of sleep, delay of falling asleep, effective duration of sleep, sleep efficacy, sleep disorders, needed number of sleep-inducing pills, and day-time performance. Each item has a score of 0 to 3 (0 indicates no difficulty and 3 indicates severe difficulty) and these items form overall score of 0 to 21. The reliability of PQSI is 0.726,[10] *(iv) Self-structured academic performance scale:* the self-structured academic performance scale was prepared by investigators to assess the academic performance among the nursing students. This tool consisted of 9 items of 3 points Likert's scale Scoring: For positive items: always (3), sometimes (2), never (1). If the student score between 9-15, will be having good academic performance and if score is between 22-27, considered as poor academic performance. The Cronbach's alpha reliability of the scale is 0.887.

Ethical approval was taken from the institutional ethical committee to conduct the study. The certificate Reference Number is AIIMS/IEC/2022/3890 dated: 25 February 2022. The written permission and informed consent were taken from the principal and students respectively. Confidentiality and anonymity of the students and data collected were maintained throughout the study. To respect the ethical codes, the institution remained anonymous in this study. Data were coded and entered an excel sheet and analysed using SPSS software version 16 (IBM Inc, Armonk, New York, USA). Descriptive statistics, including frequency, percentage, mean, and standard deviation, were used for central and deviation indexes. Inferential statistics were used to find the level of association between the selected personal variables and smartphone addiction, quality of sleep and academics performance.

Result

In the present study, we approached 160 nursing students where 44.4% of students were in the age group of 20-21 years. Most of the students 98.1% were females in this study. The professional course of 87.5% of students was B.Sc. (Hons.) nursing and 12.5% of students were M.Sc. 30 nursing. The Majority of students 86.2% were living in a hostel and 13.8% of students were living at home with parents. Half of the students 51.2% were using smartphones for 1 to 3 years of duration. The majority 37.5% of students spent 1 to 3 hours daily on smartphones. Majority of 31.9% students were check smartphone within 5 minutes after wake up in morning. Majority of 43.8% student's pickups smartphone 11-20 times per day followed by 19.1% were more than 30 times. The majority of 92.5% students were use the smartphone for academic uses followed by 91.8% were social media. Most of the students 92.5% had no family history of sleep disorder. (Table 1)

Table 2 shows 38.1 % students were having moderate smartphone addiction. This addiction among student's ranges from 10-45 with a mean of 26.44±8.67. Also 42.5% of students had poor quality of sleep. Quality of sleep among students range from 0 to 13 with a mean 4.73±3.10. Table 2 also shows that 5% of students were having poor academic performance; this scale in students' ranges from 9 to 24 with a mean of 14.78±3.60.

Table 1. Socio-demographic characteristics of 160 nursing students

Demographic variable	Frequency (%)
Age (Years)	
18-19	5 (3.1)
20-21	71 (44.4)
22-23	67 (41.9)
24 and more	17 (10.6)
Gender	
Male	3 (1.9)
Female	157 (98.1)
Professional course	
B.Sc. nursing	140 (87.5)
M.Sc. nursing	20 (12.5)
Place of living	
Living in hostel	138 (86.2)
Living with parents (home)	22 (13.8)
Duration of smartphone use	
Less than 1 year	6 (3.8)
1 to 3 years	82 (51.2)
4 to 6 years	41 (25.6)
More than 6 years	31 (19.4)
Hours daily spend on smartphone	
Less than 1 hour	9 (5.6)
1 to 3 hours	60 (37.5)
4 to 5 hours	55 (34.4)
More than 5 hours	36 (22.5)
Time check smartphone after wake up in morning	
Within 5 minutes	51 (31.9)
Within 6 to 30 minutes	49 (30.6)
Within 31 to 60 minutes	31 (19.4)
More than 60 minutes	29 (18.1)
Frequency of smartphone pickups in a day	
Less than 10 times per day	30 (18.8)
11-20 times per day	70 (43.8)
21-30 times per day	29 (18.1)
More than 30 times per day	31 (19.4)
Use of mobile phone	
Academic use	148 (92.5)
Social media	147 (91.8)
Playing game	25 (15.6)
Listening to music	126 (78.7)
Speaking to family and friends	141 (88.1)
Family history of sleep disorder	
Yes	12 (7.5)
No	148 (92.5)

Table 2. Levels of smartphone addiction, quality of sleep and academic performance among 160 nursing students

Scale	Score	Frequency (%)	Mean± SD
Smartphone addiction			
Mild	<30	99 (61.9)	20.91±5.88
Moderate	31-45	61 (38.1)	35.39±3.33
Total scale			26.44±8.67
Quality of sleep			
Good	0-5	92 (57.5)	2.46±1.44
Poor	6-21	68 (42.5)	7.79±1.87
Total			4.73±3.10
Level of academic performance			
Good	9-15	93 (58.1)	12.23±1.89
Average	16-21	59 (36.9)	17.76±1.57
Poor	22-27	8 (5.0)	22.37±0.74
Total			14.78±3.60

A significant positive correlation was seen between smartphone addiction and quality of sleep ($r=0.45$; $p<0.001$) which states that those students who had greater smartphone addiction had poor quality of sleep and also showed a significant positive correlation between smartphone addiction and academic performance ($r=0.5$; $p<0.001$), which states that those students who had smartphone addiction they had poor academic performance. A significant positive correlation was seen between quality of sleep and academic performance ($r=0.32$; $p<0.001$) states that those students who had poor quality of sleep were having poor academic performance.

It was found that smartphone addiction and academic performance significant association between hours daily spend on smartphone, time check smartphone after wake up in morning and frequency of smartphone pickups in a day. Furthermore, quality of sleep is significantly associated with duration of smartphone use, hours daily spend on smartphone, time check smartphone after wake up in morning and family history of sleep disorder. (Table 3)

Table 3. Association of smartphone addiction, quality of sleep, and academic performance with demographic variables (*n*=160)

Demographic Variables	Smartphone addiction		*p*-value	Quality of sleep		*p*-value	Academic performance			*p*-value
	Mild f (%)	Moderate/ Severe f (%)		Good f (%)	Poor f (%)		Good f (%)	Average f (%)	Poor f (%)	
Age (Years)			0.13			0.06				0.42
18-19	5 (3.1)	0 (0)		5 (3.1)	0 (0)		5 (3.1)	0	0	
20-21	47 (29.4)	24 (15)		42 (26.2)	29 (18.1)		41 (25.6)	27 (16.9)	3 (1.9)	
22-23	39 (24.4)	28 (17.5)		39 (24.4)	28 (17.5)		35 (21.9)	28 (17.5)	4 (2.5)	
Above 23	8 (5)	9 (5.6)		6 (3.8)	11 (6.9)		12 (7.5)	4 (2.5)	1 (0.6)	
Gender			0.30			0.13				0.33
Male	1 (0.6)	2 (1.2)		3 (1.9)	0 (0)		3 (1.9)	0	0	
Female	98 (61.2)	59 (36.9)		89 (55.6)	42.5)		90 (56.2)	59 (36.9)	8 (5)	
Professional course			0.85			0.80				0.49
B.Sc. nursing	87 (54.4)	53 (33.1)		81 (50.6)	59 (36.9)		79 (49.4)	54 (33.8)	7 (4.4)	
M.Sc. nursing	12 (7.5)	8 (5)		11 (6.9)	9 (5.6)		14 (8.8)	5 (3.1)	1 (0.6)	
Place of living			0.85			0.27				0.2
Living in hostel	85 (53.1)	53 (33.1)		77 (48.1)	61 (38.1)		82 (51.2)	48 (30)	8 (5)	
Living with parents	14 (8.8)	8 (5)		15 (9.4)	7 (4.4)		11 (6.9)	11 (6.9)	0 (0)	
Duration of smartphone use			0.14			0.001				0.249
< 1 year	5 (3.1)	1 (0.6)		6 (3.8)	0 (0)		6 (3.8)	0 (0)	0 (0)	
1 to 3 years	53 (33.1)	29 (18.1)		56 (35)	26 (16.2		49 (30.6)	29 (18.1)	4 (2.5)	
4 to 6 years	27 (16.9)	14 (8.8)		18 (11.2)	23 (14.4		24 (15)	14 (8.8)	3 (1.9)	
More than 6 years	14 (8.8)	17 (10.6)		12 (7.5)	19 (11.9)		14 (8.8)	16 (10)	1 (0.6)	
Hours daily spend on smartphone			<0.001			0.003				0.003
<1 hour	6 (3.8)	3 (1.9)		6 (3.8)	3 (1.9)		8 (5)	0 (0)	1 (0.6)	
1 to 3 hours	51 (31.9)	9 (5.6)		43 (26.9)	17 (10.6)		44 (27.5)	14 (8.8)	2 (1.2)	
4 to 5 hours	30 (18.8)	25 (15.6)		31 (19.4)	24 (15)		28 (17.5)	24 (15)	3 (1.9)	
6 and more hours	12 (7.5)	24 (15)		12 (7.5)	24 (15)		13 (8.1)	21 (13.1)	2 (1.2)	
Time check smartphone after wake up in morning			<0.001*			0.002*				0.001
0 to 5 minutes	24 (15)	27 (16.9)		22 (13.8)	29 (18.1		23 (14.4)	24 (15)	4 (2.5)	
6 to 30 minutes	25 (15.6)	24 (15)		24 (15)	25 (15.6		21 (13.1)	25 (15.6)	3 (1.9)	
31 to 60 minutes	26 (16.2)	593.1)		24 (15)	7 (4.4)		25915.6)	6 (3.8)	0 (0)	
61 and more minutes	24 (15)	5 (3.1)		22 (13.8)	7 (4.4)		24 (15)	4 (2.5)	1 (0.6)	
Frequency of smartphone pickups in a day			0.003*			0.42				0.015
<10 times per day	21 (13.1)	9 (5.6)		15 (9.4)	15 (9.4)		23 (14.4)	6 (3.8)	1 (0.6)	
11-20 times per day	51 (31.9)	19 (11.9)		44 (27.5)	26 (16.2)		44 (27.5)	24 (15)	2 (1.2)	
21-30 times per day	16 (10)	13 (8.1)		18 (11.2)	11 (6.9)		16 (10)	12 (7.5)	1 (0.6)	
31 and more times per day	11 (6.9)	20 (12.5)		15 (9.4)	16 (10)		10 (6.2)	17 (10.6)	4 (2.5)	
Family history of sleep disorder			0.37			0.018*				0.69
Yes	6 (3.8)	6 (3.8)		3 (1.9)	9 (5.6)		7 (4.4)	5 (3.1)	0 (0)	
No	93 (58.1)	55 (34.4)		89 (55.6)	59 (36.9)		86 (53.8)	54 (33.8)	8 (5)	

Discussion

Nowadays, a very large number of populations especially the young people is excessively spending their time and enjoying smartphone. However, in recent literature has been revealed that the excessive use of smartphone can influence daily life activities and may cause addiction.[11] This study was conducted among 160 nursing students to explore smartphone addiction and its impact on quality of sleep and academic performance among nursing students.

Students and use of smartphone

The current study result shows that, 37.5% students spent 1-3 hours daily on mobile. These findings are in resemblance with another similar study.[12] This study showed that the 91.8% students use mobile for social media These results are in line with other studies from Turkey,[13] Germany[14] claiming that most students are heavily using the platform of social media on mobile.

Another study involving college students in Hainan showed a 40.5% mobile phone addiction rate.[15] Consequently, the finding is complementary to our study finding where 38.1% students are moderately addicted with smartphone.

Smartphone addiction and quality of sleep

Current study shows 61.9% of students were having mild smartphone addiction and 38.1 % of students were having moderate smartphone addiction. It supported by another study which out of 100 students, 54% of students were found to be not addicted, while 46% of were addicted to smartphone.[16] The present study shows smart phone addiction and quality of sleep it shows 42.5% of students had poor quality of sleep. These findings are similar to the findings of a previous study, which out of 224 students, 63.3% of students were found poor quality of sleep. Poor sleep quality may experience more stress and lack of physical and mental health. The smartphone addiction significantly correlated with poor quality of sleep and this finding is complementary to other study which a positive correlation between smartphone addiction score (SV) and PSQI score.[17]

Lemolas *et al.* have evaluated the relationship between smartphones, and sleep disturbances in adolescents and found association between smartphone and impaired sleep.[18] This finding are resemble with our study. Sei *et al.* reported that large proportion of participants disclosed poor sleep (61.6%). This finding is congruent to our study where 42.5% students had poor quality sleep.[19] The current study result shows that, quality of sleep is significantly associated with duration of smartphone use, hours daily spend on smartphone, time check smartphone after wake up in morning and family history of sleep disorder. These findings are in resemblance with another similar study conducted by Mortazavi et al. determined a statistically significant relationship between the number of sleeping problems and the amount of time they used mobile phones.[20]

Smartphone addiction and academic performance

The present study shows the mean of smartphone addiction and academic performance are 26.44±8.677 and 14.78±3.604. The smartphone addiction significantly correlation with academic performance. In other similar study mean impact on academic and smartphone dependency score are 19.92±7.01 and 48.58±11.46.[21] The nursing students are faced academic pressure due to overload of assignment and stressful environment, so they are prone to develop social anxiety and mobile phone addiction it leads to lack of academic performance. The academic performance is significantly associated with hours daily spend on smartphone (p=0.003), time check smartphone after wakeup in morning (p=0.001), and frequency of smartphone pickups in a day (p=0.015) of students. This finding is congruent by another study conducted in Korea which time spent daily on weekends, frequency of use on weekdays, purpose of use, Nomophobia

(NMP), and smartphone addiction (SA) were significantly associated with low perceived academic performance (PAP).[22] Further, incorrect and excessive mobile phone use may lead to an academic burnout,[23] this finding are aligns with our study where students had poor academic performance who are addicted with smartphone. The study of Chaudhury and Tripathy that examined the relationship between smartphone addiction and academic performance[24] concluded that high addiction to smartphones lowers academic performance. This finding had an agreement with our study. Our study demonstrated a significant positive correlation between quality of sleep and academic performance ($p<0.001$). Other two studies revealed similar finding that there is a significant association between sleep quality and academic performance.[25,26]

Conclusion. Dependency on gadgets among students has been increasing nowadays, as they spend crucial hours of their day-to-day life on such appliances, which in the long run causes problems in academics and sleep pattern and social life. The present study concluded that increased frequency of smartphone usage among college students leaves a serious impact on their academics and quality of sleep. Therefore, institutions need to develop guidelines and protocols regarding smartphone usage and should also conduct educational activities on the healthy use of smartphones.

Limitations: This study is limited to one institute with nursing students and one-time data was collected, which limits and its generalizability of findings. No any significant intervention was given to the participants.

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Depression and Physical activity among cardiac patients undergone cardiac events: a correlational study

Original article

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Depression and Physical activity among cardiac patients undergone cardiac events: a correlational study

Abstract

Objective. To assess prevalence of depression and its relationship with physical activity among individuals who have experienced a cardiac event. **Methods**. This descriptive study involved 196 cardiac patients receiving treatment at selected cardiac hospitals of Punjab (India). Subjects were chosen using purposive sampling technique. After getting informed written consents from the participants the data was collected using International Physical Activity Questionnaire (IPAQ) and Beck Depression Inventory-II (BDI-II). **Results**. The results showed that majority (62.2%) of the cardiac patients had moderate clinical depression and 11.2% of patients had severe depression. 86.7% of the patients had low level of physical activity (<600 MET min/week). There was also a significant negative correlation between the depression and physical activity depicting the higher

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the physical activity, lower was the depression score and vice-versa ($p<0.05$). Moreover, study results revealed that physical activity was significantly associated with age and educational status; whereas, depression was not associated with selected demographic variables. **Conclusion.** The current investigation has brought to light that a vast majority of individuals suffering from cardiac issues exhibited signs of moderate to severe depressive symptoms. Additionally, the findings indicate an inverse relationship between depression and physical activity. Consequently, it is crucial for nurses to concentrate on identifying early indicators of depression and physical inactivity so that individualized care plans can be developed to enhance the overall health of cardiac patients.

Descriptors: depression; exercise; cardiovascular diseases.

Depresión y actividad física entre pacientes sometidos a eventos cardiacos: un estudio correlacional

Resumen

Objetivo. Evaluar la prevalencia de la depresión y su relación con la actividad física entre las personas con que han presentado un evento cardíaco. **Métodos**. Este estudio descriptivo involucró a 196 pacientes cardíacos que recibieron tratamiento en hospitales cardíovasculares seleccionados de Punjab (India). Los sujetos fueron elegidos utilizando la técnica de muestreo intencional. Después de obtener los consentimientos informados por escrito de los participantes, los datos se recopilaron utilizando el Cuestionario Internacional de Actividad Física (IPAQ, por sus siglas en inglés) y el Inventario de Depresión de Beck-II (BDI-II). **Resultados**. La mayoría (62.2%) de los pacientes cardíacos tenían depresión clínica moderada y otro 11.2% tenían depresión severa. El 86.7% de los participantes tenía bajo nivel de actividad física (<600 MET min/semana). Se encontró una correlación negativa significativa entre la depresión y la actividad física, ya que cuanto mayor era la actividad física, menor era la puntuación de depresión y viceversa ($p<0.05$). Además, los resultados del estudio revelaron que la actividad física se asoció estadísticamente con la edad y el nivel educativo; mientras que no se encontró que la depresión estuviera estadísticamente asociada con variables demográficas seleccionadas. **Conclusión.** El presente estudio reveló que la mayoría de los pacientes cardíacos tenían síntomas depresivos moderados o severos. Los resultados también mostraron que la depresión y la actividad física estaban inversamente correlacionadas. Por lo tanto, el enfoque en la detección de síntomas tempranos de depresión e inactividad física por parte de los enfermeros es crucial para la formulación de un plan de atención individualizado para promover el bienestar de estos pacientes cardíacos.

Descriptores: depresión; ejercicio físico; enfermedades cardiovasculares.

Depressão e atividade física em pacientes submetidos a eventos cardíacos: um estudo correlacional

Resumo

Objetivo. Avaliar a prevalência de depressão e sua relação com a atividade física em cardiopatas. **Métodos.** Este estudo descritivo envolveu 196 pacientes cardíacos recebendo tratamento em hospitais cardíacos selecionados em Punjab, Índia. Os indivíduos foram escolhidos usando a técnica de amostragem intencional. Após obter o consentimento informado por escrito dos participantes, os dados foram coletados por meio do Questionário Internacional de Atividade Física (IPAQ) e do Inventário de Depressão de Beck-II (BDI-II). **Resultados.** A maioria (62.2%) dos cardiopatas apresentava depressão clínica moderada e outros 11.2% apresentavam depressão grave. 86.7% dos participantes apresentavam baixo nível de atividade física (<600 MET min/semana). Foi encontrada correlação negativa significativa entre depressão e atividade física, pois quanto maior a atividade física, menor o escore de depressão e vice-versa ($p<0.05$). Além disso, os resultados do estudo revelaram que a atividade física esteve estatisticamente associada à idade e escolaridade; enquanto a depressão não foi estatisticamente associada com variáveis demográficas selecionadas. **Conclusão.** O presente estudo revelou que a maioria dos cardiopatas apresentava sintomas depressivos moderados ou graves. Os resultados também mostraram que depressão e atividade física foram inversamente correlacionadas. Portanto, o foco na detecção precoce de sintomas de depressão e sedentarismo pelos enfermeiros é crucial para a formulação de um plano de cuidados individualizado para promover o bem-estar desses cardiopatas.

Descritores: depressão; exercício físico; doenças cardiovasculares.

Introduction

Myocardial Infarction (MI) is a cardiac emergency that requires immediate medical attention to prevent further complications.[1] Every year approximately 7-8 million people suffer from MI.[2] After MI, there are severe symptoms of depression with a prevalence rate of 19.8%. More than 1/3rd of cardiac patients face these symptoms for more than a year.[3,4] Studies have shown that despite different medical approaches used, the depression among cardiac patients was not fully cured[5] because the treatment of cardiac disorders mainly focuses on physical causes rather than psychological factors.[6] However, many studies revealed an inverse relationship between the level of depression and the type of physical activity.[7,8] The use of exercise programs among cardiac patients has brought significant improvement in their outcomes and decreased depression.[9] Thus, the health care team including nurses must possess an understanding of the fact that cardiac events are accompanied by depression which must be dealt simultaneously to achieve the optimum level of health. Nurses are supposed to play a key role in the management of cardiac patients and for delivering the comprehensive nursing care. They need to keep in mind the coexisting physical and mental symptoms while planning the nursing interventions. Merely observing change in behavior and detecting depression is not easy, it needs analyzing the patient daily to find mental issues in them which a nurse can do as she is in close contact with them.[10] Hence, the study was conducted with objectives to assess the depression and physical activity among cardiac patients and to find out the relationship between depression and physical activity among cardiac patients undergone cardiac events.

Methods

The present study used a quantitative research approach with a descriptive research design. The study's sample size was determined using a 5% type I error level and an expected 10% of proportion in the population of clinical depression in post-cardiac event patients[11] and d=5%, resulting in a sample size of 138. However, a larger sample size was selected to prevent the loss of participants. Between September 2022 and December 2022, 196 cardiac patients undergoing treatment at designated hospitals in Punjab, India, were enrolled using purposive sampling methods. To be eligible, participants had to have experienced a cardiac event (such as myocardial infarction, coronary artery disease, stable angina, or heart failure), undergone cardiac interventional procedures (such as Coronary Artery Bypass Grafting, Valve Replacement, Percutaneous Coronary Interventions, Pacemaker, or Implanted Cardioverter Defibrillator), and be in class-I and II according to the New York Heart Association Functional Classification of Heart Failure.

The patients who had unstable angina pectoris, acute endo-myocarditis, recent phlebothrombosis, and arrhythmia were excluded. Written informed consent was taken from subjects. Thereafter, data was collected from participants during their regular visit to the concerned cardiologists using interview technique. Physical activity was measured in terms of Metabolic Equivalent of Task (MET) min/week using the International Physical Activity Questionnaire (IPAQ) as it cannot be subjectively quantified.[12] Low physical activity was categorized as <600 MET min/week, moderate physical activity was categorized as 600-1500 MET min/week, and high physical activity was categorized as at least 1500-3000 MET min/week. Depressive symptoms were assessed using the Beck Depression Inventory-II, which has a possible score range of 0-63. A score of more than 40 indicated extreme depression.

Ethical clearance was obtained from Institution Ethics Committee (EC/NEW/INST/2020/531/CU/09). The permission was also taken from Hospital Administrators and Consultant physicians. Confidentiality of the information was maintained. IBM SPSS (version 21) was utilized for data analysis. Demographic data (such as age, gender, marital status, etc.) as well as depression and physical activity, were presented as frequency and percentages. Pearson's correlation coefficient was used to determine the correlation between depression and physical activity. Independent T-test and One-way ANOVA were utilized to assess associations. Post-hoc tests were utilized to determine pairwise comparisons of means contributing to the overall significant difference observed while computing F statistics. The level of significance for all tests was set at $p<0.05$.

Results

In the present study, most of the patients 76 (38.8%) were in age group 51-60 years with a male preponderance 53.6% (105 out of 196), the majority [164 (83.7%)] of the cardiac patients were married, 127 (64.8%) had educational status up to the middle, 121 (61.7%) were not-working and were homemakers, 108 (55.1%) were non-vegetarians, 165 (84.2%) were taking alcohol, 170 (86.7%) were not currently smoking or consuming tobacco, 52 (26.5%) had 2 years of duration of heart disease, 77 (39.3%) patients had coronary artery disease as primary etiology, 81 (41.3%) patients cardiac history of CABG, 98 (50%) patients had CABG as therapeutic intervention done, 128 (65.3%) patients had 3 coronary vessels blocked and 116 (59.2%) patients had comorbidity. (Table 1)

Table 1. Frequency and Percentage distribution of the characteristics of 196 patients

Characteristics	n	%
Age (in years)		
30-40	10	5.1
41-50	47	24.0
51-60	76	38.8
> 60	63	32.1
Gender		
Male	105	53.6
Female	91	46.4
Marital status		
Married	164	83.7
Single	2	1.0
Widowed/ Divorced	30	15.3
Educational status		
Up to Middle	127	64.8
Up to Secondary	37	18.9
Graduation	32	16.3
Employment status		
Not-working	121	61.7
Part-time working	75	38.3
Full-time working	0	0
Occupation		
Not-working/Homemaker	121	61.7
Business/Commercial	31	15.8
Govt./Private job	44	22.4
Dietary pattern		
Vegetarian	88	44.9
Non-Vegetarian	108	55.1
Specific habits		
Alcohol	165	84.2
Smoking	26	13.3
Tobacco	26	13.3

Characteristics	n	%
Duration of heart disease (in years)		
1	30	15.3
2	52	26.5
3	44	22.4
4	31	15.8
5	20	10.2
6	19	9.7
Primary etiology		
Coronary	77	39.3
Hypertension	54	27.6
Cardiomyopathy	30	15.3
Mitral Regurgitation	16	8.2
Diabetes Mellitus	12	6.1
Rheumatic Heart Disease	7	3.6
Cardiac history / Diagnosis		
Myocardial infarction	30	15.3
Stroke/Transient ischemic attack	28	14.3
Coronary Artery Bypass Graft	81	41.3
Stable Angina	29	14.8
Percutaneous Coronary Interventions	28	14.3
Therapeutic intervention done		
Revascularization	36	18.4
Percutaneous Coronary Interventions	62	31.6
Coronary Artery Bypass Graft	98	50.0
Number of vessels blocked		
1	30	15.3
2	38	19.4
3	128	65.3
Co-morbidities		
Yes	116	59.2
No	80	40.8

Table 2. Frequency and Percentage distribution of level of depression in 196 cardiac patients

Level of depression	Possible range	n	%
Normal	1-10	0	0
Mild mood disturbance	11-16	16	8.16
Borderline clinical depression	17-20	36	18.37
Moderate depression	21-30	122	62.24
Severe depression	31-40	22	11.22
Extreme depression	41-63	0	0

The study results revealed that the majority of the cardiac patients (62.24%) had a moderate level of depression and 11.22 percentage of patients had severe depression, while 18.37 percent had borderline clinical depression. (Table 2) Additionally, the study results demonstrated that the majority (86.73%) of cardiac patients exhibited low levels of physical activity, whereas only 13.27 percent of them followed a moderate level of physical activity.

