REVIEW PAPER
ARTIGO DE REVISÃO

The use of the aged simulation suit in nursing students: a scoping review

O uso do simulador de velhice em estudantes de enfermagem: uma *scoping review*
El uso del simulador de vejez en estudiantes de enfermería: una *scoping review*

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Abstract

Background: The use of simulation in nurses' training has increased over the past decades and provided the acquisition and development of several skills. However, data on the specific use of the aged simulation suit are scattered in the literature.
Objective: To map interventions implemented in nursing students using the aged simulation suit.
Review Method: Scoping review following the Joanna Briggs Institute methodology. Two independent reviewers analyzed the relevance of the studies and extracted and synthesized data.
Presentation and interpretation of results: Two studies were included in the review. Each intervention consisted of using the complete simulation suit and only some restrictors and lasted 1 to 3 hours. Instruments were used to measure empathy and learning efficacy. Both studies were implemented in 2nd-year students of the bachelor of science in nursing.
Conclusion: The characteristics and the duration of each intervention, as well as the assessment instruments differed between studies. Further studies should be carried out to determine the effect/experiences of using the aged simulation suit in the acquisition and development of skills.

Keywords: review; aging; nursing; simulation

Resumo

Contexto: O recurso à simulação, na formação de enfermeiros, tem aumentado nas últimas décadas e proporcionado a aquisição e desenvolvimento de várias competências. Contudo, os dados relativos à utilização específica do simulador de velhice encontram-se dispersos na literatura.
Objetivo: Mapear intervenções com o simulador de velhice, implementadas em estudantes de enfermagem.
Método de revisão: *Scoping review* com base nos princípios preconizados pelo *Joanna Briggs Institute*. Dois revisores independentes realizaram a análise de relevância dos artigos, a extração e síntese dos dados.
Apresentação