The relationship between depression and physical activity was computed using Pearson's correlation coefficient resulted in value of -0.368 ($p<0.001$). The null hypothesis was rejected as there was a statistically significant negative and mild relationship between depression and physical activity i.e., the higher the physical activity, the lower was the depression score.

The association between age and physical activity among cardiac patients was found to be statistically significant ($p<0.01$) and cardiac patients in the age group 30-40 years (627.500±369.783) were physically more active than other higher age group patients. (Tables 3A and 3B)

Table 3A. Association between Age (in years) with the level of depression and physical activity among 196 cardiac patients

Variables	Age (in years)	N	Mean (Std. Deviation)	df	F stats	*p*-value
Level of Depression	30-40 years	10	24.400 (6.058)	4.192	2.121	0.653
	41-50 years	47	26.191 (6.787)			
	51-60 years	76	27.842 (6.661)			
	Above 60 years	63	28.619 (6.500)			
Physical Activity	30-40 years	10	627.500 (369.783)	4.192	7.468	0.009
	41-50 years	47	396.712 (270.758)			
	51-60 years	76	327.776 (205.847)			
	Above 60 years	63	303.079 (139.315)			

Table 3B. Post Hoc Test- Physical Activity vs. Age

Age (in years)	N	Subset for alpha = 0.05	
		1	2
Above 60 Years	63	303.0794	
51-60	76	327.7763	
41-50	47	396.7128	
30-40	10		627.5000
Sig.		0.393	1.000

From Tables 4A and 4B, it can be seen that the association between educational status and physical activity among cardiac patients was found to be statistically significant ($p<0.001$) and patients who were graduate (519.312±332.192) were physically more active than patients in other educational groups. Furthermore, the physical activity was also found to be significantly associated ($p<0.05$) with employment status, occupation, duration of heart disease, the number of vessels blocked and the presence of comorbidities. Cardiac patients who were Part-time working (337.805±205.049), were in business/commercial (442.242±343.988), who had heart disease duration of 3 years (439.590±294.400) and had co-morbidities (369.814±252.283) were physically more active. On the other hand, depression was not found to be statistically associated with selected demographic variables; age, employment status, occupation, duration of heart disease and number of vessels blocked, and presence of comorbidities.

Table 4A. Association between Educational Status with the level of depression and physical activity among 196 cardiac patients

Variables	Educational Status	N	Mean (Std. Deviation)	df	F Stats	*p*-value
Level of Depression	Up to Middle	127	27.740 (6.528)	3.193	0.269	0.764
	Up to Secondary	37	27.378 (6.897)			
	Graduate	32	26.812 (6.045)			
Physical Activity	Up to Middle	127	302.755 (173.891)	3.193	13.391	<0.001
	Up to Secondary	37	374.527 (209.437)			
	Graduate	32	519.312 (332.192)			

Table 4B. Post Hoc Test- Physical Activity vs. Educational Status

Educational Status	N	Subset for alpha = 0.05	
		1	2
Up to middle	127	302.7559	
Up to Secondary	37	374.5270	
Graduate	32		519.3125
Sig.		0.248	1.000

Discussion

In the present study, the majority of the patients 76 (38.8%) were in age group 51-60 years with a male preponderance 53.6% (105 out of 196) and 164 (83.7%) of the cardiac patients were married. These results were supported by the cross-sectional study conducted by Sharma Dhital P *et al.*[13] which showed that out of 168 respondents, 60.7% were male, 96.4% were married. Similarly, Fahmi I *et al* in their study titled as Relationship between Depression and Physical Activity of Myocardial Infarction Patients after Treatment revealed that of the 150 post-treatment STEMI patients, 78.7% were male.[14] In this study, 170 (86.7%) were not currently smoking or consuming tobacco, these results are similar to a cross-sectional study conducted in 2019 in Trinidad and Tobago that smoking was not common among participants.[15] In this study, the results revealed that the majority 77 (39.3%) of the cardiac patients had coronary artery disease as a primary etiology. This result is supported by the study conducted by Bahall[15] in South Trinidad which showed that the most (75%) common cardiac disease was ischemic heart disease or coronary heart disease.

In the present study, 81 (41.3%) of patients had a cardiac history of CABG, 98 (50%) patients had CABG as therapeutic intervention done, and 116 (59.2%) patients had comorbidities. Similarly, a study conducted in Nepal revealed that more than two-thirds (69.1%) of the respondents had surgery as mode of treatment. Likewise, half of the respondents (50.0%) had other comorbid conditions.[13] Physical activity is a key component in heart disease patients that is beneficial in reducing the risk of relapse.[16] In the present study, results of the analysis showed that 170 (86.73%) of the cardiac patients had low physical activity (<600 MET min/week). The results of this study are similar to study conducted in Indonesia (2019) where 82% of respondents were at the level of mild physical activity.[14] Similarly, the results of the study conducted by Matthias *et al*.[17] in 2017 in Sri Lanka, where mostly (56) respondents had low physical activity. Low physical activity is a trigger for the occurrence of myocardial infarction.[17]

Many factors are related to low physical activity. A study titled as ESC Prevention of Cardiovascular Disease Programme concluded that depression was one of the dominant factors causing low physical activity.[18] This is same as the results of present study. The results of bivariate testing found a relationship between depression and physical activity. During the state of depression, the patient becoming silent and limit their physical activity. Patients with myocardial infarction who experience depression tend to have low physical activity, and consume a lot of alcohol which is similar to the finding of the present study where 165 (84.2%) of the cardiac patients were taking alcohol.[19] The findings of the present study showed that out of 196 patients, 122 (62.24%) had a moderate level of depression and 170 (86.73%) had low physical activity. The results are supported by the previous study reporting 82% of respondents out of 150 post-MI patients had a mild level of physical activity and 95.7% of patients experienced moderate-severe depression.[20] The present study revealed a mild negative correlation between the level of depression and physical activity which is in consistent with the results of the previous studies showing a significant correlation between depression and physical activity.[21,22]

The selected variables-age, educational status, employment status, occupation, duration of heart disease, number of vessels blocked, and co-morbidities had a statistically significant association with the physical activity of cardiac patients. Similarly, the findings of a study showed that years of coronary heart disease (CHD) were negatively associated with maintaining regular physical activity and the patients with co-morbidities were 1.4 times more likely to maintain regular physical activity similar to the findings of the present study.[23]

In the present study, the mean level of depression was high (27.9) among patients undergone CABG. Similarly, Tully PJ and Baker RA also revealed that on an average, 15–20% of patients had major depression after CABG.[24] The result of the study conducted by Bahall M also showed similar findings that patients who had undergone open-heart surgery intervention experienced more depression (83.3%, $p = 0.49$).[15] Our study results are helpful in planning nursing care services for patients who had undergone cardiac events and interventions. Moreover, such findings are potentially useful while assessing the need for lifestyle management, and in designing interdisciplinary care programs for the provision of comprehensive nursing care. We recommend fellow nurses to carryout research in this area for which all the aspects of health (i.e., physical, mental, social and spiritual), and their inter-relationship can be studied.

Limitations. Although a correlational design was appropriate for this research study, it cannot determine a causal and effect association between depression and physical activity. Furthermore, in addition to the assessment of the relationship between depression and physical activity among post-cardiac event patients, future studies could investigate other mediating and moderating variables that were not included in the present study. Another limitation is that the results regarding the assessment of depression relied solely on the participants' self-reporting of depressive symptoms, which is a subjective, multidimensional, and dynamic concept. Additionally, the study subjects were enrolled from the selected hospitals, that might affect the generalizability of findings of the study.

Conclusion. Despite certain limitations, the present study showed that majority of the cardiac patients who had undergone cardiac events had moderate depressive symptoms. After carrying out further investigations, it revealed that depression and physical activity inversely affect each other. The depression is a subjective, multidimensional and a dynamic concept and screening of early signs of depression and physical inactivity by the nursing staff is of utmost importance to formulate an individualized nursing care plan. We recommend to shift the focus of treatment modalities merely from physical aspects to addition of psychological aspects of health too, to help in preventing depression and improving physical activity among cardiac patients as well as to reduce healthcare costs and increase the patients' quality of life.

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Predictors of COVID-19 Related Health Literacy among Older People Living in Rural Areas of Indonesia

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Predictors of COVID-19 Related Health Literacy among Older People Living in Rural Areas of Indonesia

Abstract

Objective. This study aims to identify predictive factors of COVID-19-related health literacy (HL) among older adults living in rural areas. **Method.** This study used a cross-sectional design. A total of 106 respondents participated in this study. HL was measured by using a questionnaire modified from the HLS-COVID-Q22, in addition, the scales 'Health Information Seeking', 'Family's Social Support Scale', 'Health Service Utilization'; and information on some socio-demographic variables was also obtained. A multiple linear regression model was used to identify the predictors of HL. **Results**. About two-thirds of the respondents had a moderate level of HL (63.2%). Multiple linear regression analysis showed that education level, family support, information source, and gender were significant predictors for HL ($p<0.01$). **Conclusion**. HL

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literacy was better among males, highly educated older people, media users, and those with adequate family support. This study provided insight for nurses and healthcare professionals to pay greater attention to vulnerable groups of older people (ie. female gender and those with less formal education) as well as involve family members in education or health promotion activities and use easily accessed media, such as television and radio.

Descriptors: COVID-19; aged; health literacy; rural areas; family support; Indonesia.

Predictores de la alfabetización en salud relacionados con el COVID-19 en las personas mayores que viven en zonas rurales de Indonesia

Resumen

Objetivo. Este estudio tiene como objetivo identificar los factores predictivos de alfabetización en salud (AS) relacionados con el COVID-19 en los adultos mayores indonesios que viven en zonas rurales. **Métodos.** Este estudio utilizó un diseño de corte transversal. Un total de 106 encuestados participaron en este estudio. La AS relacionada con el COVID-19 se midió con el cuestionario HLS-COVID-Q22, además se utilizaron las escalas 'Búsqueda de información sanitaria', 'Escala de apoyo social de la familia' y 'Utilización de servicios sanitarios'; también se obtuvo información de algunas variables sociodemográficas. Se utilizó un modelo de regresión lineal múltiple para identificar los predictores de la AS. **Resultados.** Alrededor de dos tercios de los encuestados tenían un nivel moderado de AS (63.2%). El análisis de regresión lineal múltiple mostró que el menor nivel educativo, el apoyo familiar, la fuente de información y el sexo eran predictores significativos de la AS ($p<0.01$). **Conclusión.** La AS fue mejor entre los varones, las personas mayores con alto nivel educativo, los usuarios de los medios de comunicación y aquellos con un apoyo familiar adecuado. Este estudio sugirió que las enfermeras y los profesionales de la salud deben prestar más atención a los grupos vulnerables de personas mayores (especialmente las mujeres y las personas con poca educación formal). También

mostró la importancia de involucrar a los familiares en las actividades de educación y promoción de la salud, y de usar medios de comunicación accesibles, como la televisión y la radio.

Descriptores: COVID-19; anciano; alfabetización en salud; medio rural; apoyo familiar; Indonesia.

Preditores relacionados à COVID-19 de alfabetização em saúde em idosos que vivem na zona rural da Indonésia

Resumo

Objetivo. Este estudo tem como objetivo identificar preditores de alfabetização em saúde (AS) relacionados ao COVID-19 em idosos indonésios que vivem em áreas rurais. **Métodos.** Este estudo utilizou um desenho transversal. Um total de 106 entrevistados participaram deste estudo. A AS relacionada à COVID-19 foi medida com o questionário HLS-COVID-Q22, além das escalas 'Pesquisa de informações em saúde', 'Escala de apoio social familiar' e 'Uso de serviços de saúde'; também foram obtidas informações sobre algumas variáveis sociodemográficas. Um modelo de regressão linear múltipla foi usado para identificar os preditores de HL. **Resultados.** Cerca de dois terços dos entrevistados apresentaram nível moderado de LH (63.2%). A análise de regressão linear múltipla mostrou que menor escolaridade, apoio familiar, fonte de informação e gênero foram preditores significativos de HL ($p<0.01$). **Conclusão.** A alfabetização em LH foi melhor entre os homens, idosos altamente educados, usuários de mídia e aqueles com suporte familiar adequado. Este estudo forneceu ideias para enfermeiros e profissionais de saúde prestarem mais atenção a grupos vulneráveis de idosos (ou seja, mulheres e pessoas com menos educação formal), bem como envolver os familiares em atividades de educação ou promoção de saúde e usar mídias de fácil acesso, como televisão e rádio.

Descritores: COVID-19; idoso; letramento em saúde; zona rural; apoio familiar; Indonesia.

Introduction

COVID-19 pandemic has been a major global health problem worldwide. There have been about 6 million confirmed cases in Indonesia from January 2020 to May 2022.[1] Compared to other age groups, older adults have the highest risk of hospitalization and death because of COVID-19 infection. The risks were 5 and 65 times, respectively, higher in 65 to 74-year-olds compared to 18 to 29-year-olds.[2] In Indonesia, the COVID-19 mortality rate for older people has reached 17.68%.[3] The increased vulnerability to coronavirus among older adults tends to be related to biological changes in the immune system that occur with aging, which are associated with age-related illnesses and susceptibility to infectious diseases.[4] Therefore, it is very plausible to demand older people adhere to COVID-19 precautionary measures to a greater degree than younger people.[5]

Health literacy (HL) is expected to have a critical role in adopting the recommended actions. HL is defined as "the motivation, knowledge, and competence used to access, understand, appraise, as well as apply health information, and make health-related decisions".[6] A study suggested that HL was associated with preventive health behaviors among older people.[7] Furthermore, it was found to be a significant determinant of preventive behaviour and awareness of the risk of COVID-19 infection.[8] Despite its importance to individual health and well-being, HL has been underestimated during the COVID-19 pandemic.[9] Older people are among the population groups who are most likely to experience low HL. A study demonstrated that about half of the older people had low HL.[10] Similarly, another study identified insufficient HL in 56.1% of older people at the time of the pandemic.[11]

Few studies about HL among older people have been conducted in Indonesia. These studies, however, focused on chronic diseases context such as hypertension and diabetes mellitus.[12,13] Health literacy of chronic diseases would be very distinct from infectious diseases like COVID-19.[14] Further, previous studies on COVID-19 related HL worldwide mainly focused on young adult or general population.[15-18] Studies specified to older adults population, however, remain limited.[11,19]

A slightly lower proportion of older adult in Indonesia lives in rural (48.4%) compared to urban areas (51.6%).[20] Rural older people, however, are often considered a vulnerable and disadvantaged group since they were less likely to utilize healthcare services than their urban counterparts.[21] Most older people in rural areas also had low (inadequate and problematic) health literacy.[22] Even though there are few studies examined COVID-19 HL among older people, but these studies concerned those living in urban or city areas.[11,19] To date, there is no study focused on older people population living in rural areas.

Various models have been developed to depict factors related to HL. For example, 'Sorensen's Model of Health Literacy' focuses on health literacy in non-healthcare settings.[23] According to the model, situational factors, such as social support, family and peer influences, and media use, influence HL. Whereas the 'RTI Health Literacy Skills Framework' describes health literacy as "a dynamic characteristic that may be influenced by patients' experiences from their engagement with health services".[24] During COVID-19 pandemic, social support and access healthcare services, however, has been significantly affected.[25,26] Health information seeking was also significantly changed during the pandemic.[27] Considering these major changes, therefore, it is valuable to examine how social support, access to healthcare services, and access to health information might relate to health literacy during the pandemic.

Examining COVID-19 related HL and its predictive factors among rural older people could provide new understanding and help to fill the gap in the literature. Outcome of this study, thus can guide health workers to develop strategies to enhance older people's compliance with preventive measures. This study aimed to determine predictors of health literacy with respect to the risk of COVID-19 infection among older adults living in rural areas.

Methods

Study design. A cross-sectional survey was carried out in December 2020 among older rural residents in Ambar Ketawang Village, Sleman Regency, Yogyakarta Province of Indonesia. Yogyakarta has the highest percentage of the older people population in Indonesia.[20]

Sample. The sample size was determined by using a formula to estimate the population proportion with specified absolute precision.[28] The anticipated population proportion was 50%, with a confidence level of 95%, and absolute precision of 10% resulting in 96 respondents as a minimum sample size. An additional 10% of respondents were included to prevent loss. Respondents were recruited by using the consecutive sampling method which is enrolling every single participant who meets inclusion criteria until reaching desired sample size. To be eligible, the respondents had to be aged 60-75 years, have normal cognitive function or mild impairment which demonstrated by the Short Portable Mental Status Questionnaire (SPMSQ) score of ≤ 4,[29] be literate, and live in extended family households. Respondents were excluded if they had mental disorders, severe vision, or hearing problems. One hundred and six respondents were proportionally drawn from the six hamlets in the Ambar Ketawang village. The selection of respondents followed the recommendation of the local health authority, which provided a list of individuals who met the inclusion criteria. A total of 106 respondents were contacted and agreed to participate in this study.

Data collection. Data were collected either through in-person or telephone structured interviews to standardize the data collection. Following the recommendation of the local health authority, for an in-person meeting, the duration was limited to 30 minutes for each respondent and physical distancing and protective equipment were applied during the contact. Health literacy is the dependent variable in this study. Independent variables include health information source, family support, healthcare services utilization, and sociodemographic variables. Data were collected using questionnaire comprised of five parts: health literacy, health information source, family support, healthcare service utilization, and sociodemographic. *(i) Health literacy*. The HL was measured using the modified HLS-COVID-Q22 questionnaire.[15] The original version contains 22 items and used a 4-point rating scale on four domains: accessing, understanding, appraising, and applying health information regarding the coronavirus. In the present study, the questionnaire was translated into Bahasa

Indonesia and then translated back into the original language. No significant discrepancies between the original and the translated version were found. A pilot study was conducted on 30 older people who were excluded from the main study sample to measure the reliability of the instrument. With regard to internal consistency, nearly all item-total correlations were more than 0.374, indicating good internal consistency. However, three items were removed due to their low total correlation. The Cronbach's alpha was 0.819. The final adapted version consisted of 19 items with a score ranging from 19-76. A higher score means a higher HL. Category: Inadequate ≤50% (≤47), moderate >50%-<66% (48-56), sufficient ≥66% (≥57);[22] *(ii) Health information source*. It consisted of a single item adapted from the 'Health Information Seeking' measures.[.] The respondents were asked where they mostly looked for information about COVID-19 during the pandemic by selecting one of the following categories: 1) family, friends, and neighbors; 2) healthcare professionals; 3) traditional media, such as television, radio, newspapers, magazines; and 4) digital media, such as the internet and social media. This variable was then further categorized into either personal (e.g., family, friends, neighbors, and healthcare professionals) or media (traditional media and the internet); *(iii) Family support*. The family support questionnaire items were derived from the 'Family's Social Support Scale' which was adapted for the circumstances of this study.[31] The original instrument was developed based upon four social support dimensions: emotional, instrumental, appraisal, and informational support, and comprised 32 question items using a 5-point Likert scale. The adapted questionnaire consisted of 17 items and used the 4-point Likert scale instead of 5 to prevent respondents from selecting a "neutral" response. A pilot test of 30 respondents showed the reliability of the questionnaire was acceptable with Cronbach's alpha coefficient of 0.874. The item-total correlations were nearly all positive and more than 0.374. The internal consistency of the questionnaire was improved by the deletion of three items. The final adapted questionnaire comprised 14 items. The total score ranges from 14-56, where a higher score would indicate higher support; *(iv) Healthcare services utilization*. The questions were derived from the 'Health Service Utilization' questionnaire which was adapted for the circumstances of this study.[32] The original scale consisted of 8 items rated on a Guttman scale. A positive response would be counted as one point and a negative response as zero. After a pilot testing, 4 items were deleted due to their low total correlation (less than 0.374). The Cronbach's alpha value was 0.734, demonstrating good internal consistency. The final questionnaire consisted of four items. The score ranges from 0-4, with a higher score meaning higher utilization; and, *(v) Sociodemographic*. The sociodemographic variables of the study's population consisted of four items with open-ended questions and multiple-choice responses, including age, gender, education level, and income.

Data analysis. Data processing was performed by using the IBM SPSS version 25.0 software. Data were analyzed using descriptive statistical methods and multiple linear regression. Descriptive statistics were employed to characterize the respondents' demographic profiles and the study's variables. To determine the factors that influence the respondents' HL, multiple linear regression was used.

Ethical considerations. This study was approved by the Research Ethics Committee of the Faculty of Health Sciences, Jenderal Soedirman University, Indonesia, on 4 December 2020 with registration number 233/EC/KEPK/XII/2020. Respondents were treated in accordance with the tenets of the Declaration of Helsinki. Prior to participation, respondents were explained the aim and nature of this study, then signed an informed consent form if they agreed to participate. Ethical principles including autonomy, privacy, dignity, confidentiality, and anonymity were ensured throughout the study.

Results

A total of 106 older people participated (Table 1). The mean age of our respondents was 67.1 years (±4.91). About two-thirds of them were female (65.1%), had low education levels (junior secondary education or lower) (60.4%), and had low income (65.1%).

Table 1. Demographic characteristics of respondents (*n*=106)

Variables	Value
Age (years); mean (SD)	67.1 (4.91)
Gender; *n* (%)	
Male	37 (34.9)
Female	69 (65.1)
Education level; *n* (%)	
Low (junior secondary school or lower)	64 (60.4)
High (senior secondary school or college)	42 (39.6)
Income; *n* (%)	
Low (below 129 USD per month)	69 (65.1)
Standard (≥ 129 USD per month)	37 (34.9)

The result showed that almost two-thirds of the respondents had a moderate level of HL (63.2%), with a mean score of 51.36 (±5.970). The family support score was 38.80±5.36, which was considered moderate relative to its possible score range (14-56). A different result was shown by the healthcare service utilization variable with an average score of only 1.75±1.53, which is at a slightly lower end of its possible score range (0-4). Regarding information sources, most respondents accessed COVID-19-related information from the media, primarily the traditional ones, such as TV, radio, newspapers, and magazines (53.8%) (Table 2).

Table 2. HL, information access, family support, and healthcare services utilization (n=106)

Variables	Value
HL scores); mean (SD)	51.36 (5.97)
HL levels; *n* (%)	
Inadequate	21 (19.8)
Moderate	67 (63.2)
Sufficient	18 (17.0)
Information source; *n* (%)	
Family, friends, neighbors	28 (26.4)
Healthcare professionals	2 (1.9)
Traditional media (TV, radio, newspapers, magazines)	57 (53.8)
Digital media (the internet, social media)	19 (17.9)
Family support; mean (SD)	38.80 (5.36)
Healthcare services utilization; mean (SD)	1.75 (1.53)

Range of scores for HL 19-76; family support 14-56; healthcare service utilization 0-4

Pearson correlation coefficient and independent t-test were used to determine the relationships among studied variables with the mean of HL. The result showed that family support and healthcare service utilization were significantly and positively correlated with HL ($p<0.001$ and $p<0.01$ respectively). Older people who accessed health information from media also had a better HL than those who received it from family, friends, neighbors, and healthcare personnel ($p<0.01$). All the demographic variables, except for age, showed a significant relationship with HL (Table 3).

Table 3. The association between HL scores and information access, family support, healthcare service utilization, and demographic characteristics (*n*=106)

Variable	Health Literacy Scores mean (SD) or r
Information source	
Personal (family, friend, neighbors, & healthcare professionals)	48.53 (5.58)[b,**]
Media (traditional media & digital media)	52.47 (5.77)
Family support	0.467[a,***]
Healthcare services utilization	0.257[a,**]
Age (years)	-0.051[a]
Gender	
Male	53.08 (4.83)[b,*]
Female	50.43 (6.33)
Education level	
Low (junior secondary school or lower)	48.67 (5.63)[b,***]
High (senior secondary school or college)	55.45 (3.74)
Income[b]	
Low (below 129 USD per month)	49.48 (5.84)[b,***]
Standard (≥ 129 USD per month)	54.86 (4.473)

[a]*Analyzed using Pearson correlation,* [b] *analyzed using independent t-test, *p<0.05, **p<0.01, ***p<0.001*

The predictors of HL are presented in Table 4. Out of the four models, all significant predictors remained in model 4. In this model, accessing health information from media, higher family support, male gender, and higher education were significant predictors of better HL. The adjusted R^2 of the 4th model was 0.458, indicating that 45.8% of the variance observed in HL can be explained by independent variables including information source, family support, gender, and education.

Table 4. Multiple linear regression analysis of the predictors of HL

Variable	Model 1	Model 2	Model 3	Model 4
Information source (ref category: media)	-0.255**	-0.255**	-0.246**	-0.242**
Family support	0.299***	0.300***	0.313***	0.330***
Healthcare services utilization	0.071	0.071	-	-
Age	-0.006	-	-	-
Gender (ref category: male)	-0.215**	-0.214**	-0.218**	-0.228**
Education (ref category: high education)	-0.285**	-0.284**	-0.302**	-0.364***
Income (ref category: standard income)	-0.126	-0.127	-0.126	-
R^2	0.494	0.494	0.489	0.478
Adjusted R^2	0.458	0.463	0.464	0.458

***p<0.01; ***p<0.001*

Discussion

The present study aims to identify the factors that influence HL regarding COVID-19 among older people living in rural areas. The findings showed that accessing information from media, having better family support, being male, and attaining a higher level of education significantly influenced HL in preventing COVID-19. Health information source refers to the primary source of information accessed by older people to obtain information regarding COVID-19. In this study, those who primarily accessed the media either traditional such as television, radio, newspapers, magazines, or digital for example the internet to obtain information regarding COVID-19, were more likely to have better HL than those who received information from personal resources, such as family, friends, neighbors, and healthcare professionals. Similarly, a study by Hoa *et al*.[33] suggested that listening to TV and radio, reading the paper, and using the internet were positively associated with HL in older people. The lower HL found among those who rely on personal resources might be because older people were suggested to stay at home and restrict their mobility as part of COVID-19 preventive measures. This situation is likely to cause them to have limited access to information. A previous study also demonstrated that older adults who have poor access to health information materials tended to show inadequate HL.[11]

Among media users, many of them accessed traditional media compared to digital media. In Indonesia, access to digital technology was lower among older age groups, as shown by lower levels of mobile phone and smartphone ownership, and usage levels of digital communications such as social media.[34] Similarly, a study in Thailand demonstrated that senior citizens in the country had an intermediate level of internet literacy.[35] Older people and those with low internet skills tend to find health information from conventional media instead of the internet.[30] Older people could benefit from using the internet for various purposes, including accessing health information.[33] It should, however, be done with caution because during the outbreak the internet and social media have exploded with inaccurate information and conflicting messages about COVID-19.[36]

Family support was also found to be a significant predictor of older people's HL. Older people that had higher family support were likely to demonstrate higher HL. This finding is consistent with a previous study, which indicated that older people that receive high-level social support from family members were more likely to have proficient HL.[11] Generally, social support can come from different sources. In Indonesia, family members, particularly adult children are the main source of social support for older people.[37]

The critical role of the family in an individual's HL has also been suggested in a study by Edwards *et al.*[38] The study proposed the concept of 'distributed health literacy' which believes that HL is distributed through social networks, including families. The family acts as HL mediators as they pass their HL skills and provide support to the individual to become more health literate.[38] This role has grown in importance in this digital age. Many older people experience difficulties in accessing information due to their limited digital skills or ability to evaluate the accuracy of the information obtained. Thus, the family may bridge the "digital divide" by facilitating access and usage of health information technology, teaching skills, and acting as online delegates.[39]

The interesting finding in this study was that even though family support was positively correlated with health literacy, older people who depend on personal resources, including family members, had a lower health literacy compared to those who used media to get information. The possible explanation is that family members can be a good source of information, however, their understanding of Covid-19 might be quite limited. Family support might be not expressed by giving older people information, but instead, giving access to the media.

Gender and education level were two demographic characteristics that significantly influence older people's HL. In this study, those with higher education levels tended to have better HL than their counterparts. A similar finding has been indicated in different studies.[10,40,41] Pechrapa *et al.*,[11] however, reported no differences in HL between individuals who have attended primary school and those with better levels of education. Nevertheless, better-educated people tended to have more access to health information, better communication with healthcare providers and better skills to find out health information.[10]

The findings of this study also demonstrated that the male respondents had better HL than their female counterparts. However, there is conflicting evidence on whether gender relates to HL and reported that male older people had better HL.[41] Still, a study by Ansari *et al.* found that female older people had better HL.[40] Meanwhile, Pechrapa *et al.* [11] and Nezafati *et al*. [10] both found that gender was not associated with HL. In Indonesia, male older people tended to have a better education level than female older people. [21] This fact might help to explain why they have better HL. Due to the inconsistent findings in prior studies, the role of gender and education in older people's HL warrants further investigation.

Limitations. One of this study's limitations is that the number of respondents was relatively small for a survey-based study due to the implementation of community activity restrictions in some areas during the pandemic. Secondly, this study only investigated a few factors and other unmentioned factors that might contribute to COVID-19-related HL in rural older people. Thirdly, the present study was conducted only in a single region in Indonesia, and thus generalizations should be done carefully due to possible sampling bias. Lastly, the test-retest reliability of the questionnaire was also not conducted in the present study. The local health authority did not allow the investigators to re-visit the respondents to minimize the COVID-19 spread. Despite its limitations, our study is still beneficial as it is one of the very few studies to have investigated COVID-19-related HL of older people in Indonesia context.

Conclusion. Older adults who accessed health information from media, had higher family support, are male in gender, and attained higher educational levels had better HL related to COVID-19 prevention. This study provides insight for nurses and healthcare professionals to pay greater attention to vulnerable groups of older people (female gender and those with fewer years of formal education), to the involvement of family members in education or health promotion activities that target older people, and to provide information with media that are easily accessed by older people, such as television and radio.

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Conceptual Models and Theories Applied to Nursing Education in Intercultural Contexts: State of the Art

Review

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Conceptual Models and Theories Applied to Nursing Education in Intercultural Contexts: State of the Art

Abstract

Objective. To analyze academic production about nursing models and theories in intercultural contexts applied to the field of education. **Methods.** State-of-the-art study, which examined 50 articles from research. **Results.** Application of the cultural competence model was found as a trend at disciplinary level, and in at interdisciplinary level, critical pedagogy was used. Regarding the curriculum, it is observed that cultural competency is a subject that is taught, but it is not treated in transversal manner. The principal didactics was cultural immersion, which permits acquiring skills and aptitudes to care for diverse population. The evaluation in the educational act centered on characterizing the level of acquisition of cultural competency. The gaps indicate the difficulty of applying the models and theories in practice scenarios, while the recommendations focus on the importance of teacher training in cultural competency.

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Conclusion. Interculturality is approached as a borrowed theory that, from education, contributes to the nursing practice from training that vindicates situational knowledge and its articulation with ethics permits developing skills to relate with others who have their own views regarding health care.

Descriptors: cultural competency; education, nursing; models, nursing; nursing care.

Modelos conceptuales y teorías aplicadas a la educación de enfermeros en contextos interculturales. Estado del Arte

Resumen

Objetivo. Analizar la producción académica sobre modelos y teorías de enfermería en contextos interculturales aplicados al campo de la educación. **Métodos.** Estado del arte donde se examinaron 50 artículos producto de investigación. **Resultados.** Se encontró como tendencia a nivel disciplinar la aplicación del modelo de competencia cultural y en cuanto a interdisciplinar se trabajó con la pedagogía crítica. Respecto al currículo, se observa que la competencia cultural es una temática que se imparte, pero no es tratada de forma trasversal. La principal didáctica fue la inmersión cultural, que permite la adquisición de habilidades y aptitudes para la atención con población diversa. La evaluación en el acto educativo se centró en caracterizar el nivel de adquisición de competencia cultural. Los vacíos señalan la dificultad de la aplicación de los modelos y teorías en los escenarios de la práctica, mientras que las recomendaciones se centran en la importancia de la formación docente en competencia cultural. **Conclusión.** La interculturalidad es abordada como una teoría prestada que, desde la educación, contribuye a la práctica enfermera desde una formación que reivindica los saberes situacionales y su articulación con la ética permite el desarrollo de habilidades para relacionarse con los otros que tienen visiones propias respecto al cuidado de la salud.

Descriptores: competencia cultural; educación en enfermería; modelos de enfermería; atención de enfermería.

Modelos conceituais e teorias aplicadas ao ensino de enfermagem em contextos interculturais. Estado da Arte

Resumo

Objetivo. Analisar a produção acadêmica sobre modelos e teorias de enfermagem em contextos interculturais aplicados ao campo da educação. **Métodos.** Estado da arte onde foram examinados 50 artigos de produtos de pesquisa. **Resultados.** A aplicação do modelo de competência cultural foi encontrada como uma tendência ao nível disciplinar e em termos de interdisciplinaridade, utilizou-se a pedagogia crítica. Em relação ao currículo, observa-se que a competência cultural é uma disciplina que se ensina, mas não é tratada de forma transversal. A principal didática foi a imersão cultural, que permite a aquisição de habilidades e aptidões para o atendimento a uma população diversificada. A avaliação no ato educativo centrou-se na caracterização do nível de aquisição da competência cultural. As lacunas apontam para a dificuldade de aplicação dos modelos e teorias em contextos de prática, enquanto as recomendações centram-se na importância da formação de professores em competência cultural. **Conclusão.** A interculturalidade é abordada como uma teoria emprestada que, a partir da educação, contribui para a prática de enfermagem a partir de um treinamento que reivindica o conhecimento situacional e sua articulação com a ética permite o desenvolvimento de habilidades para se relacionar com outras pessoas que têm suas próprias visões em relação à assistência à saúde.

Descritores: competência cultural; educação em enfermagem; modelos de enfermagem; cuidados de enfermagem

Introduction

Despite the importance of having epistemic and ontological support of care to train future nursing professionals, there is still scarce research from education on intercultural contexts.[1] This indicates the need to inquire on what approaches have been carried out, bearing in mind that society continuously undergoes transformations that require the views and knowledge of others that contribute to more pertinent training[2] and contextualized care. A situation evident in Latin America and Colombia, where these transformations are forced to cultural diversity, underscoring the need for the intercultural view, due to the forgetfulness of this situated knowledge that permit knowing how to live and coexist in a given setting.[3] Thus, it is expected for education to serve as "counterweight to the anthropological and cosmological model imposed with the hegemony of the neoliberal spirit".[3]

Likewise, in the education of nursing professionals, interculturality can promote a pedagogy that, in the words of Fornet-Betancourt, recovers the contextual knowledge of health care, rather than "disregarding the so-called traditional knowledge generated in and for the various life worlds".[3] Then, the need emerges to train nursing professionals competent to work with diverse populations[4] because interculturality goes beyond recognizing and accepting cultural diversity.[5] Thus, from education, interculturality is defined as: "An attitude and intellectual, ethical, political, and social disposition regarding a relationship among culturally diverse people and social groups, where each one places themselves in continuous questioning and transforms in conditions of respect and dignity to construct other ways of thinking, being, doing, and coexisting".[6] This enables rethinking that, in health, interculturality implies "the explicit incorporation of the patient's collective cultural burden in the relationship established with the health worker".[7] In nursing, weaving interculturality into the pedagogical act permits recognizing others as "human beings equal to them, but diverse in their thinking regarding health care, without, in this relationship, one of the actors locking themselves in their vision or one of them assimilating the gaze of the other and losing their identity, which would permit advancing toward a more reciprocal vision of care".[5]

The philosophical visions of nursing care guide the training of the professional who must have an epistemic as of where,[8] this sustenance can be given according to Barret[9] from models and theories, both own and borrowed from other disciplines; The first, refer to the advances from the discipline that normally focus on the application of knowledge already established, while the second allude to development with other disciplines that permit advancing nursing knowledge from the practice or can perpetuate a hegemonic view of scientific knowledge. All these observations evidence the importance of selecting conceptualizations that support training professionals, bearing in mind the research and application experiences in the practice. Chrizostimo

and Brandão[10] reiterate that in the discipline, professional teaching presents a trend that ignores the context and social commitment, which results critical when considering that health systems demand more human aspects in care.[11] Stemming from the aforementioned, a state-of-the-art was conducted, seeking to analyze the academic production on nursing models and theories in intercultural contexts applied to the field of education.

Methods

This was a state-of-the-art qualitative research, which followed five phases:[12] (i) *Contextualization*: corresponds to the definition of the criteria for the search for information, research limits, and types of resources to use. The search for the documents took place from June to December 2021 through the Descriptors in Health Sciences (DeCS): *Educación en enfermería*, *modelos conceptuales*, *competencia cultural* and their corresponding terms in English. Each of these was entered into the databases chosen: PUBMED, Web of Science, Scopus, CUIDEN, EBSCO, ERIC, LILACS, ProQuest, Redalyc, and university repositories. The inclusion criteria required the documents to be research results, available in English or Spanish, and no limit was established for date of publication, given that it was an emerging topic. The work excluded reflections, letters to the editor, essays, or studies not dealing with the topic of interest. At resource level, the Rayyan Systematic Review software was used to quickly read and select the articles and the Atlas.ti software version 22 for coding and analysis of the information. (ii) *Analysis:* permits classifying the documents regarding the methodological, epistemic, and pedagogical approach. This was done by loading onto the Rayyan software the studies obtained through the search. This software permitted reading the titles and abstracts, to select the research by eliminating duplicates and facilitated the application of exclusion criteria, forming a documentary *corpus* of 50 articles (Figure 1). These were described according to their characteristics and were categorized with respect to topic trends, by using Atlas.ti, where open codes were underlined.

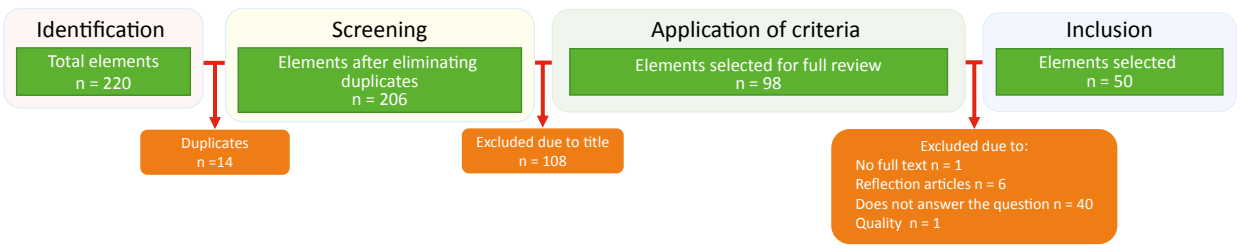

Figure 1. Flow diagram

(iii) *Interpretation by thematic nucleus*: broadens the study horizon relating the analysis units identified in the previous step, which transcends from a descriptive view to the creation of families that permit outlining useful hypotheses for the theoretical construction. (iv) *Global theoretical construction*: where the information extracted from the previous interpretation permits indicating the gaps, difficulties, trends, and achievements available currently in the field of study, for which the Atlas.ti software was used through the relations emerging from the families, thus, forming the core or selective category. And, (v) *Extension*: corresponds to the process of writing the article and submitting it to publication to disclose the results.

Results

The characteristics of the articles included (Table 1) indicate predominance of qualitative research, a topic explored mostly since 2012, developed principally in the United States and with student population.

Table 1. Characteristics of the articles included

Parameter	Description of characteristics
Types of articles	*Quantitative* (15): Transversal (11), quasi-experimental (4)
	Qualitative (30): systematic literature review (8), phenomenology (5), case study (5), documentary analysis (2), integrative review (2), ethnography (2), content analysis (2), state of the art (1), narrative (1), community-based participative research (1), constant comparison method: theory of cultural contracts (1).
	Mixed (5).
Year of publication	2005 (1), 2007 (1), 2008 (3), 2009 (1), 2010 (2), 2011 (2), 2012 (5), 2013 (5), 2014 (2), 2015 (4), 2016 (4), 2017 (4), 2018(5), 2019 (6), 2020 (1), 2021 (4).
Country	The United States (23), Australia (4), Canada (3), Türkiye (3), Chile (2), Spain (2), Finland (2), Iran (2), Brazil (1), China (1), Colombia (1), South Korea (1), Slovenia (1), Mexico (1), Puerto Rico (1), Sweden (1), Venezuela (1).
Population approached	Students (18), documents (13), professors (6), nursing professionals (5), students and professors/university managers (3), university and faculty administrators (3), culturally diverse population (2).

The disciplines that support intercultural conceptual and theoretical models in the field of education, their trends and research gaps found in the review are summarized by the following:

Disciplines that support theories and conceptual models

It was identified in the training of nurses in intercultural contexts, theories and disciplinary and interdisciplinary models for nursing.[9] Thus, the practice of this profession has been carried out from its own progress and at the same time it has been nourished by borrowed theories or interdisciplinary models that have been used in the practice, principally from education, psychology, and sociology, and to a lesser extent in philosophy, politics, anthropology, and ethics.

Trends in conceptual and theoretical models

From the theoretical culture category, diverse open codes emerge and from the weave of its relations these are integrated to axial categories that concentrate nursing models and theories or for nursing. The following describe those with the greatest conceptual density throughout the studies reviewed.

Own theories and disciplinary models

Theory of transcultural nursing. Also called the rising sun model, developed principally by Leininger, it is defined as a scientific and humanistic area that considers the differential individual characteristics of the population regarding the specifics of their cultural context, thereby, it is important to know the differences and similarities presented by cultures with respect to values of care, care practices, and of life;[13-16] given that their knowledge will enable improving patient care, upon contemplating relevant information that permits managing effectively their health needs,[15] recognizing the role and importance of culture on the health of individuals.[16] This theory has been worked by other authors, like Williamson & Harrison[17] and Cai,[18,19]

the first consider that transcultural nursing is a competence of cultural care in holistic manner, which permits maintaining or reestablishing the health of individuals in an appropriate and beneficial way, the latter adds that skills can be developed to relate properly with other cultures at the moment of care, through encounters of two or more cultures.[20]

Cultural competency model. The studies mostly retake it from Campinha-Bacote, who defines it as the "skill of understanding the beliefs, values, behaviors, and customs to work effectively according to the client's cultural context".[21] It is considered that the nursing professional requires a continuous process to acquire said skill of working with different cultures;[20] consequently, the person is not, but becomes culturally competent.[15,22] Thus, cultural competency, as a conscious process, seeks to adapt care so that it is consistent with the client's culture.[23] Hence, the person is the center of care, thereby, caregivers are required to incorporate in their behavior thoughts, actions, and ways to communicate with and from the other.[24] This way, health professionals must make a constant effort to acquire and apply the cultural views of care in the relation established during the care process; this implies the development of five components: cultural awareness, cultural knowledge, cultural skill, cultural encounter and cultural desire.[20] In addition, caregivers can provide what is denominated culturally competent care, understood as a sensitive and profound form of providing health, based on the needs of people's ways of life so they have well-being.[20] In order to achieve a holistic view that takes into account the individual's needs considering their cultural differences.[25]

Borrowed theories and interdisciplinary models

Theory of critical pedagogy. Regarding borrowed theories, the one with the greatest concentration was the critical theory from Paulo Freire, who supports an educational approach centered on developing conscious critical thinking in students, a type of thinking that permits questioning beliefs and social practices that generate oppression.[26] Thus, through this and the use of praxis, emancipation of those who are oppressed is achieved, given that the work with both will allow subjects to be critical about social reality.[27] This theory is sustained by culture and the recognition of cultural diversity, understood as "differences in skin color, race, ethnicity, nationality, socioeconomic status, level of education, employment status, and religion".[20] Nevertheless, in the articles reviewed, this concept was addressed in nursing care and the theory by Freire is focused on education. In the nursing practice, it is expected for this view to support the transformation of teaching the profession,[28] in the sense that it considers the professor as a companion and the student is assumed as an agent of social change, which in the educational interactions achieve the interpretation, transformation, and intervention of the problems and needs of the community.[29]

Eco-social model. At interdisciplinary model level, the eco-social model proposed by Krieger[30] was the most referenced in the studies reviewed. This proposes a perspective centered on inequalities at health level, which are explained from a combination of social and biological factors.[16] Knowing the influence of these factors permits not being restricted in the scope, addressing health characteristics, like space and time, multilevel interactions, and personal particularities.[26] At conceptual level, this model was worked from the culture and encounters and cultural interaction, points retaken also in the disciplinary model of cultural competency.

Educational act. Overall, the studies indicated different points related with the educational act, formed by the curriculum, didactics, and evaluation.[31] The findings concerning these are described in the following. In relation with the curriculum, inclusion was noted of components from cultural competency at theoretical level[32] in the planning and programming of assignments.[33] Regarding what is taught, real curriculum, the students experience the discussion around

attributes required to be culturally competent and the different components of the term of cultural competency.[24] Curricular pertinence is seen around globalization and changes in the population due to migration,[34] where study plans require the inclusion of the demands of the context.[16] The didactics suggested vary depending on the learning objectives, for example, Long[35] emphasizes the need to use debates and essays that permit students to reflect upon an experience of intercultural encounter. The short-term and long-term cultural immersion is highlighted in various studies upon favoring the theory and practice relation in the interaction with people.[13,36] Also indicated, are web tools, simulation,[37] and cases constructed by the community from social research, by providing forms of cultural interaction without ethical risks.[38] The review also found that the evaluation of cultural competency is a highly relevant point, given that in formation institutions of nursing professionals, it permits recognizing the level of understanding and comprehension of other cultures.[39,40] It is evident that there is still a need to consider that the topic requires being worked transversally and professors need specific preparation in theories and models to improve their pedagogical practices.[41] There is marked interest in knowing the level of the acquired competences, where the validation of instruments was central; nonetheless, this is carried out partially as only certain components of cultural competency were addressed. The research findings reveal that when a person is from a culture other than the context where they are trained, they feel more confident in caring for diverse people.[34]

Gaps and recommendations on intercultural conceptual and theoretical models. As principal gaps, it was found that in the training practices conducted in clinical scenarios, a theoretical-practical gap persists when revealing difficulty in applying the models and theories.[42,43] Likewise, a challenge is posed in the education of future nursing professionals when not having the types of evaluations that identify in the students if they have acquired the skills and knowledge proposed by the models and theories in relation with the development of cultural competency.[44,45] Moreover, it is shown that research is needed in the educational setting with respect to how the teaching process contributes to the student's training in the development of cultural competency. Table 2 indicates the other gaps identified, such invite us to ponder how academia can develop a cultural competency model articulated with care to, thus, achieve curricular pertinence from the context; it should be clarified that not all the works reviewed indicated gaps.

Table 2. Research gaps in nursing education in intercultural contexts

Gap	Number	%
Application in the practice	11	25.57
Evaluation of the competency in the practice	8	18.60
Research on education	7	16.28
Development of cultural competency during training	5	11.62
Clarity of the concept	3	6.98
Negative effects in clinical care	3	6.98
Student motivation	2	4.65
Scientific resources	1	2.33
Centered on the development of the competency	1	2.33
Concepts not retaken in clinical teaching	1	2.33
Scarce knowledge about cultures	1	2.33

With regards to the recommendations (Table 3), among the works that formulated recommendations, most indicate the need to train professors in intercultural theories and models because these require knowledge to be able to teach to others.[16] In addition, the need was identified to include topics of cultural competency in curricula,[46] given that it is poorly addressed in universities or is treated as a tangential issue, which in many cases is not approached adequately or is made invisible by remaining in the discourse.[20]

Table 3. Recommendations for nursing education in intercultural contexts

Recommendations indicated	Number	%
Teacher training	7	22.58
Inclusion of topics of cultural competency	6	19.35
Evaluation of programs	5	16.13
Experiential didactics	4	12.90
Own models and theories	3	9.68
Learning in context	2	6.45
Include ethics and moral reasoning	2	6.45
Research	1	3.23
Institutional commitment	1	3.23

Discussion

The findings allow unveiling different achievements evidenced in the research of the nursing models and theories applied in intercultural education. Thus, the trends show an approach that denotes interest in the formation. At disciplinary level, the Campinha-Bacote model predominated, which "is limited, to the extent that the health provider-subject of care power relationship is maintained, recognizing the importance of culture in the subject's health, but without leading to dialogue".[47] The situation does not favor care with a more reciprocal view, when keeping in mind that populations are increasingly more heterogenous, where care implies a process of empathy, openness, sympathy, and generosity.[4] Consequently, trust relationships are expected to be built between subject of care and caregiver that imply time, knowing antecedents, language, knowledge regarding health care, and compassionate willingness to comprehend such.[48] So, compassion in the pedagogical act provides, to whom it prepares and who is prepared, sensitivity to the pain or suffering of another (diverse but which is equal as human being), upon understanding that the actions of the nurse caregiver lead to consequences that impact on the subject and that this not only involves epistemic sustenance, but also attitudes and emotions.[48,49]

With respect to the interdisciplinary theories identified, and which contribute to the field of nursing education from an intercultural approach, these are guided from the contributions by Paulo Freire,[28] who calls for the emancipation of pedagogy from dominant the classes to pedagogy of freedom, where the oppressed has the conditions to reflect, so that it is discovered and conquered. From this point of view, Flórez-Ochoa[50] expresses that pedagogy is a theoretical and practical possibility that makes it easier for individuals to free themselves from themselves and from the context through the development of their conscious activity, that is, a process of humanization the authors denominate substance of pedagogical action. The process of humanization, in the opinion of Mendoza-Carrasco[51] implies recognizing the student as a human being who needs affection, endearment, and respect, which they denominate pedagogy of love and tenderness. This pedagogy integrates science and spirituality because it advocates for a connection between reason and feeling, thus, educating is an act of mutual love.[51]

Hence, it is expected for nursing teaching within an intercultural context to permit the development of awareness and critical thinking,[52] given that education is not a neutral process, but a way of reflecting about reality and think of ways to transform it, supported on the construction of curricula from dialogue with other disciplines.[26] However, the studies reviewed do not delve into this last point; thereafter, the need is highlighted to retake the category of *interculturality* from borrowed theories that contribute to broadening the horizon in the nursing practice, bearing in mind that it addresses the care of human beings and the understanding of their conceptions, but it is also nourished by other perspectives.[16]

It is expected that a transdisciplinary approach, from the identity as nurses, not only to explore

the concept of otherness, because it has already been identified who the others are, but to be able to know them during the formative process, by exploring the knowledge of others that is explicit within the disciplinary subjects, allowing to find common ground, not only from objective care, in terms of the development of skills, but from a subjective one in the acquisition of soft skills that promote a more human relationship from the recognition of others and other things.[5]

In effect, education in intercultural contexts must be more aware of the multicultural reality, where shocks emerge in health care, therefore, formation guided by own and adapted models and theories that respond to particular care is required.[4] Hence, having an ethical stance is an essential requirement, which starts from the reflection on the relationship that emerges during care, the behavior, and commitment that must be had with that other, arising from the autonomy that provides an epistemic sustenance to assume the responsibility implied by care.[5] Furthermore, nursing education in intercultural contexts has focused on topics, like: "Global nursing challenges, health care systems, transcultural theories and models, intercultural communication, beliefs, and practices based on culture, culture-based healing and care".[15] Consequently, some programs have adopted a specific model or theory that guides the formation of future professionals, as in the case of Slovenia with the transcultural nursing model and cultural competency.[15] However, it is necessary to recognize that one is not more important than another, there are different contributions made from social sciences, philosophy, and nursing, which provide foundations to adapt to changes in populations around the world.[26]

Different achievements were found in the studies regarding the curriculum, such as recognition of the importance of flexibility and the practice within it. Thus, Prosen[15] suggests that, for intercultural nursing formation, establishment of a flexible curriculum is required that adapts to the specific needs of the region, guides the forms of teaching and learning, besides facilitating during practices for students to interact with others who are culturally different. This situation from the ecological perspective of cultural competency requires early articulation between theoretical teaching and formative care practice, which favors dialogue with another and the search for solutions.[53] Where the formative practice, as a learning scenario for students, can generate the recognition of their knowledge and the learning of other knowledge regarding health care, from the cultural shock that sometimes arises upon knowing diverse cultures and different from one's own.[13] Thereby, being able to relate in the clinical setting with patients and recognizing the difficulties that are met due to inequity or inequality in the quality of care received by individuals from minority groups,[54] motivates future professionals to wanting to know the culture of the other, initiating the process of becoming culturally competent through cultural desire.[55] Thus, academic units can think of their own model of intercultural care that guides training, bearing in mind the experiences of nursing professionals in the practice.

The literature reports that when programs have an epistemic from where of nursing theory, or borrowed, that guides intercultural formation in its students, the didactics used most so that these can internalize such are cultural contacts in either formative practices or cultural immersions.[13] An achievement that leaves a path to explore in academic units for each of them to analyze the time it takes the student and professor to develop this skill, considering the social, economic, and political context of each country. Curricula are required with specific assignments of intercultural theories and models, besides the use of didactics that facilitate their learning.[56,57] Hence, inclusion of topics in the curriculum is not sufficient, given the difficulty to carry out culturally competent care in the institutions where students conduct the practice. Shoghi *et al*.,[42] consider that there is lack of dialogue between the formation institutions and the context, underscoring the importance of understanding that: "the gap between theory and practice is a constant

nursing problem experienced by advanced students and newly qualified professionals (...), which is summarized as the gap between the theories the professionals claim underlie their practice and the implicit theories, of which they may not be aware, integrated in their practice".[42]

It is worth highlighting that, in the practice scenarios, this theory and practice dichotomy generates difficulties in the relations established with the subjects of care due to the lack of knowledge about the other and self that does not allow comprehension.[34] In this regard, Flores *et al*.,[58] reiterate that, in the university, from the teaching of health professionals, it becomes necessary to strengthen the different communication skills and openness attitudes necessary to provide intercultural care; thereby focusing on ways that allow knowing other visions of care, which highlight the importance of the context in health and the relevance both have in the assessment of the subject of nursing care.[13] This leads to evaluating the acquisition of knowledge and skills, framed in the understanding of whether professionals are able to facilitate the relationship of care through understanding.[39] Nevertheless, it is important to recognize in the cultural competency evaluation processes the need to transcend the doing and knowing the being, that is, consider that the professor's and student's experience caring for culturally diverse people is a challenge because in the care relationship tensions are experienced among linguistic barriers, knowledge, and ethical responsibilities.[5]

The methodologies used in the studies were principally qualitative, which shows the comprehensive approach that has been carried out; it is necessary to continue with this trend because it supports the study of interculturality by allowing to delve into the contextual and social depth of the theme[59] when bearing in mind that care is based on relations. In addition, these methodologies permit knowing the patient's conditioning factors through contextualization in their culture, which leads to an understanding of the perspective of what is health and disease, in order to improve the caregiver-subject of care relations.[4]

Regarding the limitations found, these were subdivided into the application and pedagogy. Thus, it is indicated that there is a marked difficulty in the application,[60] students in care practice scenarios show lack of knowledge with respect to cultural competency, which leads to increased inequity of care.[15] In pedagogy, scant teacher training is shown, given that teaching in nursing models and theories in intercultural contexts requires having an epistemic from where, which enables not only clarity of concepts but also lets the professor be a training model.[20,47] Given the foregoing, processes of acculturation of minorities through adaptation to the environment are added in educational contexts [61] and cultural uncertainty in the care area, situations overcome with the inclusion of cultural competency during the formation.[13] From Noddings' point of view,[62] to educate in cultural competency, it is necessary to recognize that caring is evidenced in the relations established with professors, students, and colleagues, for which moral education is favored in the pedagogical act, to the extent that, from the interactions with the professors, students receive respect and are listened to, establishing a dialogue that enables their developing skills and attitudes to maintain care relations with others. This implies the student's active attitude in learning from dialogue-action.[63] Thus, the importance is highlighted of including in the curriculum a more human perspective that opens the way to the ethical vision of care that permits moral reasoning, where the relationships that emerge in this interaction are prioritized to understand who others are, to recognize them and recognize oneself in interaction with diverse cultures.[24]

With respect to the gaps found, there is low student motivation to access the practice, which demands the commitment of accompaniment by educational institutions,[15] not only with regards to the inclusion of subjects and teacher training,

but that the choice of cultural immersions is facilitated or included within curricula, given that student motivation for these experiences is hindered by administrative difficulties and graduation delays.[13] In addition to underscoring the importance of conducting research on intercultural contexts in the educational setting, with a low density of production in this area compared with the care area.[64] Likewise, the gaps demonstrate that there is still a way to go at conceptualization level of models and theories because ambiguity is found in the terms that compose them, as in the case of cultural competency, where some author emphasize on competency and others on culture.[20,65] This makes it necessary to propose own models and theories that recognize the diversity experienced, its causes, and the particularities of the context.[42] This is so specially when the theories and models found have been addressed mainly in the United States, where diversity is related with migration, different from Latin American countries in which multiethnicity and pluriculturality are characteristic of the region; bearing in mind that culturally competent care is expected to enable more effective care, which improves health by diminishing inequity,[20] facilitating the caregiver-subject of care interaction,[24] which impacts upon the community.[34] Thinking of formation that includes interculturality from the importance of having an ethical stance in care, where ethics provides epistemic and ontological support to nursing professionals that allow them to recognize their responsibilities and duties with another who is diverse and, consequently, broadens the vision of health care toward a more holistic vision of the human being.[5,66] The aforementioned invites us to think about theories and models from our own context, so they can be applied, more so when scant research is available regarding the practical utility of the models and theories established.[4,53]

Finally, as a recommendation, it seems important to rethink the internal and external pertinence of the curricula at the macro context level of the training of nursing professionals from interculturality, a point of origin would be the training of professors regarding cultural competency, exploring the knowledge of students and research in territories, to generate social impact in and out of the classroom. In turn, it is convenient for higher education institutions to meet students' needs in relation to their interests of intercultural practice scenarios that contribute to graduation profiles that respond to the country's reality.

Conclusion

Upon analyzing the academic production, it was found that ethical action by professionals is fundamental for the nursing task, highlighting that there is an ethical view of care by dimensioning that such cannot be understood as homogeneous, rather that concern exists in educating for particular care. However, coherence is required between theory and practice in education to close the existing gap in the application of models and theories, considering that these are based on caregiver-subject of care relations, but that clarity is needed on how to measure the acquisition of aptitudes and attitudes for care. The journey through the literature found permitted visualizing the trends, where these demonstrate that although a wide range of studies was found, there is still no application clarity, this delimited in that nursing programs still have no consensus on what theories and models to use to apply them. The overall invitation would be framed in rethinking these models and theories in context to, thus, bring them to dialogue with borrowed theories, opening the vision to contributions from other disciplines.

In this sense, professors are again the center, given that as those in charge of formation, they must be valid interlocutors, not only solo from their conceptual knowledge but from their work, so that students can see their ethical actions and that the relations that emerge in the pedagogical act show openness to others through dialogue and respect.

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Review

Educational Interventions in Adults with Type 2 Diabetes Mellitus in Primary Health Care Settings. A Scoping Review

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Educational Interventions in Adults with Type-2 Diabetes Mellitus in Primary Health Care Settings: a Scoping Review

Abstract

Objective. To synthesize the evidence of studies with educational interventions for adults with type-2 diabetes mellitus (DM2) in primary health care settings. **Methods.** A scoping review was conducted following the recommendations by the Joanna Briggs Institute and by the PRISMA declaration. The protocol was registered in INPLASY20215009. The search was carried out in: MEDLINE (via PubMed), EMBASE, Web of Science, LILACS, and grey literature. **Results.** Seventeen studies were included; most were randomized clinical trials of which 65% were conducted in high-income countries,

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and all the studies represented 5 656 participants. The results showed four big categories derived from educational interventions: therapeutic adherence (significant results on the satisfaction with the treatment); self-care and self-management in diabetes (improvement in self-efficacy, empowerment, and disease awareness); glycemic control in diabetes (significant results in reducing glycosylated hemoglobin); nursing and its role in the educational interventions on patients with DM2 (guidance in restructuring behaviors). **Conclusion.** The findings of this review suggest that educational interventions on patients with DM2 within the setting of primary health care can impact positively on therapeutic adherence, self-control, and knowledge of the disease. Moreover, it was possible to identify the influence of multidisciplinary health teams, where the relevance of nursing professionals in the construction and implementation of educational interventions is evidenced in obtaining better health results.

Descriptors: diabetes mellitus, type 2; primary health care; patient education as topic; self-care; primary care nursing.

Intervenciones educativas en adultos con diabetes mellitus tipo 2 en entornos de atención primaria de salud: una revisión de alcance

Resumen

Objetivo. Sintetizar la evidencia de estudios con intervenciones educativas para adultos con diabetes mellitus tipo 2 (DM2) en la atención primaria de salud. **Métodos.** Se realizó una revisión de alcance siguiendo las recomendaciones del *Instituto Joanna Briggs* y de la declaración PRISMA. El protocolo se registró en INPLASY20215009. La búsqueda se realizó en: MEDLINE (vía PubMed), EMBASE, Web of Science, LILACS y literatura gris. **Resultados.** Diecisiete estudios fueron incluidos, la mayoría fueron ensayos clínicos aleatorizados, de estos 65% fueron conducidos en países de ingresos altos, y todos los estudios en total representaron 5656 participantes. Los resultados mostraron cuatro grandes categorías derivadas de las intervenciones educativas: adherencia terapéutica (resultados significativos en la satisfacción con el tratamiento); autocuidado y automanejo en diabetes (mejora en la autoeficacia, empoderamiento y conciencia de la enfermedad); control glucémico en diabetes (resultados significativos en la reducción de la hemoglobina glicosilada); enfermería y su papel en las intervenciones educativas en pacientes con DM2 (orientación en la reestructuración de comportamientos). **Conclusión.** Los hallazgos de esta revisión sugieren que las intervenciones educativas en pacientes con DM2 en el ámbito de la atención primaria de salud pueden impactar positivamente

en la adherencia terapéutica, el autocontrol y el conocimiento de la enfermedad. Además, fue posible identificar la influencia de los equipos multidisciplinarios de salud, donde se evidencia la relevancia de los profesionales de enfermería en la construcción e implementación de intervenciones educativas para la obtención de mejores resultados de salud.

Descriptores: diabetes mellitus, tipo 2; atención primaria en salud; educación del paciente como asunto; autocuidado; enfermería de atención primaria.

Intervenções educacionais em adultos com diabetes mellitus tipo 2 em ambientes de atenção primária à saúde: uma revisão de escopo

Resumo

Objetivo. Sintetizar as evidências de estudos sobre intervenções educacionais para adultos com diabetes mellitus tipo 2 (DM2) na atenção primária à saúde. **Métodos.** Foi realizada uma revisão de escopo seguindo as recomendações do Joanna Briggs Institute e a declaração PRISMA. O protocolo foi registrado no INPLASY20215009. A pesquisa foi realizada em: MEDLINE (via PubMed), EMBASE, Web of Science, LILACS e literatura cinzenta. **Resultados.** Dezessete estudos foram incluídos, a maioria eram ensaios clínicos randomizados, 65% deles foram conduzidos em países de alta renda e todos os estudos, no total, contaram com 5656 participantes. Os resultados mostraram quatro grandes categorias derivadas das intervenções educacionais: adesão (resultados significativos na satisfação com o tratamento); autocuidado e autogestão da diabetes (melhoria na autoeficácia, fortalecimento e conscientização sobre a doença); controle glicêmico na diabetes (resultados significativos na redução da hemoglobina glicada); enfermagem e seu papel nas intervenções educacionais em pacientes com DM2 (orientação na reestruturação de comportamentos). **Conclusão.** Os achados desta revisão sugerem que as intervenções educacionais em pacientes com DM2 no ambiente da atenção primária à saúde podem impactar positivamente na adesão, no autogerenciamento e no conhecimento da doença. Além disso, foi possível identificar a influência das equipes multidisciplinares de saúde, onde fica evidente a relevância dos profissionais de enfermagem na construção e implementação de intervenções educacionais para obter melhores resultados de saúde.

Descritores: diabetes mellitus, tipo 2; atenção primária em saúde, educação do paciente como assunto; autocuidado; enfermagem de atenção primária.

Introduction

Diabetes mellitus type 2 (DM2) is one of the non-communicable diseases that make up the high burden of morbidity and mortality in the world, representing a considerable public health problem.[1] In agreement with International Diabetes Federation, there are 463 million adults with diabetes worldwide, and it is estimated that this number will increase to 578 million by 2030 and 700 million by 2045, since DM2 represents 90% of cases in the world and among people aged 50 to 74 years it is the fifth cause of death.[2] Different strategies have been used in health services since the performance of the interdisciplinary team, seeking to face a problem that is expanding globally.[3] However, for this, the commitment that the patient assumes with his care is decisive.

The programs conducted for self-care in patients with DM2 have been widely addressed by different studies that have been able to identify the benefits of the implementation of educational interventions in the context of primary health care for patients with DM2. These benefits are specifically identified in activities that promote a healthy lifestyle, motivating self-efficacy and a better level of adherence and disease control.[4] In the development of programs focused on the individual, in order to contribute to decision-making and the search for a change in some patterns of risk in lifestyle, strategies that impact on primary health care services are seen as relevant.[4] The literature shows that the use of educational interventions in patients with DM2, compared to habitual care, can improve self-control and the management of clinical parameters as well as reduce costs in health systems.[5] Therefore, educational interventions have a high level of importance within self-care. Consequently, seeking to condense the literature, discover new strategies framed in the interventions, and call the attention of nursing professionals to the urgent need to deal with this problem, this scoping review aimed to synthesize the evidence on educational interventions for DM2 in primary health care.

Methods

Design and registration of the protocol. This is a scoping review (SR) guided by the recommendations of the Joanna Briggs Institute (JBI);[6] and followed the Preferred Reporting Items for Systematic Reviews and the Meta-Analyses (PRISMA) checklist for scoping reviews. [7] The protocol was registered under the serial number INPLASY202150091.[8]

Source of data and search strategy. Searches were performed in the following databases: MEDLINE (via PubMed), Excerpta Medica Database (EMBASE), Latin American Caribbean Health Sciences Literature (LILACS via BIREME), and Web of Science. In addition, gray literature was considered in the selection process. These searches were performance out from inception until March 2021 as indicated in Supplemental online 1.The following search strategy was used for MEDLINE: *(Diabetes Mellitus, Type 2[MeSH Terms]) OR (Diabetes Mellitus, Type II) OR (Diabetes, Type 2) OR (Type 2 Diabetes) OR (Type 2 Diabetes Mellitus) AND (primary health care[MeSH Terms]) OR (Care, Primary Health) OR (Health Care, Primary) OR (Primary Healthcare) OR (Healthcare, Primary) AND (Education[MeSH Terms]) OR (Patient education[MeSH Terms]) OR (Education, Patient) OR (Patient Education) OR (Education of Patients) OR ((Health Education[MeSH Terms]) OR (Education, Health) OR (Education, Nursing[MeSH Terms]) OR (Nursing Education) OR (Educations, Nursing) OR (Nursing Educations) AND (Standard of Care[MeSH Terms]) OR (Care Standard) OR (Care Standards) OR (Standards of Care).*

Eligibility criteria of the studies. This SR includes randomized controlled trials (RCTs), quasi-experimental, and cluster studies, published from inception until March 2021 in the languages of Portuguese, English, or Spanish, with both the abstract and full text available. The following PICO strategy (population, intervention, comparator, outcomes) was applied for study eligibility, P: adults with DM2 in primary health care, I: educational interventions; C: habitual or standard care, and O: improve clinical outcomes (adherence or compliance to treatment, diabetes control, knowledge and self-care).

Data extraction. The extracted data was collected in an Excel spreadsheet, containing the following information: author, year, country, study design, sample size, type of intervention, follow-up, control group, and main findings.

Risk of bias assessment. The risk of bias tool (RoB 1) from the Cochrane Collaboration was used to evaluate the risk of bias in RCTs. The following elements were evaluated: random sequence generation and allocation concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete outcome data, and selective reporting of results and other sources of bias.[9] In addition, the JBI recommendations were used to assess the level of evidence of the studies.[10] For the graphical visualization of the result of the methodological quality of the individual studies, it was carried out in the *robvis* web application. [11]

Results

Identification and selection of the studies

In total, 358 studies were identified (Figure. 1). Of these, 37 duplicate articles were excluded, 321 studies being included for reading the title and abstract. Of those 321, 290 studies were excluded because they did not meet the objectives of the type of patient, type of study, educational intervention, location, or results found. Of the 31 remaining studies included for full text reading, 14 articles that did not meet the criteria established in the PICO strategy were excluded. Finally, seventeen studies meet the eligibility criteria for inclusion in this scoping review.

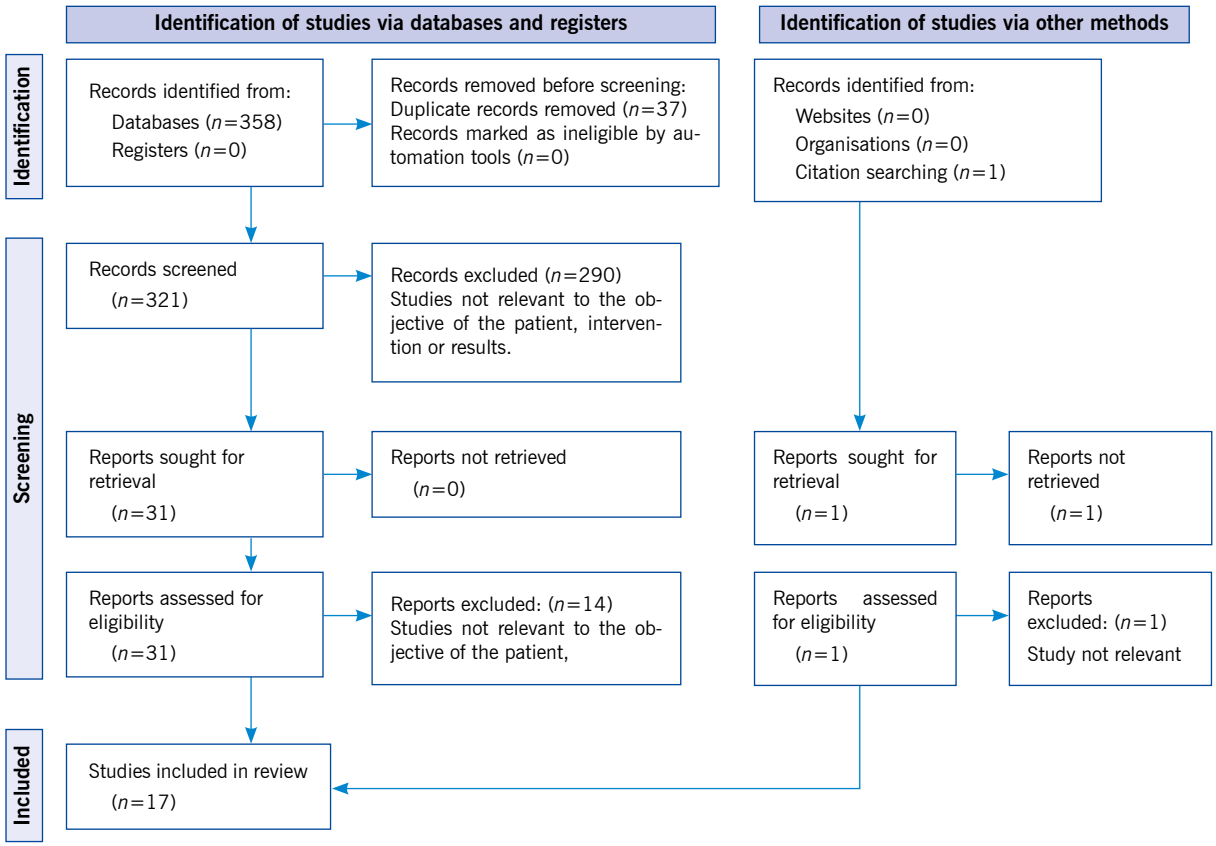

Figure 1. Flow diagram of study selection process

Characteristics of studies included

Of the 17 studies included in the SR. The studies were carried in 11 countries; of these, 65% of the studies were conducted in high-income countries, the rest being from low- and middle-income countries. These studies were published between 2010 and 2020. In relation to the type of study, it was found that 13 of the studies were randomized controlled trials and four cluster-randomized trials. Sample sizes ranged from 76 to 1589, with a mean of 344. The included studies were followed up for different periods, ranging from the first month after the intervention to 24 months. Studies with follow-up at 3, 6, and 12 months predominated. Although educational interventions showed a wide diversity, common strategies were found, such as education for diabetes control, a diabetes adherence and empowerment program, activities that included the individual, family, and communities. Education focused on the knowledge of the disease, warning signs, diet, and self-care practices. Regarding the control group, it was evident that all studies included standard care, that is, usual care. Educational interventions for the management of adults with DM2 were identified, which were grouped into four large categories, with the goal of projecting a better understanding of this review and a more delimited guide that serves health professionals in the implementation of interventions that respond to the needs identified in their practical environments.

Therapeutic adherence

Therapeutic adherence has historically represented one of the most important elements in the care of patients with DM2 and, with it, the execution of adequate treatment and control of the disease. Therefore, different countries have focused their educational intervention programs on adequate therapeutic adherence and, with this, seek to contribute to the management of DM2.[12] Thus, as a study aimed to provide training to community health workers on the pathophysiology of the disease, risk factors for DM2, and lifestyle strategies with an impact on glycemic control (nutrition, exercise, physical activity, and prevention of diabetic complications), this educational intervention, which was received by the professionals who guided the patients with DM2, allowed a greater adherence to the treatment, which consequently brought the improvement of the blood glucose levels of the study participants.

Table 1. Characteristics of the included studies

Authors, (year), country	Type of study	Sample size	Intervention group (IG)	Follow-up	Control group (CG)	Main findings	Level of evidence
Chen *et al.* (2020)[13] China	Randomized clinical trial	1325 Intervention: 665 Control: 660	• Education conferences • Periodic follow-up interviews with physical examination • Specialized medical services	12 months	Standard care	Blood glucose level decreased in the IG compared to the CG: • Difference-in-difference model (DID) = 0.53mmol (95% CI 0.90, to 0.16); p=0.005 • Diabetes knowledge score increased significantly in the IG compared to CG: • DID = 0.91 (95 % CI 0.64–1.18)	1C
De la Fuente *et al.* (2020)[14] Spain	Randomized controlled clinical trial	236 Intervention: 97 Control: 139	Structured education provided by a nurse: • Accompaniment to a family member or caregiver • Basic knowledge of diabetes • Use of empowerment model	12 and 24 months	Standard care	Glycated hemoglobin (HbA1C) • IG:(−0.55, 95% CI −0.20, −0.90; p<0.001) • CG: (0.06, 95% CI −0.14, +0.28, p=0.530) • HbA1C <7%: • IG: 35.2% vs. CG: 24.7%	1C
Presley *et al.* (2020) [15] United States	Randomized controlled trial	97 Intervention: 62 Control: 35	Community-based diabetes self-management education and peer support through the mHealth web application: • 12 weekly phone calls • 3 monthly calls	6 months	Standard care	HbA1C reduction after 6 months: • IG: 10.1 (SD 1.7) to 9.6 (SD 1.9) • CG: 9.8 (SD 7) to 9.1 (SD 1.9) • Reduction of diabetes distress in both groups: • p<0.001	1C
White *et al*. (2020) [16] United States	Cluster randomized clinical trial	364 Intervention: 184 Control: 180	Partnership to improve diabetes education: • Literacy-sensitive, provider-centered health communication intervention	12 and 24 months	Standard care	Treatment effects on 12 months: Adjusted HbA1C: • IG: (−0.76 [95% CI, −1.08 to -0.44]; p<0.001 • CG: (-0.54 [95% CI, - 0.86 to -0.21]; p=0.001) • Satisfaction with treatment: • IG: (3.93 [95% CI, 2.48-6.21]; p<0.001) • CG: (3.04 [95% CI, 1.93-4.77]; p<0.001) • Self-efficacy: • IG: (2.97 [95% CI, 1.89-4.67]; p<0.001) • CG: (1.81 [95% CI, 1.1-2.84]; p=0.01)	1C

Table 1. Characteristics of the included studies (Cont.)

Authors, (year), country	Type of study	Sample size	Intervention group (IG)	Follow-up	Control group (CG)	Main findings	Level of evidence
Sharoni *et al*. (2018) [17] Malaysia	Randomized controlled trial	76 Intervention: 36 Control: 36	Health education program, based on: • Theory of self-efficacy of Albert Bandura • Group Diabetes Education Seminars	1 month and 3 months	Standard care	Foot self-care behavior after 12 months: • IG: 62.61 (SD 7.54) • CG: 47.55 (SD 7.30) • Foot care self-efficacy after 12 months: • IG: 40.89 (SD 4.91) • CG: 34.37 (SD 4.69) • Knowledge of foot care after 12 months: • IG: 7.68 (SD 1.49) • CG: 5.16 (SD 3.09)	1C
Santos *et al*. (2017)[18] Brazil	Cluster randomized clinical trial	238 Intervention: 127 Control: 111	Adherence and empowerment program in diabetes: • Group education • Home visits • Telephone monitoring	12 months (3-months intervals)	Standard care	Glycemic control (HbA1c): • IG: 7.10 (5-12.4); p=0.001 • CG: 7.40 (4.9-13.9); p=0.3000 • Self-care questionnaire for DM2: • IG: 4.05 (1.75-6.25); p=0.0001 • CG: 3.00 (1.25-6.1); p=0.9700 • Empowerment questionnaire for DM2: • IG: 4.13 (2.75-5); p=0.001 • CG: 4.00 (2.5-4.88); p=0.001	1C
Paz-Pacheco *et al*. (2017)[19] Filipinas	Randomized clinical trial	155 Intervention: 85 Control: 70	Diabetes self-management education: • During the follow-up visits, 8 topics were taught.	3 and 6 months	Standard care	Glycemic control (HbA1C≤7.0) after 6 months: n (%) • IG: 43 (59.72) • CG: 20 (38.46) • Foot examination after 3 months: n (%) • IG: 49 (76.56) vs. CG: 34 (57.63)	1C
Grillo *et al*. (2016)[20] Brazil	Randomized clinical trial	137 Intervention: 69 Control: 68	Diabetes self-management education: • Identification of modifiable factors • Non-pharmacological treatment • Drug therapy • Complications of chronic diabetes • Foot care	12 months	Standard care	Knowledge of diabetes mellitus after 12 months: • IG: 16 (3%) • CG: 12 (4%) • Glycemic control (HbA1C) after 12 months: • IG: 8.7 (1.7%) vs. CG: 9.2 (2.2%)	1C
Pérez-Escamilla *et al*. (2015) [12] United States	Randomized clinical trial	211 Intervention: 105 Control: 106	Latino Diabetes Best Practices Program: • Self-management of diabetes • Medications for diabetes • Nutrition and exercise • Intercultural counseling • Mental health	3, 6, 12 and 18 months	Standard care	Glycemic control (HbA1C) after 18 months: • IC: 9.32 (8.91, 9.74) • CG: 8.77 (8.35, 9.20)	1C
Merakou *et al*. (2015) [21] Grecia	Clinically controlled trial	193 Intervention: 138 Control: 55	Structured group educational program: • Conversation Maps: Learning About Diabetes	Not informed	Standard care	Glycemic control (HbA1C) after 6 months: • IG: 1.4 (95% CI: 1.1, 1.7; p<0.001) • CG: 0.5 (95% CI: 0.5, 0.3; p=0.003) • Maps for people with DM2 are more effective in diabetes self-management	1C

Table 1. Characteristics of the included studies (Cont.)

Authors, (year), country	Type of study	Sample size	Intervention group (IG)	Follow-up	Control group (CG)	Main findings	Level of evidence
Ruggiero *et al*. (2014) [22] United States	Randomized controlled clinical trial	266 Intervention: 134 Control: 132	Physician Assistant Self-Care Coaching: • Patient-centered and individualized • Transtheoretical model • Empowerment model • Best practice advice	6 and 12 months	Standard care	Medication adherence: • IG: 6.6 (SD 2.0) • CG: 6.12 (SD 2.4) • Diabetes self-care behaviors: • IG: 3.81 (SD 2.2) • CG: 3.48 (SD 2.2) • There results were not significant.	1C
Plotnikoff *et al*. (2011) [23] Canada	Randomized clinical trial	96 Intervention: 49 Control: 47	Diabetes Education Program Plus Physical activity: • Energy Expenditure and Fitness • Modified Canadian Aerobic Fitness Test • Phone support	3, 6 and 12 months	Standard care	Glycemic control after 12 months: • IG: -0.5 (-0.9 to -0.2; $p<0.01$) • CG: -0.4 (-0.7–0.0) • Physical Activity after 12 months: • IG: 654.2 (466.9–841.6; ($p<0.01$) • CG: -33.9 (-213.6–145.8)	1C
Quinn *et al*. (2011) [24] Canada	Cluster-randomized clinical trial	163 Intervention: 107 Control: 56	Mobile Diabetes Intervention: • Coach-only • Coach primary care providers portal • Coach primary care providers portal with decision-support	12 months	Standard care	Glycemic control after 12 months: • IG: 1.9% (95% CI 1.5–2.3) • CG: 0.7% (0.3–1.1) • There were no significant results in relation to diabetes distress, depression, diabetes symptoms, or blood pressure and lipid levels (all $p>0.05$).	1C
Sönnichsen *et al*. (2010) [25] Austria	Cluster-randomized controlled trial	1489 Intervention: 649 Control: 840	Disease management programs "Therapie aktiv": • Group for Preventive Medicine Salzburg • Standardized documentation of physical examination • Structured interdisciplinary care	12 months	Standard care	Glycemic control (HbA1C): • IG: 0.41% [95 CI % 0.32; 0.50] • CG: 0.28% [95 CI % 0.21; 0.35] • Eye examination: • IG: 71.0% vs. CG: 51.2% • Foot examination: • IG: 73.8% vs.CG: 45.1% • Patient education: • IG: 49.5% vs. CG: 20.1%	1C
Gaillard *et al*. (2015) [26] United States	Randomized clinical trial	96 Intervention: 58 Control: 38	Diabetes Self-Management and Support: • Community health worker • Diabetes self-management training • Weekly call support • Community resources	6 months	Standard care	Glycemic control (HbA1C) after 6 months: • IG: 7.5 (1.3%; $p=0.02$) • CG: 7.7 (1.5%; $p=0.405$) • No significant changes in metabolic parameters	1C
Gehlawat *et al*. (2019) [27] India	Randomized controlled trial	314 Intervention: 157 Control: 157	Diabetes Self-Care Activities: • Education sessions of 45 minutes • Self-care kits (mirror, an oil bottle, and glucose tablets)	6 months	Standard care	Self-care of the feet: • IG: 3.64 vs. CG: 2.21 • Both groups: 1.95 (1.4-2.4; $p<0.001$) • Inspect the inside of your footwear: • IG: 1.34 vs. CG: 0.04 • Both groups: 0.78 (0.5-1.0; $p<0.001$)	1C
Romero-Guevara *et al*. (2019) [28] Colombia	Randomized controlled trial	200 Intervention: 98 Control: 102	Teaching: Individual: • Six educational sessions of 20 to 40 minutes: Behavior modification; teaching, disease process, prescribed medication, prescribed diet and exercise and coping enhancement • By two nurses	6 and 12 months	Standard care	Systolic blood pressure in 24 (mmHg): • IG: 125 (SD 14.6) • CG: 123 (SD 13.9) • HbA1c: • IG: 6.19 (SD 1.71) • CG: 6.15 (SD 1.44) • These results were not significant.	1C

In the United States, a study which carried two groups through an intervention using two guides on educational intervention for DM2 (one of the groups used the kit designed to improve diabetes education in the intervention, sessions were carried out that included updating on diabetes and instruction on techniques to improve communication in health, and the second group received guidance based on the National Health Program as an intervention. Diabetes Education to carry out discussions for the care of the disease) found that after these interventions in patients with diabetes, satisfaction with treatment presented significant results (3.93 [95% confidence interval (CI), 2.48-6.21]; $p<0.001$ versus 3.04 [95% CI, 1.93-4.77]; $p<0.001$), improving adherence to treatment.[16] Another study through the delivery of material created by an interdisciplinary group based on the American Diabetes Association and the American Association of Diabetes Educators, was carried out with an educational intervention in small groups with 45-minute sections, focused on the self-care of "healthy eating, being active, regular blood sugar control, taking medication on time, problem solving, risk reduction and healthy coping," resulting in 2% adherence to medication for control of blood glucose levels by the participants.[27]

Self-care and self-management in diabetes

The evidence has shown the high morbidity rate that diabetes mellitus represents. In this sense, the implementation of educational interventions that are focused on the proper management of it will consequently allow a positive impact on the self-care of patients. Thus, a study that applied the theory of self-efficacy in the self-care behavior with the feet in adults with DM2, allowed to obtain improvements in the performance and indirect experience of the physical and emotional states and verbal persuasion of the participants.[17] The application of this theory has shown significant results in self-care and knowledge of DM2 when comparing the intervention group to which the theory was applied and the control group that received standard treatment ($p<0.01$).[16] Structured education programs in primary health care settings have shown the effectiveness of self-care practices and a significant improvement of 33.5% [95% CI: 22.9–44.0].[27] This, therefore, shows foot care's considerable relevance since it seeks to also impact the patient's own self-care and thereby improve knowledge about the disease, which has led to significant results at 6 at 12 months of intervention ($p<0.01$).[22] On the other hand, adherence and empowerment are indicators that can present improvement through self-care practices. A study carried out in Brazil implemented a strategy of group education and family visits. This group education strategy produced better results in relation to glycemic control and diabetes self-care.[18] Through educational interventions, it has also been shown that knowledge about diabetes significantly increased in the group that received the educational intervention versus the control group (where it decreased), with the difference-in-difference model (DID) equal to (0.91 [95% CI: 0.64-1.18], $p<0.001$).[13] Likewise, a study found that community-based, peer-supported education shows a significant reduction in diabetes distress ($p<0.001$).[15]

Glycemic control of diabetes

The versatility of measures such as web applications for the education of patients with DM2 that have allowed a significant reduction in HbA1C ($p=0.004$).[15] A study with the intervention with web portals showed a mean decrease in glycated hemoglobin of 1.9% in contrast to standard care 0.7%, which has a variance of 1.2% ($p=0.001$) at 12 months.[24] The literature has been consistent in demonstrating the positive results of group programs for education in patients with DM2. Two studies showed significant results ($p<0.001$) in the reduction of glycated hemoglobin compared to other interventions, such as home visits, or standard care.[16,21] Interventions in structured groups have also made it possible to improve the knowledge of

patients in relation to DM2, and with this, they have prevented the elevation of HbA1C.[20] The inclusion of cultural aspects in educational interventions in a Latino population residing in the United States achieved a significant reduction in the HbA1C difference at 3 months ($p=0.043$), followed by a reduction difference at 6 months ($p=0.05$) and finally at 18 months ($p=0.009$).[12] Similarly, a culturally adapted self-care coaching intervention for racial/ethnic minority populations showed significant improvement in blood glucose levels.[22] Likewise, the individualized educational intervention in a study carried out in Austria showed significant reductions in weight and cholesterol, but it did not significantly influence metabolic control measured by HbA1C after one year.[25] With this, physical activity advice as an educational intervention has been effective in promoting a significant reduction in HbA1C 0.5% ($p<0.01$). Additionally, it has left positive results in glycemic control and the health of patients with DM2.[23] These types of activities that provide accompaniment and support in lifestyle have shown that it is possible to obtain a significant reduction in HbA1C ($p=0.02$) and in random blood glucose levels ($p=0.03$), compared to standard care. Thus, approaching the patient as an integral being through empowerment and commitment undoubtedly allows for even more successful interventions for diabetes self-management.[19,26]

Nursing and its role in educational interventions in patients with DM2

In the development of educational interventions, the multidisciplinary health team plays a fundamental role. However, it is recognized that nursing professionals have a differentiated scope within the team. Patient-centered interventions, which have the execution and accompaniment of the nursing staff, have allowed patients to self-identify their challenges and thus together be able to develop different strategies to overcome them.[26] It has also been shown that the educational strategies that are stimulated by other educational components outside the standard, and that guide the restructuring of behaviors, through education on the disease process, prescribed medication, diet, prescribed exercise, and improvement in coping with the disease by nursing professionals in the care of patients with DM2, it has generated encouraging results.[28] A study showed the importance of having professionals who have vast experience in education on DM2 through various structured and individualized educational interventions. The participants and their caregivers improved autonomy, allowing greater metabolic control and achievement of their long-term therapeutic goals.[14] Educational interventions have shown a great role in the care of diseases. The evidence showed that the performance of the nursing professional in the execution of these interventions prevents the increase in HbA1C in patients with diabetes. This is possible through the training of groups with patients with DM2, through familiarization and training in diabetic education for the identification of risk factors, and the non-compliance with pharmacological treatment when compared to other educating agents.[20]

Risk of bias of the studies included

The results of the analysis of the quality of the included studies is presented in Table 2, performed based on the parameters evaluated by RoB 1 in the 17 included studies. 88% described adequate random sequence generation[12–16,18–20,22–28] and 23% described allocation concealment.[17,24,25,28] Only two articles described blinding of participants and staff,[12,28] and 23% described blinding of outcome assessment.[12,14,20,28] Regarding the risk of selective reporting of results, it was shown that 76% described the proposed results from the beginning[12–14,16–18,20–22,25–28] (Figure 2 and Table 2). According to the JBI, the level of evidence of the 17 studies was 1C.

Table 2. Risk of bias among included studies

Studies	Random sequence generation	Allocation concealment	Blinding of participants and personnel	Blinding of outcome assessment	Incomplete outcome data	Selective reporting of results
Chen *et al*. (2020)[13]	Low risk	High risk	Not informed	Not informed	Low risk	Low risk
De la Fuente *et al*. (2020)[14]	Low risk	High risk	High risk	Low risk	Low risk	Low risk
Presley *et al*. (2020)[15]	Low risk	Not informed	Not informed	Not informed	Low risk	Unclear risk*
White *et al*. (2020)[16]	Low risk	Not informed	Not informed	Not informed	Low risk	Low risk
Sharoni *et al*. (2018)[17]	High risk	Low risk	High risk	High risk	Low risk	Low risk
Santos *et al*. (2017)[18]	Low risk	Not informed	High risk	High risk	Low risk	Low risk
Paz-Pacheco *et al*. (2017)[19]	Low risk	Not informed	Not informed	Not informed	Low risk	Unclear risk*
Grillo *et al*. (2016)[20]	Low risk	High risk	High risk	Low risk	Low risk	Low risk
Pérez-Escamilla *et al*. (2015)[12]	Low risk	Not informed	Low risk	Low risk	Low risk	Low risk
Merakou *et al*. (2015)[21]	High risk	High risk	High risk	High risk	Low risk	Low risk
Ruggiero *et al*. (2014)[22]	Low risk	High risk	High risk	High risk	Low risk	Low risk
Plotnikoff *et al*. (2011)[23]	Low risk	Not informed	Not informed	Not informed	Low risk	Unclear risk*
Quinn *et al*. (2011)[24]	Low risk	Low risk	Not informed	Not informed	Low risk	Unclear risk*
Sönnichsen *et al*. (2010)[25]	Low risk	Low risk	High risk	High risk	Low risk	Low risk
Gaillard, *et al*. (2015)[26]	Low risk	Not informed	Not informed	Not informed	Low risk	Low risk
Gehlawat *et al*. (2019)[27]	Low risk	Not informed	Not informed	Not informed	Low risk	Low risk
Romero-Guevara *et al*. (2019)[28]	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk

* Study registration or published protocol not found.

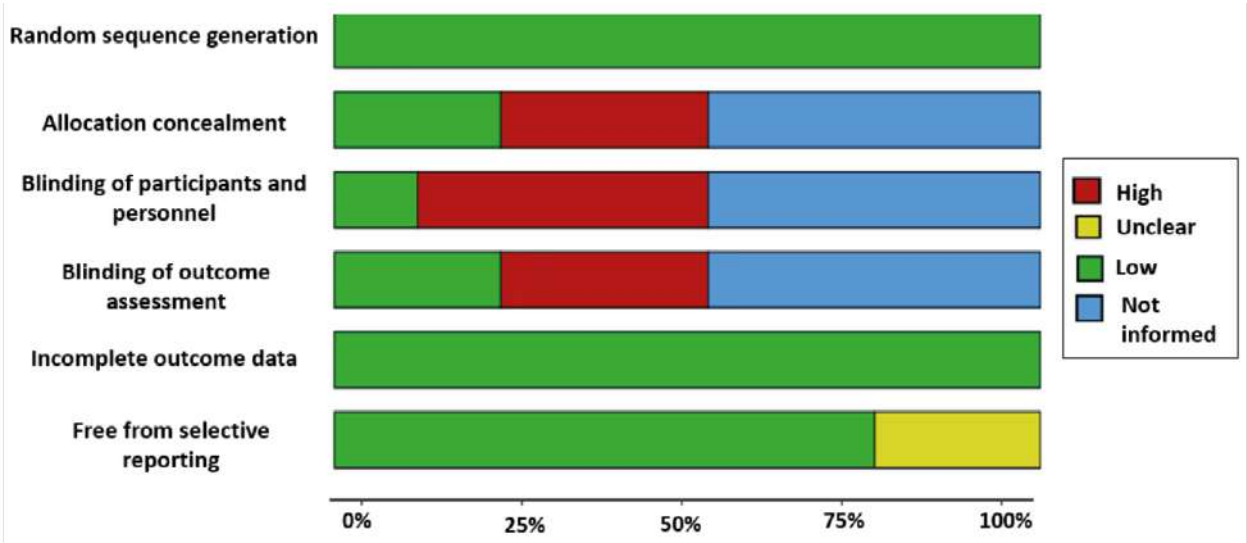

Figure 2. Methodological quality of individual studies

Discussion

The results of the review made it possible to identify educational interventions in individuals with DM2 in primary health care, which were categorized into four main aspects, representing a challenge for nursing professionals seeking: control of the disease, adherence by the patient to the programs, adherence to the therapeutic regimen, showing to a positive impact on quality of life. Our results were consistent in showing that educational interventions have shown significant impacts on adherence and therapeutic satisfaction.

This result agrees with other findings where the patient's adherence to the drug regimen showed a reduction in the severity of complications. It is believed that medication adherence factors in chronic patients can be made up of five major categories including economic and social factors, the health team, and the patient care system as well as treatment-related factors. Patient-related factors can be modified through education and increased knowledge.[29] Likewise, the evidence has shown the positive effects of educational interventions with an emphasis on self-care, these have shown improvements in self-efficacy during the health-disease processes faced by the population, highlighting an aspect that becomes relevant and that was evidenced in the results for coping with health conditions, such as empowerment and awareness of the disease. It is also shown that the inclusion approach of the patient and their family environment brings an improvement in knowledge and that it will thus have an influence on prevention of future complications such as foot care and other organs that may be affected.[4,30] Through the application of these educational interventions, different strategies have been implemented, providing educational interventions individually and in groups. However, a meta-analysis supports our findings. It shows significant results to improve knowledge, self-control of the disease based on knowledge about the condition itself, and the treatment and identification of one's own abilities. This consequently brings about the reduction of HbA1C levels in self-care interventions aimed at groups ($p<0.0001$).[31]

Within this review, the relevant role of the use of strategies through technological resources was evidenced, giving an encouraging panorama in the combination of methodologies that seek to adapt to the specific conditions of the population and have shown a favorable impact on the lifestyle of patients presenting a reduction in HbA1C levels up to 0.38%. It also allows secondary results in the improvement of knowledge and other comorbidities, all this giving support for the combination of methodologies that will impact positive results both in the population and in the health system with the use of low-cost strategies.[32] Therefore, showing the very positive results of educational interventions in patients with DM2, the nursing professional plays a very important role in the proper planning and execution of these patient-centered interventions for the self-control of the disease and its role in decision making, demonstrating with this relevant scope in the modification and obtaining of controlled clinical parameters in patients.[30] Thus, educational interventions in patients with diabetes mellitus have identified a relevant reference point, when compared to care, not only because it involves compliance with figures between normal values in clinical parameters but also because it allows contributions in the implementation of these programs with different methodologies, multidisciplinary teams, and both individual and group approaches.[4,33]

Although this SR was carried out under PRISMA guidelines, it has some limitations. First, searches were only carried out in MEDLINE, EMBASE, LILACS, Web of Science and gray literature. Second, the analysis of the quality of the included studies showed lack of information on allocation concealment, blinding of outcomes assessment and blinding of participants and staff in some studies. Lastly, this review did not use the GRADE (Grading of Recommendations, Assessment, Development and Evaluation) methodology to evaluate the degrees of recommendation of the studies selected.

Nonetheless, the JBI recommendations were used to assess the level of evidence of the studies.

Conclusion. The findings of this review suggest that educational interventions in patients with DM2 in the primary health care setting can have a positive impact on therapeutic adherence, self-control and knowledge of the disease. In addition, it was possible to identify the influence of health teams, pointing out the scope of nursing professionals in the construction and implementation of educational interventions for better health outcomes. This way, the value of the performance of the nursing profession in its investigative, academic, practical, and management role that results in a contribution to the discipline and the community is pointed out.

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Construction and Validation of an Occupational Risks Scale for Intra-hospital Nursing Staff

Original Article

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Construction and Validation of an Occupational Risks Scale for Intra-hospital Nursing Staff

Abstract

Objective. To construct and evaluate initial validity indicators of an instrument on occupational risks for hospital nursing staff. **Methods.** A methodological study was conducted in four Chilean hospitals. The study was carried out in three stages: (i) integrative literature review on risk assessment instruments for nursing; (ii) descriptive qualitative study on 113 health professionals to identify their work conditions and experiences regarding occupational risks and construct three instruments proposals for nursing managers, clinical nurses, and technicians; and (iii) validity and reliability study of the three instruments in 503 nurses and nursing technicians. To collect the data from the qualitative study, individual interviews, focal groups, and non-participant observation were conducted. The data were analyzed thematically into predefined

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risk categories. Content validation was performed through expert judgment, and exploratory factor analysis of principal components was conducted for the preliminary construct validity study. Cronbach's alpha was used as an indicator of internal consistency. **Results.** A total of 128 items were identified, distributed across 11 categories and 25 subcategories of occupational risks for the three instruments derived from the original proposal. After expert validation, pilot study, and instrument administration, Cronbach's alpha values between 0.88 and 0.93 were obtained. Exploratory factor analysis distinguished eight to eleven components, with unsatisfactory goodness-of-fit indicators. **Conclusion**. The instruments demonstrated good parameters of content validity and reliability, although their construct validity needs further improvement.

Descriptors: occupational risks; occupational health nursing; nursing staff; hospitals; surveys and questionnaires.

Construcción y validación de una escala de riesgos laborales del personal de enfermería intrahospitalario

Resumen

Objetivo. Construir y evaluar indicadores de validez inicial de un instrumento sobre riesgos laborales del personal de enfermería intrahospitalario. **Métodos.** Estudio metodológico, participaron cuatro hospitales chilenos. Se desarrolló en tres etapas: (i) revisión integradora de la literatura sobre instrumentos de evaluación de riesgos en enfermería; (ii) estudio cualitativo descriptivo en 113 profesionales de salud para identificar sus condiciones laborales y vivencias respecto a los riesgos laborales y construir tres propuestas de instrumentos para jefaturas de enfermería, enfermeros clínicos y técnicos; y (iii) estudio de validez y confiabilidad de los tres instrumentos en 503 enfermeros y técnicos en enfermería. Para la recolección de datos del estudio cualitativo se realizaron entrevistas individuales, grupos focales y observación no participante. Los datos fueron analizados temáticamente en categorías de riesgos predefinidas. La validación de contenido se realizó a través del juicio de expertos y para el estudio preliminar de validez de constructo se hizo análisis factorial exploratorio de componentes principales. Como indicador de la consistencia interna se aplicó Alfa de Cronbach. **Resultados.** Se identificaron 128 ítems para 11 categorías y 25 subcategorías de riesgos laborales para tres instrumentos derivados del originalmente propuesto. Luego de la validación por expertos, el estudio piloto y la aplicación de los instrumentos, se obtuvieron valores

de alfa de Cronbach entre 0.88 y 0.93. El análisis factorial exploratorio distinguió ocho a once componentes, no lográndose buenos indicadores de bondad de ajuste. **Conclusión.** Los instrumentos presentan buenos parámetros de validez de contenido y confiabilidad, debiéndose perfeccionar su validez de constructo.

Descriptores: riesgos laborales; enfermería del trabajo; personal de enfermería; hospitales; encuestas y cuestionarios.

Construção e validação de escala de risco ocupacional para equipe de enfermagem intra-hospitalar

Resumo

Objetivo. Construir e avaliar indicadores de validade inicial de um instrumento sobre riscos ocupacionais da equipe de enfermagem intra-hospitalar. **Métodos.** Estudo metodológico, quatro hospitais chilenos participaram. Foi desenvolvido em três etapas: (i) revisão integrativa da literatura sobre instrumentos de avaliação de risco em enfermagem; (ii) estudo descritivo qualitativo em 113 profissionais de saúde para identificar suas condições de trabalho e experiências em relação aos riscos ocupacionais e construir três propostas de instrumentos para chefes, enfermeiros assistenciais e técnicos de enfermagem; e (iii) estudo de validade e confiabilidade dos três instrumentos em 503 enfermeiros e técnicos de enfermagem. Para a coleta de dados do estudo qualitativo, foram realizadas entrevistas individuais, grupos focais e observação não participante. Os dados foram analisados tematicamente em categorias de risco pré-definidas. A validação de conteúdo foi realizada por meio de julgamento de especialistas e para o estudo preliminar de validade de construto foi realizada uma análise fatorial exploratória de componentes principais. Como indicador de consistência interna, foi aplicado o Alfa de Cronbach. **Resultados.** Foram identificados 128 itens para 11 categorias e 25 subcategorias de riscos ocupacionais para três instrumentos derivados do originalmente proposto. Após a validação por especialistas, o estudo piloto e a aplicação dos instrumentos, foram obtidos valores de alfa de Cronbach entre 0.88 e 0.93. A análise fatorial exploratória distinguiu de oito a onze componentes, não alcançando bons indicadores de qualidade de ajuste. **Conclusão.** Os instrumentos apresentam bons parâmetros de validade de conteúdo e confiabilidade, e sua validade de construto deve ser aprimorada.

Descritores: riscos ocupacionais; enfermagem do trabalho; recursos humanos de enfermagem; hospitais; inquéritos e questionários.

Introduction

Intrahospital nursing work is an activity that entails an overload inherent to the nature of its activities and the environment, taking place under complex working conditions.[1-3] Continuous contact with patients and their families, performing procedures, nightwork, confrontation with suffering, pain, and death within a stressful context of staff shortage, and a continuous process of decision-making under pressure[4,5] exposes the nursing staff to multiple risks that can trigger the occurrence of accidents and occupational diseases.[6-8] Work shift, especially night shifts, derives into chronodisruptive disruptions, eating disorders, insomnia, and anxiety.[9] Besides, this work system limits the time dedicated to their families, provoking conflicts between work and personal life.[10] Additionally, this work system limits the time dedicated to their families, causing conflicts between work and personal life. Furthermore, the handling of chemical substances leads to a wide range of health problems.[11-14] In addition, the need to remain standing for long periods of time or the mobilization of patients and heavy objects may cause musculoskeletal disorders.[15]

Stress and burnout have also been identified as relevant risks associated with patient care and the organizational factors that impact the performance of nursing duties.[16] These factors include the performance of additional tasks outside the nursing scope and the staff shortage.[17] The COVID-19 pandemic added another variable, over-demanding nursing staff in an environment of uncertainty provoking negative effects on their mental health.[18,19] Finally, violence in the workplace, principally from patients or their relatives, emerges as a challenging issue to be prevented and managed, putting the physical and emotional integrity of healthcare workers at risk.[20]

Given that the health protection and well-being of nursing workers has implications for the achievement of positive outcomes for the staff, patients, organizations, and health systems,[21] generation of strategies aimed to improve systematically the safety of working conditions is especially relevant to guarantee a safe working environment. In this sense, it turns out crucial to identify and evaluate risks to generate interventions that improve well-being and work safety. Although there are tools available to asses nursing occupational risks, these have been developed in other countries[22] and have not been validated in Chile. Furthermore, they measure specific risks, without considering a comprehensive perspective or specific aspects of different nursing and nursing technicians (NTEs). Regarding the lack of knowledge about occupational risks according to the area of nursing practice, the Chilean Social Security Superintendent initiated a research call to develop an instrument to measure occupational risks in intrahospital nursing teams. Therefore, this study aims to construct and validate an assessment instrument for occupational risks among nursing personnel working in Chilean hospitals.

Methods

A methodological study with a mixed, qualitative, and quantitative design was conducted in four hospitals located in the provinces of Aconcagua and Los Andes in the region of Valparaíso, Chile. The participating hospitals were San Juan de Dios Hospital in Los Andes (172 beds), San Camilo Hospital (232 beds), Philippe Pinel Hospital (354 beds), and San Francisco de Llay-Llay Hospital (45 beds). The first two are of high complexity, while the third corresponds to a medium-complexity psychiatric hospital. Finally, the Llay-Llay Hospital is a low-complexity hospital. The research was conducted in three phases; the first involved an integrative literature review with the aim of knowing and guiding the construction of risk categories as a basis for developing the assessment tool. The second consisted of a descriptive qualitative study to know the working conditions of the nursing staff and their exposure to risks in hospitals. Finally, the third stage involved a quantitative study that aimed to validate the instrument and establish its psychometric properties.

Stage 1. Integrative literature review

The integrative literature review regarding occupational risks and risk assessment tools for nursing staff was carried out between September and November 2020. PubMed, Ebsco Host, Scopus, Cochrane Library, and Scielo databases were reviewed to answer the following guiding question: "What evidence is available in the literature regarding the occupational risks of nursing personnel working in hospitals and the tools to assess these risks?" Spanish and English DeCS/MeSH keywords were used, including nursing, occupational health, hospitals, occupational risks, risk assessment, occupational accidents, psychological stress, emotional exhaustion, workplace violence, circadian rhythm sleep disorders, shift work schedule, leadership, emotional intelligence, and pandemic. Primary studies, systematic reviews, integrative reviews, and meta-analyses from the last 15 years were searched, combining different keywords to ensure comprehensive results. This preliminary stage not only provided a deep understanding of a wide range of publications related to the research topic but also guided the construction of categories and subcategories of occupational risks based on a preliminary classification according to their nature for use in the next stage.

Stage 2. Qualitative study

This stage was carried out between January and September 2021. Due to the COVID-19 pandemic, the work modality was adjusted, conducting part of the activities remotely using the Zoom® platform. The participants included nursing managers, supervisory nurses, clinical nurses, administrative nurses, nursing technicians (NTEs), occupational risk officers, and occupational psychologists. The inclusion criteria for the nursing staff established having work experience of at least two years in the clinical unit. While for the risk prevention managers and occupational psychologist, the inclusion criteria established having work experience of at least one year in the hospital. The sample size for each hospital was determined by convenience in collaboration with the nursing management of each hospital, based on the inclusion criteria and availability of participants at the data collection time. The sample consisted of 113 participants, including four hospital nursing managers, 12 supervisory nurses, 47 clinical nurses, 45 NTEs, four occupational risk officers, and one occupational psychologist.

Data collection involved focus groups, individual interviews, and non-participant observation of the daily activities of nurses and NTEs. Guidelines were developed for conducting interviews and focus groups. Ten face-to-face interviews, 20 video conference interviews, and 11 hybrid format focus groups were conducted, including five with clinical nurses and six with NTEs. Both interviews

and focus groups were guided by two occupational psychologists with experience in qualitative research. Prior to the activities, informed consent was obtained from the participants.

The interviews were conducted with four nursing managers, 12 supervisory nurses, eight clinical nurses, one nursing technician (who couldn't participate in the focus group), four occupational risk officers, and one occupational psychologist. The interviews took place in closed offices within their respective units. Before each interview, feasibility was checked, and the objective of the activity was reinforced. For video conference interviews, technical conditions and internet access were previously verified. In cases where offices had poor internet connection, or computers without cameras, a notebook with mobile broadband internet access was provided. Subsequently, a technical check of the internet connection, Zoom® platform functionality, and audio-visual quality was performed before formally starting the interview, which lasted between one hour and one hour and thirty minutes.

A semi-structured interview guideline was used with open-ended guiding questions that mentioned their daily life at work, their experiences, and their challenges. These questions included: What are the challenges you face in your work? Have you experienced or are you experiencing difficult, complex situations on an exceptional or permanent situation? Do you and your work team have contact with hazardous, polluting procedures or products? Do you have to perform excessive forces or movements that affect you physically? Please indicate the three risks you consider most serious for your teamwork. Is this severity due to physical, emotional, or psychological risk? Which one affects you most personally and why?

Regarding the focal groups, six were held for the NTEs staff and five for clinical nurses in rooms designated by the participating hospitals. A total of 39 nurses and 44 NTEs participated in these activities. The focal groups were conducted by the occupational psychologists of the research staff, who alternated the roles of observer and moderator. The modality for the focal groups was hybrid due to the sanitary conditions of the pandemic and travel restrictions. This is why, according to the epidemiological situation of each day, focal groups were held with both psychologists present and focal groups with the moderator present and the observer remotely with a connection via the Zoom® platform. Before starting the activity, an introduction to the study and its objectives was provided. As well as for the interviews, a semi-structured guideline with open questions was used addressing their working life, such as: What is your job, let's think about what are your daily tasks? With whom do you interact? In what setting does your work take place? What is your role within the teamwork? How is your relationship with your teamwork? How is your relationship with superiors? How is your relationship with the organization? Do you relate with patients? What is the challenge in this relationship? Do you work in shifts? What are the principal difficulties related to shifts?

Both focus groups and individual interviews were recorded in audio and video files, backed up and accessible only to the research team. Non-participant observation involved accompanying daily tasks and observing the working conditions in 30 clinical units (intensive care, adult and pediatric medical-surgical services, surgical wards, sterilization, dialysis, emergency, traumatology, endoscopy, post-anesthesia recovery, quality unit, unit for prevention of healthcare-associated infections, and psychiatric units). Field notes were taken using a field notebook, which included recording the narrative and meta-narrative of the observations. Subsequently, the notes were transcribed into a Word document for further review and analysis. The recordings of the interviews and focus groups were transcribed using the AmberScript® program and saved in

a Word file. This initial transcription was then reviewed and corrected by the research team. To safeguard the confidentiality of participant identification data, an alphanumeric code was assigned to each interview. The data obtained from the discourses were initially analyzed using the predetermined categories and subcategories. The textual citations were grouped into first- and second-level categories and subcategories. Content from each code was analyzed, comparing it with the rest and identifying the elements in common, which permitted the creation of additional sub-categories to those previously defined.

During a second analysis stage, axial coding was carried out giving rise to the second-level categories. Finally, three instrument proposals were built: one for clinical nurses, one for nursing heads, and the other for NTEs, given the differences between their job profiles and their exposure to different hazards at work.

Non-participant observation consisted in monitoring the daily tasks and observing the conditions in which the work was performed and this was conducted in 30 clinical units (intensive care, adult and pediatric medical-surgical services, surgical wards, sterilization, dialysis, emergency, traumatology, endoscopy, anesthetic recovery, quality unit, unit for the prevention of infections associated with health care, and psychiatry units). Field notes were taken in a field notebook that considered the record of the story and the meta-story of that observation. Thereafter, these were transcribed into a Word file for later review and analysis. The recordings of the interviews and focal groups were transcribed using the AmberScript® program and stored in a Word file. Then, this first transcription was revised and corrected by the research staff. To safeguard the confidentiality of participants' identification data, an alphanumeric code was assigned to each interview. Thereafter, the data obtained from the discourses were subjected to analysis, using in the first instance the categories and subcategories defined *a priori*. The content of each code was analyzed and compared with the others, and common elements were identified, leading to the creation of additional subcategories beyond those defined beforehand. In the second stage of analysis, axial coding was performed, resulting in second-level categories. Finally, three instrument proposals were developed: one for clinical nurses, one for nursing managers, and another for NTEs considering the differences in their job profiles and exposure to different work hazards.

Stage 3. Quantitative study

The three instruments proposed were subjected to content validity by the judgment of 10 professional experts (two risk prevention professionals and eight nurses with a Master's degree and experience of over ten years in intra-hospital work). The validity assessment was performed through criteria of relevance, conceptual clarity, and writing, using the methodology proposed by Hernández-Nieto.[23] Next, a pilot study of a proposed instrument with 128 items was conducted on 15 nursing professionals from hospitals different from those studied.

This pilot study revealed the impossibility of generating a common instrument for nursing managers, clinical nurses, administrative nurses, and NTEs (nursing technicians) due to the significant variability in positions, workplaces, types of responsibilities, and exposure to different risks. Although the requirement of the Occupational Safety Institute was to build an instrument, in practical terms, it was impossible to have a common instrument even differentiating among nurses managers, clinical nurses, and NTEs, given that the 128 items did not apply to all job types, therefore, three possible groups of questions were grouped: the first with common items for all the nurse and NTEs positions; the second with common items to all the nursing

positions that care for patients; and the third with common items to nurses and NTEs who do not care directly for patients. However, the combination of the 128 original items can give rise to 17 instruments (two for nurses managers, eight for clinical and administrative nurses, and seven for NTEs) that consider the specific characteristics of each job position in the different clinical and administrative units and the hazards related with the direct patient's care, such as biological, physical, chemical agents and others, like shift work. Differences in the administrative and leadership tasks and team leadership were also considered.

This pilot study revealed the impossibility of achieving the initial purpose of constructing and validating a single instrument. Due to the magnitude and technical feasibility of validating 17 instruments, it was decided to subject the three instruments with common items to an initial study of validity and reliability, leaving for a later stage the validation of the 17 assessment tools foreseen. Then, the validity and reliability study was conducted, which was proposed to be carried out in the population of nursing workers from the four hospitals (n = 620). The research design corresponded to a quantitative study with descriptive cross-sectional scope carried out between December 2021 and April 2022.

Data collection was carried out in each of the clinical and administrative services where nurses and NTEs worked. Two members of the research team delivered the instruments to the nursing staff in a sealed envelope that included the instrument and the informed consent to be self-answered. Then, the envelopes were collected on consecutive days until completing the data capture period. Since this was conducted during the summer period, it was necessary to wait for the workers' vacation periods. Therefore, both the delivery and retrieval of the instruments were done once a week in the four establishments.

For each group of interest (nursing managers, clinical nurses, administrative nurses, and NTEs), the corresponding instrument for the job position and unit in which each nurse and NTEs worked was used. This included a variable number of questions on a five-point Likert scale ranging from 1 = "strongly disagree" to 5 = "strongly agree". Once the instruments were collected, the responses were entered into an Excel spreadsheet, which was later exported to a data file in the statistical software Stata version 17, following the required data cleaning protocols before conducting any analysis. The following strategies were used: *Descriptive statistics*: while taking into account that Likert scale variables are qualitative and ordinal, the average and standard deviation were calculated for each item and dimension of the instrument. Additionally, the proportion of responses for each Likert scale in all items was calculated. *Internal consistency:* the reliability analysis of the items and categories was examined by calculating the α-Cronbach coefficient. *Construct validity:* to assess the coherence of the scale construction with the theoretical model, Kendall's correlation was used as a first step to applying exploratory factor analysis (EFA). The EFA was conducted using the principal axis extraction method with Varimax rotation, as this rotation method seeks to maximize the loadings at the factor level. In other words, each item or variable is expected to be represented in only one factor in order to minimize the number of variables in each factor. Additionally, the basic assumptions of sphericity were tested through Bartlett's test, complemented by the Kaiser-Meyer-Olkin (KMO) test. The KMO takes values between 0 and 1 and was performed to provide a measure of the adequacy of the factor analysis. If the values are small, it means that the items generally have very little in common to justify a factor analysis. Historically, the following labels are assigned to KMO values: 0.00 to 0.49 = unacceptable, 0.50 to 0.59 = miserable; 0.60 to 0.69 = mediocre, 0.70 to 0.79 =

intermediate, 0.80 to 0.89 = meritorious, and 0.90 to 1.00 = excellent. Additionally, as a preliminary assessment of the goodness of fit of this factor analysis, standard goodness-of-fit indicators were calculated, excluding categories with only one item: Standardized Root Mean Square Residual (SRMR), Root Mean Square Error of Approximation (RMSEA), Tucker-Lewis Index (TLI). Values below 0.05 for SRMR and RMSEA indicate a good fit of the model, while values above 0.90 for the Tucker-Lewis Index and Comparative Fit Index indicate an adequate model fit.[24]

Variable standardization: The variability in the number of questions resulted in an imbalance in the structure of risk categories, which led to the need to standardize the scores to generate a single risk assessment indicator that would make the instruments comparable, regardless of the number of questions they included.

Taking into account the number of items per dimension in each instrument, the minimum and maximum risk scores were established. Then, the scores were centered in relation to the minimum score, as well as standardized according to the maximum score. The latter corresponds to the Overall Occupational Risk Index (OORI) and ranges from 0 to 100 points. The following cutoff scores were also established for three risk levels: low risk (0-39 points), medium risk (40-70 points), and high risk (71-100 points). This was done by applying the norm based on percentiles.[25] Finally, the scores obtained by the participants in each of the eleven risk categories were standardized, resulting in a Specific Occupational Risk Index (SORI).

Ethical considerations: Approval was obtained from the Scientific Ethics Committee of the Universidad Viña del Mar (CEC UVM 23/09/2020) and the Aconcagua Health Service (CEC 20/2020). Informed consent was obtained from all study participants

Results

Stage 1. Integrative literature review

As a result of the integrative review, 11 preliminary categories of risks were identified based on their nature: occupational stress and burnout, risks associated with the individual and their relationship with the organizational environment, mental workload, shift work, workplace violence, risks associated with the relationship styles of healthcare personnel or work teams, musculoskeletal risks, biological risks, physical risks, chemical risks, and double presence; along with 26 first-level risk subcategories. The predetermined categories and subcategories of occupational risks formed the basis for guiding the qualitative study in the second phase of this research.

Stage 2. Qualitative study

The analysis of the discourse obtained from the interviews and focus groups led to the identification of the same eleven categories of risks resulting from the literature review. A total of 1355 textual citations were analyzed. The most frequently mentioned categories of occupational risks by the participants, in descending order, were: stress and emotional exhaustion, risks associated with the individual and their relationship with the organizational environment, mental workload, and relationship styles of healthcare personnel and work teams, representing 75.1% of the citations. It was observed that while the risk categories are common among most nurses and nursing technicians, they affect them differently, determining their way of experiencing and evaluating them. Furthermore, the nature of work in certain clinical units exposes professionals to quite specific chemical and physical risks. Therefore, the eleven categories of risks gave rise to 25 first-level subcategories and 98 second-level subcategories. Table 1 shows the classification of the categories and first-level subcategories.

Table 1. First-level categories and subcategories of occupational risks

First-level category and subcategory
Stress and emotional exhaustion
Work overload
Care and relationship with patients and relatives
Lack of self-care
Leadership concerns
Fear of contracting infectious diseases.
Risks associated with the individual and their relationship with the organizational environment
Perception of the lack of appreciation of nursing work
Inefficient management
Lack of training and formation
Insufficient staffing to perform the job
Mental workload
Capabilities and/or attitudes of people
Types of tasks and work methods
Equipment and infrastructure
Administrative aspects
Relationship among services and their link with patient health
Shift work
Perception of risk at work
Violence in the workplace
Violence associated with daily work
Relationship styles of health personnel or teamwork
Leadership
Communication within the staff
Work climate and dysfunctional dynamics
Teamwork
Musculoskeletal risks
Musculoskeletal risks associated with the nature of the work
Biological risks
Biological risks associated with the nature of the work
Chemical risks
Handling/exposure to chemical substances
Physical risks
Physical risks associated with the nature of the work
Double presence
Double presence associated with the nature of the work

Based on the first- and second-level categories and subcategories, 128 items were constructed, which can give rise to 17 nursing team occupational risk scales (NTRS) with a different combination of questions, according to the job position and clinical or administrative unit with a varying number of questions depending on their position and work unit (nurses managers: between 64 and 81 questions, clinical and administrative nurses between 55 and 99 questions, and NTEs between 68 and 97 questions). These 17 differentiated scales should be validated in the future. Figure 1 shows the construction process of the instrument's items from the results of the qualitative study and stages prior to the instrument's validity and reliability study.

Category	First level subcategory	Second level subcategory	Items of the scale
Stress and emotional exhaustion	Stress and emotional exhaustion due to work overload	Strenuous work days (many patients, procedures, meetings, problems to solve, etc.)	My work days are exhausting (caring for many patients or my administrative work is excessive)
	Stress and emotional exhaustion due to care and the relationship with patients and relatives	Accompanying the death of a patient/coping with grief	It is difficult for me to cope with grief due to the death of one or more patients
	Stress and emotional exhaustion due to lack of self-care	Impossibility to exercise self-care	It is difficult for me to exercise self-care
	Stress and emotional exhaustion due to leadership concerns	Emotional exhaustion due to personnel management/interpersonal relationships NTEs, doctors, nurses	Managing interpersonal relationships among NTEs, doctors, and nurses overwhelms me

Figure 1. Scheme to elaborate the instrument's questions. Example of the Stress and Emotional Exhaustion category and four items.

Stage 3. Quantitative study

The content validity analysis conducted by expert judgment resulted in a content validity coefficient of 0.97. Minor adjustments were made to some words based on their suggestions. Subsequently, the pilot study indicated the impossibility of validating a total of 17 instruments generated from the combination of 128 items. Therefore, a preliminary study of psychometric properties was conducted on three instruments with common items: one for all nursing positions and NTEs, another for nurses and NTEs who attend to patients, and finally, an instrument for nurses and NTEs who do not attend to patients. Out of the 620 instruments distributed, 512 were collected. However, nine were discarded due to a high number of omitted responses. Hence, a total of 503 valid instruments were included in the analysis,

which was completed by nurses and NTEs from the four hospitals studied (430 who worked with patients and 73 who did not work with patients): 198 from San Juan de Dios Hospital in Los Andes, 210 from San Camilo Hospital, 60 from Philippe Pinel Hospital, and 35 from Llay Llay Hospital. Among the total sample, 31 corresponded to nursing management positions, 171 to clinical nurses (13 from administrative services, four from dialysis, 78 from adult and pediatric medical-surgical services, 12 from the operating room, five from traumatology, 38 from the critical care unit, 20 from the emergency department, and one from sterilization), and 301 to nursing technicians (seven from dialysis, 116 from adult and pediatric medical-surgical services, 42 from the operating room, 13 from traumatology, 34 from the critical care unit, 61 from the emergency department, and 28 from sterilization).

Given the variability in the number of risk categories and questions applicable to different nursing positions, three groups of items were created for an initial validation approach. The first group consisted of 52 items common to all positions, corresponding to eight risk categories. The categories "Shift work," "Chemical risks," and "Biological risks" were excluded from this analysis as they were specific to certain positions and clinical services. The second group incorporated nurses and NTEs who work with patients, sharing a total of 90 items corresponding to the eleven risk categories. Finally, the third group comprised nurses and NTEs who do not work with patients, sharing a total of 52 items corresponding to the same eight categories as the first group. For the first group including all positions and 52 common questions, Cronbach's alpha statistic was calculated for each item, resulting in an overall Cronbach's α of 0.9025. Table 2 shows that all items yielded values above 0.889, indicating excellent reliability of internal consistency for the 52-item instrument.[26]

Table 2. Cronbach's alpha results for each item common to all nursing staff posts

Category/ items	Cronbach's alpha
Stress and emotional exhaustion	
My workdays are exhausting	0.9001
I can rest outside working hours	0.9009
I have a work overload due to supervising new staff	0.9007
It is difficult for me to practice self-care	0.9006
There are formal instances of self-care	0.9015
There are informal instances of self-care	0.9013
I am aware that my self-care is important	0.9047
My responsibility and commitment go beyond the established	0.9043
I have been afraid of contracting infectious diseases	0.9023
Risks associated with individuals and their relationship with the organizational environment	
My work is valued by my supervisor	0.9032
My work is valued by the management	0.9006
The management pays little attention to how workers feel	0.9003
The hospital is efficient in problem-solving	0.8997
I participate in decision-making regarding my working conditions	0.9004
The management does not address occupational risk issues	0.8997
The management gives little importance to personnel problems	0.8997
Occupational risks-related problems are solved	0.9005

Table 2. Cronbach's alpha results for each item common to all nursing staff posts (Cont.)

Category/ items	Cronbach's alpha
There is infrastructure without maintenance	0.9006
There is a shortage of healthcare staff	0.9015
Training is available for new personnel	0.9009
I have access to training for new challenges	0.9007
Mental workload	
I struggle to concentrate during the workday	0.9009
I feel I do not remember the things I have to do	0.9013
I have difficulty processing all the information	0.9008
It exhausts me when my colleagues resist changes	0.8999
It exhausts me when my superiors are resistant to changes	0.8992
The tasks I perform are highly demanding	0.9012
Continuous changes in procedures overwhelm me	0.8997
It overwhelms me to have to keep an eye on the work of new staff	0.8996
The distribution of resources among services is equitable	0.9007
We have the infrastructure for the nursing staff	0.9014
The management is only interested in our being productive	0.8993
My professional opinion is taken into account	0.9001
Established quality standards are met	0.9018
The conditions in which employees are hired are equitable	0.9000
I am exhausted by having to worry about mistakes that other members of my health staff could make	0.9002
Violence in the workplace	
I have suffered verbal aggression from a member of my work staff	0.9006
Healthcare staff's relationship styles or team dynamics	
My supervisor exhibits good leadership	0.9008
Communication with my direct management is expedited	0.9014
Communication with my peers is effective	0.9016
The hospital´s management clearly communicates the organization´s general guidelines	0.9004
Part of the coexistence issues at work is due to teams comprising individuals of different ages or generations	0.9032
There are coexistence problems among employees in my department	0.9005
In this hospital, marked differences exist among the levels of the health staff	0.9011
Musculoskeletal risks	
There are conditions in my department that increase the risk of falls among personnel	0.9006
Physical risks	
I am exposed to extreme temperatures	0.9007
I am exposed to risks due to poor lighting	0.9004
I am exposed to risks due to infrastructure in bad conditions	0.8989
I am exposed to risks due to the lack of safety signage	0.8992
I am exposed to risks due to a lack of emergency protocols	0.8998
Double presence	
While I am working, I am worried about what is going on in my home	0.9012
In general, I can balance my work and personal life	0.9021
Overall Cronbach's alpha	0.9025

The KMO test resulted in 0.8704, and Bartlett's test yielded a p-value less than 0.05, indicating the presence of correlation structure, which made it feasible to study the exploratory factor structure of the instrument, leading to conducting EFA. The Varimax rotation distinguished eight factors that grouped the items of the eight studied categories. The exploratory fit indices of the model were not satisfactory (TLI=0.535, RMSAE=0.096, RSAE=0.079). For the second group consisting of nurses and NTEs who attend to patients, the overall Cronbach's alpha was 0.932. All items resulted in values higher than 0.93, indicating excellent internal consistency reliability of the 90-item instrument.[26] The KMO was 0.8417, and Bartlett's test was significant, demonstrating the feasibility of conducting EFA. It revealed a total of 11 factors that, like the previous case, grouped the items of the 11 occupational risk categories. Convergence was not achieved to evaluate the satisfaction of the goodness-of-fit indicators. Finally, for the third group composed of nurses and TENs who do not attend to patients, the overall Cronbach's alpha was 0.88. All items resulted in values higher than 0.87, indicating good internal consistency reliability of the 52-item instrument. (26) The KMO was 0.7469, and Bartlett's test was significant, allowing for the EFA, which identified nine factors that more clearly grouped the items of the eight common categories in this third grouping. The exploratory fit indices of the model were not satisfactory (TLI=0.167, RMSAE=0.163, RSAE=0.175).

Discussion

Although the construction of a common occupational risk assessment instrument for nurses and NTEs was initially considered, the development of the qualitative phase and pilot study detected differences in the exposure to these risks, depending on the professional profile and workplace. This allows us to visualize for future research, specific instruments according to these criteria.

Since this project was carried out following guidelines provided by the state funding agency for the study, which stated that the instrument items should emerge from the initial qualitative study, it was not feasible to control the number of items, despite the suggestion of having a balanced number of items per dimension.[27] However, the imbalance of these items highlights the importance of each category and reflects the working conditions faced by nursing staff. Out of a total of 128 items, not even 38 of these items could be incorporated into the preliminary validation process, as they were applicable to a very small number of professionals exposed to chemical and physical risks. This prevented us from having a sufficient quantity of the latter to carry out this initial validation process.

Regarding the question set of the NTRS, the dimension of stress and emotional exhaustion includes aspects that are experienced as risk factors. Within these factors, work overload, exhausting work schedules, and aspects associated with patient and family relationships are among the items investigated in this dimension, which is consistent with other authors.[1] Although this research was conducted during the pandemic, the results indicated that COVID exacerbated the impact of risk factors rather than adding new ones, except for the fear of contagion. This has been described as a source of stress and anxiety among nursing professionals during a pandemic.[19]

Also, regarding the risks associated with the relationship between the individual and the organization, the items in this dimension reflect the perception of nursing work valuation, the impact of organizational decisions, and the lack of staff, among others, similar to what is described in the literature.[2,17]

In the mental workload category, the items reflect cognitive efforts to simultaneously handle a considerable amount of information and a multitude of tasks, many of which have high demands and must be completed within limited

time periods.[4] The shift work dimension includes questions associated with the impact of shifts on health, personal life, and patient safety. These are consistent with studies that have detected issues such as eating and metabolic disorders, chronodisruption, anxiety, and stress, among others.[4,9] Regarding risks associated with relationship styles, items on leadership, teamwork, and communication were incorporated, which are inherent to the nature of nursing work and have different effects depending on the role.[2,17]

Additionally, the instrument captured relevant aspects related to exposure to musculoskeletal risks, which is a complex issue as working conditions and risky activities can extend throughout a significant part of a professional's life, causing acute and chronic pathologies.[3,7,8,15,20] The dimension of workplace violence included aggression from both healthcare personnel and patients and their families, as well as items related to the perception of institutional support in the face of aggression. This is a growing problem that affects the well-being of healthcare workers and poses challenges for professionals and institutions to manage.[20] The items in the categories of physical, chemical, and biological risks refer to multiple agents capable of causing occupational diseases, with rigorous regulations that must be complied with to protect personnel, without finding agents different from those described in previous studies.[11-14]

Finally, the instrument includes items that account for dual presence, which is consistent with what has been reported in scientific literature.[2,17] As recommended by international organizations, occupational health, and safety should be seen as an organizational objective and integrated into a continuous and systematic risk assessment system.[22] In this sense, constructing an NTRS was a complex task given the multiplicity of risks encountered in the workplace and the various factors influencing them. The NTRS provides cohesive data regarding working conditions based on job profiles, which is a differentiating element compared to various instruments that do not discriminate. Moreover, the Overall Occupational Risk Index (OORI) and Specific Occupational Risk Index (SORI) provide understandable communication of a result that represents the level of risk, impacting both the prioritization and type of intervention measures to improve outcomes and the optimization of resource utilization. While the results generated by the instrument provide a general understanding of occupational risk issues, further exploration can be achieved by applying other validated instruments to evaluate each risk. This led to the construction of a set of 128 items that allowed, in this initial approach, the discernment of three instruments to assess occupational risks for the nursing team. The validation process should be continued to improve the construct validity in future research. However, an overall risk indicator and eleven specific risk indicators, according to risk categories have already been proposed. This constitutes a first step towards advancing the evaluation of risks for the nursing team and generating interventions to improve their well-being and work-related health.

Study limitations: Due to the restrictions imposed by the pandemic, the execution of the study was affected in terms of access to a larger sample of nursing professionals in other regions of the country, and the limited timeframe established by the state entity that required this study. This prevented the inclusion of all items in the initial study of psychometric properties and the continuation of subsequent phases of the required construct validity study for this instrument.

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Review

Analysis of the concept of nurses' autonomy in intensive care units: A hybrid model

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Analysis of the concept of nurses' autonomy in intensive care units: A hybrid model

Abstract

Objective. To analyze the concept of autonomy of nurses in Intensive Care Units (ICU). **Methods.** The hybrid model approach proposed by Schwartz-Barcott and Kim, which includes theoretical, fieldwork and analytical phases, was used for this study. For the theoretical and fieldwork phases, the Graneheim and Lundman stages and the CORE-Q checklist were used, and the results were combined in the final analysis phase. For the theoretical phase, 46 related articles, two instruments and four books were identified after using a search strategy in 7 bibliographic databases in English and one in Persian with the terms MESH: 'nursing', 'autonomy' and 'intensive care'. The information extracted in the theoretical phase served as the basis for the design of the questions used in the semi-structured interviews in the fieldwork phase. Eight nurses with ICU experience working in hospitals

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affiliated to Isfahan University of Medical Sciences (Iran) participated in the fieldwork phase. **Results.** The antecedents of the concept of nurse autonomy in ICUs were: empowerment of the workforce, organizational platform, and social and individual views of the profession. Its attributes were professionalism and high personal capabilities. Finally, increased personal competencies, promotion of quality of care, improved attitudes towards the profession and professional outcomes were noted as consequences. **Conclusion.** The autonomy of nurses in the ICU can facilitate their empowerment, which translates into the promotion of their caring behaviours, followed by the improvement of patient outcomes and quality of care.

Descriptors: professional autonomy; nurses; intensive care units; concept formation.

Análisis del concepto de autonomía de las Unidades de Cuidado Intensivo. Un modelo hídrido

Resumen

Objetivo. Analizar el concepto de autonomía entre las enfermeras de la Unidad de Cuidados Intensivos (UCI). **Métodos.** Para este estudio se utilizó el enfoque de modelo híbrido propuesto por Schwartz-Barcott y Kim que incluye las fases: teórica, de trabajo de campo y analítica. Para las fases teórica y de trabajo de campo se utilizaron las etapas de Graneheim y Lundman y la lista de comprobación CORE-Q, y los resultados se combinaron en la fase de análisis final. Para la fase teórica se identificaron 46 artículos relacionados, dos instrumentos y cuatro libros tras utilizar una estrategia de búsqueda en 7 bases de datos bibliográficas en inglés y otra en persa con los términos MESH: 'nursing', 'autonomy' e 'intensive care'. La información extraída en la fase teórica sirvió de base para el diseño de las preguntas que se utilizaron en las entrevistas semiestructuradas de la fase de trabajo de campo. En esta última fase participaron ocho enfermeras con experiencia en UCI que trabajaban en hospitales afiliados a la Universidad de Ciencias Médicas de Isfahan (Irán). **Resultados.** Los antecedentes del concepto de autonomía de las enfermeras en las Unidades de UCI fueron: el empoderamiento de la fuerza de trabajo, la plataforma organizativa y las opiniones sociales e individuales acerca de la profesión. Sus atributos fueron el profesionalismo y las grandes capacidades personales. Por último, se señalaron como consecuencias: el incremento de las competencias personales, la promoción de la calidad de los cuidados, la mejoría de las actitudes hacia la profesión y los resultados profesionales. **Conclusión.** La autonomía de las enfermeras en las UCI puede facilitar su empoderamiento, lo que se traduce en la promoción de sus conductas asistenciales, seguida de la mejora de los resultados de los pacientes y de la calidad asistencial.

Descriptores: autonomía profesional; enfermeras y enfermeros; unidades de cuidados intensivos; formación de concepto

Análise do conceito de autonomia das Unidades de Terapia Intensiva. Um modelo híbrido

Resumo

Objetivo. Analisar o conceito de autonomia dos enfermeiros da Unidade de Terapia Intensiva (UTI). **Métodos.** Este estudo foi realizado utilizando a abordagem do modelo híbrido proposto por Schwartz- Barcott e Kim, que inclui as fases teórica, de campo e analítica. As etapas de Graneheim e Lundman e o *checklist* CORE-Q foram utilizados nas fases teórica e de trabalho de campo, e os resultados foram combinados na fase de análise final. Para a fase teórica, foram identificados 46 artigos relacionados, dois instrumentos e quatro livros após a utilização de uma estratégia de busca em 7 bases bibliográficas em inglês e outra em persa com os termos MESH: 'nursing', 'autonomy' e 'intensive care'. As informações extraídas na fase teórica serviram de base para o desenho das questões que foram utilizadas nas entrevistas semiestruturadas da fase de trabalho de campo. Participaram desta última fase, oito enfermeiras experientes em UTI trabalhando em hospitais afiliados à Universidade de Ciências Médicas de Isfahan, no Irã. **Resultados.** Os antecedentes do conceito de autonomia dos enfermeiros nas Unidades de Terapia Intensiva foram: o empoderamento da força de trabalho, a plataforma organizacional e as opiniões sociais e individuais sobre a profissão. Seus atributos eram profissionalismo e grandes habilidades pessoais. Por fim, foram apontadas as seguintes consequências: o aumento das competências pessoais, a promoção da qualidade dos cuidados, a melhoria das atitudes perante a profissão e os resultados profissionais. **Conclusão.** A autonomia dos enfermeiros na UTI pode facilitar seu empoderamento, que se traduz na promoção de seus comportamentos assistenciais, seguida da melhoria dos resultados dos pacientes e da qualidade da assistência.

Descritores: autonomia professional; enfermeiras e enfermeiros; unidades de terapia intensiva; formação de conceito.

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Introduction

Autonomy plays an important role in achieving career recognition and full professional status.[1,2] Different disciplines require different levels of autonomy; however, in any profession, there must be some degree of autonomy to enhance critical thinking and job satisfaction.[3] In Oxford Dictionary, autonomy has been defined as the ability to operate and make decisions without being controlled by others.[4] In Longman Dictionary, it has been defined as the ability or opportunity to make personal decisions without being controlled by another person.[5]

Despite the complexity of the issue, professional autonomy remains a topic of debate and discussion in the 21st century.[6] Nurses' autonomy is among the issues that have been frequently explored in numerous studies but there is a lack of understanding of the concept of autonomy in nursing literature, especially within intensive care nursing.[7] In fact, autonomy is among the prerequisites for professionalism in the nursing profession.[8] A nurse's autonomy is defined by Weston[9] as "the ability of nurses to act according to their knowledge and clinical judgment which reflects and encourages the full scope of nursing practice, as defined by regulating bodies and ethical codes and values". According to Iranmanesh *et al.*,[10] this concept is the most important intrinsic motivation element for an occupation, which implies autonomy, responsibility, and authority and leads to the feeling of competence and belonging to a social group.

When nurses trust their judgment and act autonomously, they will feel satisfied with their independent experience and can affect health policies. Hence, professional autonomy is considered a basic element for healthcare specialists as well as an important dimension of a healthy and positive nursing workplace. Taking care of patients is a fundamental duty of nurses as members of the healthcare team. Having meaningful autonomy would allow nurses to practice within a self-regulatory environment based on their professional judgment, make clinical decisions based on this judgment, and act accordingly within their full scope of practice.[9] In this context, the profession encompasses control, autonomy, and the ability to use clinical decision-making and judgment for patient care. Nursing autonomy has been shown to improve patient outcomes. A nurse's sense of autonomy and accountability enables them to provide high-quality patient care, maintain patient safety, and reduce mortality.[9,12] Intensive Care Units (ICUs) is one of the most important and highly stressful hospital wards where critically ill patients receive expensive care, and intensive care nurses often have to make urgent decisions about deteriorating patients.[13] Nursing professionals feel an increased need for autonomy in these clinical settings and together with increased work pressure necessitate the identification of this concept. Limited autonomy in ICUs results in nurses' restricted authority for using their personal and professional logics and moral values in patient care, eventually leading to a reduction in job satisfaction. In other words, weak nurse-physician cooperation and nurses' low autonomy may limit ICU nurses' ability for clinical decision-making.[14-17]

Therefore, healthcare organizations should empower and support ICU nurses to fulfill their caring responsibilities and deliver high-quality, evidence-based care to patients.[18] Regardless, nurses discover autonomous decision-making in clinical situations to be demanding and regard the exercise of autonomy as "complex" due to the dominance of medicine, the power inequality between genders, and authoritarian leadership styles.[19] The health care system in Iran is physician overlooked that arises from contrasts in educational experiences, the documented domination of men over women, and the historical position of physicians and nurses.[20,21] The present study aims to analyze the concept of nurses' autonomy in Intensive Care Units (ICUs) using the hybrid model. Schwartz-Barcott and Kim's hybrid model combining inductive and deductive approaches have been used to clarify the basic dimensions of autonomy in ICU nurses. The strength of this method lies in the collection of data by integration of theory and practice. Therefore, it is in complete concordance with the present study objectives.

Methods

This study is an explanatory mixed methods study that was conducted using a sequential quantitative-qualitative design (QUAN-QUAL) consisting of three sequential steps using the approach proposed by Schwartz-Barcott and Kim's hybrid model and also COREQ checklist[22] and Graneheim and Lundman stages to analyze the concept of nurse autonomy in ICUs using.[23,24] The COREQ checklist includes 32 criteria and is the only reporting guide for qualitative research using interviews and focus groups. Interviews and focus groups were designed to be reported explicitly and comprehensively via this tool.[25] Qualitative content analysis was done using the Graneheim and Lundman stages related to the following concepts: unit of analysis, meaning unit, code, category, sub-themes, and theme.[23] The hybrid model consisted of theoretical, fieldwork, and analytical phases, which were carried out through qualitative analysis of the phenomena while investigating texts, instruments, and articles and interviewing participants.[24,26,27] In the theoretical phase, the concept was selected and the definitions related to autonomy among ICU nurses obtained through searching articles, instruments, and texts were compared and analyzed to achieve a comprehensive definition. During fieldwork, the setting, as well as the participants, were chosen and the data were collected and analyzed. Additionally, the differences between the definitions of ICU nurses' autonomy and their practice in clinical settings were identified. Finally, the findings of the two aforementioned phases were compared and weighted in the analytical phase, resulting in a clear definition of nurses' autonomy in ICUs.[27] What follows includes the phases of analysis of the concept of ICU nurses' autonomy in the present research.

Phase 1: Theoretical phase

Search strategy for concept analysis

This phase involved a systematic approach. To understand the precise and comprehensive definition of the concept of autonomy, at first, the available books were explored, after that studies were searched via a protocol-driven strategy followed by the snowball strategy following the recommendations proposed by Greenhalgh and Peacock. Reference lists were scanned of all full-text articles and used the decision to determine whether to pursue these further Citation tracking.[28]

A procedure based on York University guidelines was designed and executed. An implementation plan included selecting review questions, including inclusion criteria, searching strategies, selecting studies, extracting data, assessing quality, synthesizing data, and disseminating conclusions.[29] In doing so, seven English and Persian databases, namely ProQuest, PubMed, Science Direct, Scopus, Wiley, MagIran (Persian), and SID (Scientific Information Database, in Persian), were searched using 'nursing,' 'autonomy,' and 'intensive care' and other MESH (Medical Subject Headings).

Eligibility criteria

Eligible articles had the words keywords in Persian and English from April to June 2019: "nursing" OR "registered nurses" OR "personnel nurse" OR "nurse" AND "nursing autonomy" OR "autonomy" OR "professional autonomy" OR "autonomy, nursing" AND "intensive care unit" OR "unit, intensive care" OR "intensive care, unit". in the title. Journals were searched for the period 2000 to 2019. Eligibility criteria were (1) focus on work of nurses (2) setting was ICUs (3) autonomy was discussed. At first, 2491 articles were found, which was reduced to 987 articles after eliminating the duplicates. Then, searching was filtered by language (Persian and English) and only specialized nursing journals, books, and these were selected, which decreased the number of articles to 658. Afterward, the titles and abstracts were screened for their relevance. The articles whose full texts were not available were excluded, as well. Then, the remaining full texts were evaluated for eligibility. Accordingly, the articles that showed how the concept was perceived, described, and functionalized were entered into the research. The titles and abstracts of available books and instruments also were screened for their relevance and books without full texts were excluded and extracted from the data. Finally, 46 related articles, two instruments, and four books were identified. A sample of 46 studies, 2 instruments, and 4 books was found by SHM and MM. RD, MB, SHM, and MM extracted data from each article and summarized relevant information for the review. The entire research team under the supervision of FT assessed random samples of the extracted summaries for accuracy and consistency. Disagreements between the research team were discussed.

Since this study aimed to identify the definitions, antecedents, attributes, and consequences of the concept and in order not to miss any data the credibility and quality of the texts were not evaluated. Additionally, the selection of the materials was continued until reaching a consensus regarding the depth of perceptions and explanations. Among the 46 articles obtained, 16 were qualitative, 2 were composite and 28 were quantitative and the number of participants in these 46 articles was 50,022. After investigating 46 articles, four books, and two instruments, no new information was achieved and, consequently, searching was stopped. Finally, the definitions, attributes, antecedents, and consequences were screened and integrated by the research team.

Content analysis

Content analysis was used to analyze the concept of nurses' autonomy in ICUs. The clarification process is a dimension of the content analysis strategy presented by Rogers, which includes the analysis of the existing definitions and the identification of antecedents, attributes, and consequences.[27] In the present study, each definition was divided into meaning units and coded by two researchers. A coding table was also prepared inductively and deductively in an iterative process. In the case of the emergence of new codes, while analyzing new definitions, the table was expanded continuously. Then, it was reviewed and explored by two other researchers to ensure the extraction of the data. Finally, the codes were categorized into meaningful clusters like a powerful human workforce.

Phase 2: Fieldwork

Interview with key informants

At the beginning of the fieldwork, the data extracted from the theoretical phase were used for designing questions. During the face-to-face meeting of the research team, semi-structured primary questions for the second phase of the study were written and reviewed from the data. The questions were based on PICO (Participants, Intervention, Comparison, and Outcome) and focused on the research objectives. The second phase with questions like: What is your definition of nursing autonomy in special care units? How do you evaluate the status of professional autonomy? Have there been situations in the department where you have maintained the autonomy of nursing in front of other professions, such as medicine? It was done and according to the answers of the

participants, the questions continued and the interview continued until data saturation. In doing so, the data were explored by two researchers, and the questions were listed. These questions were then reviewed by two other researchers and the fieldwork was started. According to Schwartz, Barcott, and Kim, fieldwork is a basic element in concept analysis.[26] In concept analysis using the hybrid model, qualitative data are utilized to expand insight regarding the nature of the concept. To maximize variation in responses in the present study, the samples were purposively selected from experienced ICU nurses working in the hospital's affiliated Isfahan University of Medical Sciences. The inclusion criteria of the present study were having worked in an ICU for at least a year, having at least a BSc degree, and being able and willing to express one's viewpoints about autonomy in ICUs.

To analyze the concept of autonomy in ICU nurses, semi-structured interviews were conducted with 8 nurses with 4-13 years of work experience in the ICUs of the educational hospitals affiliated with Isfahan University of Medical Sciences. The interviews lasted for 30-60 minutes. With the permission of the participants, their voices were recorded during the interview, and notes were also taken. During the interview, the interviewer was present in the ICU as a complete observer before and after the interview, taking direct, constant observations and taking field notes. The interviews were immediately transcribed and analyzed using the approach proposed by Granheim and Landman.[23] In so doing, the interviews were transcribed and read several times by the research team to gain an overall view. The interviews were considered the analysis unit, whole paragraphs, sentences, and even words were regarded as meaning units. There are many ways to interpret qualitative content analysis and focus on it. It is important to describe the manifest messages that each text or picture conveys, as well as the latent meanings hidden within them. The interpretation of manifest messages and latent meanings may vary in depth and level of abstraction.[23]

The research team discussed one meaning unit's latent meaning with the question: 'What does it mean on a latent level?'. The meaning units were coded based on their hidden meanings. The codes were then compared regarding their similarities and differences and were classified into more abstract categories. Finally, by comparing and carefully investigating the categories, the hidden contents of the data were introduced as the research theme. The trustworthiness of the data was assessed using the criteria proposed by Lincoln and Guba, *i.e.*, credibility, transferability, confirmability, and dependability.[30] A prolonged engagement (5 months) was used to determine the credibility of the collected data. In addition, the research team continuously investigated and reviewed the codes, categories, and themes. Interviewees were also asked to confirm the initial codes. To determine dependability, several external observers reviewed the data analysis process, and the results were presented to the research team. The external observers were involved in the analysis and theme formation to achieve confirmability. As a final step in enhancing transferability, maximum diversity was observed in the selection of the participants.

Phase 3: Analytical stage

Analytical reflection refers to a combination of the data obtained from the theoretical phase and fieldwork, resulting in probable changes in the definition of the concept and its filtration.[27] In this study, the results of the qualitative data were inductively and deductively explored compared to the theoretical data using an iterative process and analyzed, the main themes were extracted, and the concept of nursing autonomy in ICU was defined based on the emerging concepts and indicators. Consequently, this final definition was supported by both theoretical and empirical data In this way, the similarities and differences between the two datasets were determined. Finally, an integrated table was prepared, which included the antecedents, attributes, and consequences obtained from articles, instruments, books, and interviews.

Ethics approval and consent to participate. After approval of the proposal by the Ethics Committee in Biomedical Research of Isfahan university of medical sciences (IR.MUI.RESEARCH.REC.1399.252), the necessary permissions were gained from the authorities of the School of Nursing and Midwifery as well as from those of the health centers affiliated to Isfahan university of medical sciences. After introducing oneself to the unit leaders and expressing the research objectives, the researcher asked for their permission to collect data with written informed consent.

Results

Theoretical phase

Characteristics and definition of concept

Autonomy is an abstract and complex concept that nurses, having a license, gain the freedom and ability to make conscious and independent decisions based on their professional knowledge and judgment and to achieve the desired result in the scope of nursing and providing care without the permission of others. They act based on it and have control over the working condition.[1,11,15,17,31-44] It is defined as the belief in patient-centeredness in decision-making, responsibility, and discretion, both are interdependent and the ability to perform professional work based on skill and judgment regarding patient care and clinical decision-making. It shows the freedom to make decisions based on expertise, authority, and knowledge .[45-47] And is an important aspect of becoming a professional, which leads to the independent provider of services and plays an important role in developing the boundaries of professional autonomy.[1] it is the ability, responsibility, and right to determine functions, implement them, and make decisions about patient needs and freedom in implementing professional values.[48] Elsewhere, autonomy in decision-making in ethical cases related to working with patients is defined[49] and is one of the characteristics of the nursing profession, and it is essential for quality and safe care. It also leads to autonomy in decision-making and judgment and reduces external pressure in providing nursing care.[16]

The most important factor in the state of the profession has led to its promotion and control over job performance.[7,50] In some studies, it is more specifically related to autonomy in care, such as the ability to make decisions related to the ventilator and implement them without the direct supervision of a doctor. And also the nurse's independent decision-making based on the use of analgesic and sedation protocols in prescribing analgesics and sedation for the patient is mentioned.[51-53] Autonomy determines the freedom of choice and makes decisions without external control[54] It is considered social freedom and a law that makes action decisions without guidance and control outside the profession and is a rational person's capacity to make informed decisions without permission.[54,55] The ability to guide, rethink and make decisions is a state of autonomy, accountability, authority, and responsibility in the field of doing things and the ability to act on professional knowledge in judging nursing care and clinical decisions. Autonomy has three levels: 1- Clinical Autonomy: the ability to use nursing in clinical judgment in an independent and interprofessional manner to make decisions for the patient. At this level, it is important to have knowledge and judgment about what directly relates to the patient. 2- Job autonomy: refers to operational nursing decisions that are obtained through interaction with managers in collaborative employment approaches. 3- Third, control over nursing practice refers to joint decisions that nurses make in professional practices and policies. They operate in an organization that is effective on level 2 and 3 knowledge related to the organization.[10,46,56,57]

In another study autonomy is a human characteristic and there is a desirable quality to it, and independent action is necessary for safe and quality patient care.[17] Professional autonomy in nursing defines the right to have any clinical and organizational judgment within the framework of a mutual health care team and by the regulations of the discipline. Professional autonomy is a dynamic process that enables the

nurse to exercise independent accountability and informed decision-making in clinical judgment.[58] In their study, Espinosa *et al*.[59] consider the autonomy of nurses who direct palliative care. The definition of autonomy is expressed elsewhere with the concept of participatory management this approach provides an opportunity for health system employees to participate in the discussion, decision-making, and continuous improvement of work based on constant training.[60] Critical care nurses must have the ability to make decisions about their patient's care.[61]

The results indicated that the results of fieldwork were mostly in line with those of the theoretical phase. In other words, the basic features of autonomy in ICUs were supported by the fieldwork. The only difference was related to the participants' expression of financial motivation, which was one of the sub-subcategories of the 'personality features' subcategory and the 'powerful human workforce' category in the antecedents of the concept. Overall, reviewing the related texts and instruments, interviews, and clinical observations revealed the attributes, antecedents, and consequences for identifying the concept of autonomy in ICU nurses, which have been described in detail below. It is worth mentioning that this study aimed to explore the information about ICU nurses' autonomy in texts, instruments, articles, and also fieldwork.

Antecedents (based on the theoretical phase and fieldwork)

In the review of the existing studies, it was mentioned as antecedents such as knowledge *(n=15)* and skill training *(n=5)*, individual variables such as sex *(n=2)*, age *(n=4)*, education*(n=4)*, courage*(n=2)*, wishes of a person*(n=1)*, financial incentive *(n=2)*, work experience*(n=2)*, eligibility*(n=4)* and the power of independent judgment*(n=2)* and also environmental, cultural, social factors *(n=9)*, the power of the relevant organization such as freedom of action and thought *(n=3)*, overcoming the rule of medicine *(n=15)* and legal authority *(n=2)* also national laws and regulations *(n=3)*, professional leadership and management *(n=8)*, professional policy *(n=9)*, individual capabilities such as Philanthropy *(n=1)*, ethical standards *(n=2)*, responsibility *(n=4)*, accountability *(n=3)*, decision-making power *(n=16)* and communication skills *(n=3)*, and also individual characteristics in the profession *(n=13)*, professional standards *(n=2)*, professional identity development *(n=13)* and ethical principles and standards *(n=2)*. Based on the theoretical stage and fieldwork and integration of the obtained codes using an iterative process, three antecedent emerging from this concept includes a powerful human workforce, an organizational platform, and, a sociocultural platform.

1- Powerful human workforce

A powerful human workforce was one of the antecedents of the concept of ICU nurses' autonomy, which consisted of three subcategories; i.e., demographic features, personality features, and professional competence.

a) Demographic features. This subcategory included such sub-subcategories as sex, age, education level, race, and job tenure: *Men are more courageous. In my opinion, entrance of the educated men into the nursing profession is highly effective. Women are calm, we always appease. If they tell me to do something tomorrow, I will do that. If they tell me that again, I will. But men are not like this* (P2).Considering the effective factors in the empowerment of the human workforce, another participant maintained: *Nurses are not independent, which can be associated with a variety of reasons, one of which being related to sex. A large number of nurses are female. They have low self-confidence or they are not interested in working autonomously or like to be dependent on someone while working. Another reason is age. Those who are younger are inexperienced and do not even think about being autonomous* (P5). The present study participants emphasized the role of demographic features such as age, sex, education level, and job tenure in ICU nurses' autonomy. In the research carried out by Galbany-Estragues *et*

al.[33] also, participants referred to the impact of sex on nurses' autonomy. Similarly, Katja Pursio[62] mentioned knowledge and skills as the factors related to nurses' professional autonomy, which represented the key role of demographic features in this concept.

b) Personality features. The second subcategory of the powerful human workforce was personality features, which included the following sub-subcategories: having courage, expedition, personal desires, financial motivation -The importance of money and financial motivation for some people, which can be considered among the personality traits of each person some people considered money as an important motivating factor to increase their autonomy in their profession-, accuracy, interest in working in the ICU, correct interaction, personality growth and maturation, high-stress tolerance, humanity, moral regulations, having self-confidence, and self-esteem. Considering the need for courage as an antecedent of autonomy, one of the participants stated: *Lack of autonomy among nurses may be due to the lack of courage. For example, we have learned to say yes to everything physicians say. When a doctor comes for the clinical round, we are not able to express our opinions. Even when we know that we are right, we are afraid of making mistakes and being teased or considered a lowly educated person* (P1). Another participant emphasized the necessity for prompt decision-making in interventions:*Sometimes, we cannot wait for the resident to come due to the patient's condition. We're not responsible for intubation, but I saw several times that the head nurse did the intubation before the arrival of the anesthesia technician. We do this to save patients. However, if physicians come soon, they do their routine tasks* (P3). Vicki D. Lachman[63] introduced moral courage as a prerequisite for advancement in the nursing profession. Additionally, Sung Mi-Hae[64] conducted a study in 2011 and revealed a significant relationship between nurses' self-confidence and professional autonomy, which confirmed the impact of personality features on ICU nurses' autonomy. However, financial motivation was only mentioned as an antecedent in the fieldwork some nurses considered increasing salaries and benefits as one of the prerequisites for increasing autonomy in the profession: *I work in the ICU and I receive 100 tomans more than the nurse who works in other wards. This difference does not motivate me to work autonomously. If the payment is increased, we will work more efficiently* (P3); *The nurses who work in private cardiac ICUs receive more. Besides, the system wants them to do a series of tasks, which leads them to feel more autonomous* (P5). Ruth McDonald[65] disclosed the impact of financial motivation on the quality of care provided by nurses and physicians, but not on nurses' professional autonomy. In another research performed by Baljoon[66] in 2018, autonomy was found to be a factor in increasing motivation and decreasing job quit amongst nurses. In other words, autonomy was mentioned as a factor for the continuation of working in clinical settings, which was the contrary to the results obtained in the present investigation.

c) Having professional competence. Having professional competence based on the theoretical phase and fieldwork was the last subcategory of a powerful human workforce, which included knowledge and performance competence, strong clinical reasoning, competence and skills, professional specialty and skills, ability to judge autonomously, unlimited use of one's knowledge and skills, responsibility and accountability, decision-making capability, building relationships(The ability to establish proper communication with other professions in the health system), problem-solving ability, perceived strength in clinical centers, the necessity to make decisions and act quickly depending on patients' conditions, interdisciplinary performance, maintenance of professional autonomy in teamwork, having authority for self-assessment, differentiation, and ability to apply knowledge. All these capabilities obtained from phase one were also confirmed by phase two and are among the prerequisites of a nurse for independent performance in the health system. One of the study participants discussed the unlimited utilization of knowledge and skills, having the ability to make decisions, expedition, and knowledge competence:

In my opinion, autonomy implies that nurses have freedom of action and take responsibility for their activities. It means that nurses make decisions based on the knowledge they have gained about their profession without worrying about the occurrence of legal problems (P1). Another participant considered the ability to forge effective relationships with colleagues as an influential factor in the maintenance of autonomy: *I have seen that the nurses who have better relationships with physicians are more trusted by the system, of course, if they have the required knowledge* (P1). It was also found that quick clinical decision-making increased nurses' autonomy in ICUs: *Patients in ICUs are in worse conditions. Therefore, they need more autonomous, prompt decisions. Besides, the devices are complicated and nurses need some levels of autonomy to work with them* (P7). The results also indicated that having a specific job description and acting accordingly would lead to professional competence: *Some duties are mixed up. Nurses do some tasks due to their work conscience, but they will not be able to carry out their responsibilities. Thus, they become tired and feel that they have to do everything or they have to do the tasks that other people don't do. There is no clear job description and nurses have to do what they are not responsible for* (P2). The necessity of teamwork was yet another subcategory of professional competence. *This is our fault most of the time. We don't believe in ourselves, we don't do what we know is right, and we cause a challenge for each other* (P8). Particular specialties and skills were also found to enhance professional autonomy: *The more specialist nurses such as respiratory nurses, wound specialists, ICU nurses, and gastroenterology nurses, the higher the professional autonomy will be* (P2). Considering professional responsibility as a subcategory of professional competence, one of the participants said: *Nurse should be aware that the patient's life is in their hands. They shouldn't say that care is useless and the patient is dead. I remember a man who was admitted to our ward. His consciousness level was 3, which reached 5 and he left here. Five months later, he came to the ward and said that he remembered our voices* (P3). Based on the present study findings, ICU nurses have to strengthen their professional competence to achieve professional autonomy. In the same line, Weston *et al.*[67] emphasized the necessity for increasing nurses' clinical competence and developing their decision-making skills to promote professional autonomy. Katja Pursio[62] also showed the necessity of nurses' competencies for achieving autonomy.

2-Organizational platform

Considering the antecedents of autonomy among ICU nurses, the second theme was organizational platform that referred to an organizational regulations and organizational culture.

a) Organizational regulations. Organizational regulations included professional support, liability insurance, legal authority, acceptance of nurses' autonomy by insurance companies, the opportunity for autonomous decision-making and function, freedom of action and thought, the new job description for nurses, tariff setting for nursing services, limited payback, cooperation in policymaking and rule setting, institute's policies, organizational and national laws, legal identification of professional performance boundaries, legal license for autonomy, existence and application of care scales and protocols, and sufficient equipment. Regarding freedom of action and legal authority, one of the participants maintained: When laws are adopted by policymakers that support the autonomy of nurses, then nurses will work independently without fear of being called to account (P6). Professional support was also found to enhance ICU nurses' autonomy: *Fear from the occurrence of legal problems may be a reason for the reduction of autonomy…I do my job accurately, but how much can I count on the head nurse or the matron? How much support will they provide? Will their support be effective?* (P7). In terms of tariff setting for nursing services, one of the participants said: *When we don't receive money for the tasks we do, we will not be autonomous* (P2); *Medical dominance in clinical settings is highly effective in nurses' autonomy. For instance, the hospital manager is a physician. Everything has been defined for physicians…Physicians are even paid for some procedures that have been done by*

nurses. Under these circumstances, physicians do not let us work autonomously. If financial issues were not a problem, nurses would be paid for what they did, which could consequently enhance their autonomy (P4); *Accreditation of nurses requires a defensive force* (P6).

b) Organizational culture. The subcategories of organizational culture were overcoming medical sovereignty, leadership style, nursing managers' behaviors, group adaptability, physicians' view towards nurses' autonomy, physicians' trust in nurses, reduction of physicians' monitoring, overcoming medical hegemony, the existence of strong managers in the nursing profession, autonomous leadership and management, giving some managerial authorities to nurses without the interference of other treatment team members, defending nurses' proper performance on the part of nursing managers in front of physicians, and other healthcare teams' trust in nurses. Managers' power was also reported to increase support for nurses, thereby enhancing autonomy in this profession. *More powerful authorities may provide nurses with more support…* (P2). In line with the present study, Ulrich revealed the direct impact of organizational factors and regulations on nurses' autonomy.[68]

3- Society's sociocultural platform

This category included social and individual views towards the profession, equity among the treatment team members, valuing autonomous performance, workplace (urban/rural, clinic/hospital), and cultural, social, political, economic, religious, and traditional factors.Considering the effect of the workplace on nurses' autonomy, one of the participants maintained: *Nurses sometimes take tests for each other. They may not have the sufficient motivation or the hospital environment may have convinced them that there is no difference between having and not having knowledge* (P1). Regarding the social view and impact of culture, one of the participants said: *Our major was long among the low-level occupations. Of course, people have a better view of the profession nowadays, but they still consider us as mere service providers. Nothing more is expected from us and, as a result, we don't try to be autonomous* (P6). In the present study, the nurses discussed the negative effect of culture on autonomy. In contrast, Ingrid Hanssen[69] mentioned autonomy and freedom as the inseparable elements of reasoning as well as the natural components of maturity in western culture. In other words, the ideal western autonomy is a part of the cultural heritage. Regarding the lack of equity between nurses and physicians, one of the study participants mentioned: *We are not independent. There is no equity between us and physicians. If we were considered at an equal level to physicians and were valued as much, we could make decisions more easily and work autonomously* (P4). The above mentioned participant referred to the lack of equity between physicians and nurses as a factor preventing nurses from achieving professional autonomy. Consistently, Evanthia Georgiou[48] conducted a study in Cyprus and reported a low level of cooperation between nurses and physicians in terms of patient care as well as a moderate level of autonomy amongst nurses. Furthermore, Daniel Salhani[70] pointed to the negative effects of political, economic, religious, and traditional factors, but none of the participants mentioned these factors in clinical settings.

Attributes (based on the theoretical phase and fieldwork)

Nurses in special care units must have individual skills such as the ability to make clinical decisions about their patient's care[61]. In various articles, it was mentioned to have individual characteristics such as professional autonomy *(n=8)*, independent decision-making and performance *(n=20)*, competence *(n=1)*, professional skill *(n=6)*, professional performance *(n=9)*, scientific performance and awareness of the field of action *(n=7)*. The evolution of the role in the profession was also mentioned in various articles by the ability of the individual *(n=6)*, the promotion of critical thinking *(n=2)*, and the acceptance of high levels of responsibility *(n=2)*. Adherence to the profession was also mentioned in the studies in the form of paying attention to accountability *(n=4)*, commitment *(n=3)*, planning *(n=2)*, and increasing the levels of empowerment *(n=3)*. Adherence to ethical and valuable criteria *(n=5)* was also mentioned in some studies.

Based on the theoretical phase and fieldwork, two main themes; i.e., professionalism and personal capabilities were the attributes of the concept of autonomy in ICU nurses.

1- Professionalism

The subcategories of this attribute were professional autonomy, professional skills, scientific performance, knowledge, value, commitment, accountability for one's responsibilities, adherence to moral issues, legal privileges, and controlling adherence to the regulations of the profession. Concerning the importance of professional knowledge and attitude and the need for deep professional knowledge in this theme, one of the participants stated: *From my perspective, the most important point is that we should learn and believe in our lessons. Sometimes, nurses have learned something, but they don't believe in it or they may have memorized the lesson…* (P2). Similarly, Marla J. Weston and Gail Holland Wade[67,71] revealed the necessity of educational and skill competencies in nurses, which led to their professional autonomy. Accountability for one's responsibilities was yet another category extracted from professionalism: *If the physicians did the right task and received income and I did the right task and received income, they would be responsible for their tasks and I would be responsible for mine* (P2). Gilmore, as cited by Nouri,[39] also emphasized autonomy alongside accountability as the prerequisite for professional nursing performance.

2- Personal capabilities

This theme involved critical thinking, responsibility, decision-making, and autonomous performance. One of the participants believed that a lack of decision-making and independent performance would be accompanied by a lack of autonomy: *When I work in a place where I know that I have some authority and I don't have to obey others, I will have a higher level of motivation, and I will feel more responsible, I will try to keep up-to-date because I know that I have to make decisions. However, when the physician is the one who makes decisions, I say to myself that we will do whatever the physician says in case of problems; the physician is responsible in any event* (P2): *Nurses should make decisions for patients irrespective of the routines and physicians' orders. They should provide patients with the best healthcare depending on the conditions and take responsibility for what they have done. They should do this according to the knowledge they have gained* (P8). The present study findings revealed responsibility as one of the attributes of autonomy amongst ICU nurses. Katerina[19] also disclosed that a high level of accountability, responsibility, and autonomy was required in ICUs to optimize patients' outcomes.

Consequences (based on the theoretical phase and fieldwork)

The consequences of the concept of nurses' autonomy have been mentioned in many articles: professionalization *(n=17)*, nurses' autonomy *(n=9)*, improvement of patient outcomes *(n=15)*, improvement of nurse outcomes *(n=8)*, improvement of organizational outcomes *(n=12)*, promotion of individual performance *(n=14)*, promotion of organizational performance *(n=12)*, increasing value *(n=7)*, increasing satisfaction *(n=21)* and adherence to moral principles *(n=5).* Based on the theoretical stage and fieldwork, four main themes were obtained regarding the consequences of ICU nurses' autonomy.

1- Increased personal competency

The consequences of autonomy in ICUs included increased responsibility, credit, motivation to continue education, implementation of creative ideas, the performance of research activities, promotion of clinical judgment, and critical thinking. In this regard, one of the participants stated: *If we can act autonomously, we will have a higher level of motivation to improve our information and even continue our education, because we know that we will be able to act autonomously in case of having a higher level of knowledge* (P6). Increased motivation for continuing education and working in the profession has also been expressed in the book titled Autonomy and Empowerment of Advanced Practice Nurses in New Mexico as well as in the study carried out by Riitta-Liisa Lakanmaa.[7,54] Polly *et al*. also conducted

a study in 2017 and indicated individual capabilities as a consequence of nurses' autonomy.[72] Similarly, Motamed-Jahromi[34] demonstrated that increased responsibility was one of the consequences of nurses' autonomy. Increased decision-making power and critical thinking were other consequences mentioned by Stewart in 2004.[73]

2- Promotion of care quality

Autonomy was found to enhance the quality of patient care. In this regard, one of the participants said: *If we are autonomous, we have our care protocols and we know what to do with patients without waiting for the physician. This is good for patient safety, as well* (P2). Promoted care quality was one of the basic consequences of autonomy among ICU nurses, which has been confirmed in numerous studies.[19,34,43,54,71,73,74] Moreover, autonomy was found to reduce costs as well as the length of hospital stay: *Hospital-acquired infections will decrease and lower costs will be imposed on patients. It will also be beneficial for patients in terms of safety. In my opinion, it will be most beneficial for patients* (P6); *Experienced individuals do many tasks independently. They do something, which is exactly ordered by physicians. This accelerates the process of patient care. Overall, it increases patient safety and accelerates the care process* (P3). Reduction of the length of hospital stay and costs was another important consequence, which was mentioned by Polly in 2012, as well.[54]

3- Improvement of the view towards the profession

In this respect, one of the participants maintained: *It is important to have approved protocols. I sometimes feel that even the protocols coming from the Treatment Deputy are old and that is why physicians do not accept them. If they know that our protocols are up-to-date, they will accept them to be used in clinical settings, which will be effective in improving the view towards the nursing profession* (P2). Many researchers have also argued that professionalism, specialism, and socialism could promote the view toward the nursing profession.[17,37,45]

4- Organizational consequences

This theme included the facilitation of healthcare provision, increased adherence to guidelines and protocols, increased knowledge-based performance, and effective leadership. In terms of knowledge-based performance and adherence to protocols, one of the study participants said: *If nurses are autonomous, they will be motivated to perform more efficiently based on protocols. In this way, they will try to learn accurately and will be able to provide more professional care services* (P7). In agreement with the present study findings, Nouri, Tao, and Carolyn Elaine Disher[15,53,74] indicated that commitment to the profession and the organization resulted in higher adherence to regulations, as a consequence of nurses' autonomy. Tume[51] also reported the increased adherence to guidelines and protocols as an important consequence of nurses' autonomy. Increased knowledge and experience was yet another organizational consequence disclosed by Baykara in Turkey.[1] On the other hand, Panunto introduced a lack of autonomy as a factor in nurses' non-adherence to the profession.[50]

Analytical reflection (based on the analytical phase)

A comparison of the concept of autonomy in the articles to that described by the key informants in the experimental phase indicated that the only difference between the data obtained from the fieldwork and the theoretical phase was related to financial motivation. This was related to the personality features, as one of the attributes, was mentioned in the clinical setting, but was not found to be among the antecedents of nurses' autonomy in the explored articles and texts. Furthermore, the negative effects of political, economic, religious, and traditional factors related to the society's sociocultural platform were among the antecedents expressed in the articles, while they were not emphasized in the clinical setting. The integrated overview of the antecedents, attributes, and consequences of this concept has been presented in Table 1.

Table1. The integrated view of the antecedents, attributes, and consequences of the concept

Antecedents	Attributes	Consequences
1-Powerful human workforce a) Demographic features b) Mental and personality features c) Having professional competence 2-Organizational platform 3-Sociocultural platform	1-Professionalism 2-Personal capability	1-Increase of personal competencies 2-Promotion of care quality 3-Improvement of attitude towards the profession 4-Professional outcomes

Definition
According to the results of the present study, "autonomy of nurses in intensive care units" has antecedents such as powerful human workforce, organizational platform, and sociocultural platform with the attributes of professionalism and personal capability, and can cause increase of personal competencies, promotion of care quality, improvement of attitude towards the profession, and professional outcomes.

Discussion

The present study findings provided an overview of the concept of nurses' autonomy in ICUs after reviewing texts, articles, instruments, and nurses' perceptions. Clarification of the attributes of nurses' autonomy in ICUs can help develop this concept in the health systems and promote nurses' professional identity.[75] In the current research, the antecedents of the concept of nurses' autonomy in ICUs were the powerful human workforce, organizational platform, and society's sociocultural platform. Based on the results, mental and personality characteristics, and professional competence could result in having a powerful human workforce, thereby promoting autonomy among ICU nurses. In the same line, Schutzenhofer[76] revealed a significant relationship between nurses' autonomy and nursing education, clinical specialty, functional role, membership in professional organizations, gender stereotypes, and personality. Sung *et al.*[64] also showed that mental and personality characteristics such as professional self-concept and self-esteem were positively correlated to professional autonomy and job satisfaction amongst nurses. In the research carried out by Iliopoulou *et al.,*[19] young nurses presented a lower level of autonomy. Additionally, female nurses were more autonomous, which was contrary to the present study findings. Labrague *et al*.[11] also performed a study in 2019 and demonstrated that age, work experience, and education level were effective variables in nurses' autonomy. Accordingly, experienced nurses gained higher scores of autonomy. In the research performed by Amini et al. in 2015,[77] male nurses and those aged 30-40 years showed considerably higher autonomy compared to females and other age groups.

Another antecedent of autonomy was professional competence, which involved the ability to build effective relationships with other treatment team members. Similarly, Maylone *et al*.[78]stated that teamwork and cooperation between nurses and physicians were necessary to reach professional autonomy, which could eventually strengthen patients' outcomes, increase their safety, and promote care quality. In addition, having sufficient knowledge and technical experience were among the prerequisites for professional autonomy, as mentioned in the nurses' autonomy instrument.[79] The other antecedents obtained in the current study were organizational platforms and sociocultural platforms. Considering the diversity of cultures around the world, Kuwano *et al.*[80] argued that the incorporation of transcultural nursing content in educational curricula in universities and hospitals could enhance cross-cultural sensitivity

and improve nurses' professional autonomy. Generally, organizational variables such as assigning a large number of patients to each nurse, a variety of hospitals, a shortage of staff, and organizational policies and regulations can restrict nurses' autonomy.[11] The organizational platform was also one of the antecedents of this concept in the current investigation. Consistently, Allahbakhshian *et al.*[61] indicated that nurses encountered two main barriers to achieving professional competence: profession-related and organization-related barriers. The obstacles related to the profession included the inability to apply professional autonomy and the lack of professional nursing organizations such as nursing associations for professionally directing the nursing profession. The organizational barriers included role conflicts, unsupported workplaces, and lack of support and encouragement on the part of managers.

In the current study, the attributes of the concept of autonomy in ICU nurses were professionalism and individual capabilities such as critical thinking, responsibility, decision-making, and autonomous performance. Considering professionalism, Iliopoulou[19] stated that education, role empowerment, and support were required for ICU nurses to achieve their maximum professional potential. In the present study also, professional competence including the need for increased knowledge and skills was one of the important antecedents. The consequences obtained from theoretical and practical concept analysis in the present research included increased personal competence, improved care quality, organizational consequences, and professional consequences. In the same line, Labrague[11] showed the positive impact of autonomy on organizational commitment, job satisfaction, and performance. Overall, the combination of the data obtained from the theoretical phase and fieldwork and their analysis resulted in the emergence of three main categories, namely antecedents, attributes, and consequences, of autonomy among ICU nurses, which can be presented to health managers and policymakers.

Conclusion. This study aimed to analyze the concept of nurses' autonomy in ICUs by describing its antecedents (powerful human workforce, organizational platform, and society's sociocultural platform), attributes (professionalism and personal capabilities), and consequences (increased personal competence, improved care quality, improved view towards the profession, and improved outcomes) using a hybrid model.

Relevance to clinical practice. Providing the obtained results to the nurses working in ICUs, managers, and health policymakers can help value and strengthen the concept of nurses' autonomy in ICUs, improve professional identity, increase job satisfaction, improve patient outcomes, and facilitate further research in this field.

Limitations. The quality of the articles was not evaluated in this study, because it aimed to investigate all the related studies in the theoretical phase. As another study limitation, the fieldwork ended with a small number of participants due to reaching the data saturation point.

Availability of data and materials. In this study, the data used and analyzed are subject to the following licenses and restrictions: The datasets used in this study can be obtained by emailing the corresponding author upon reasonable request.

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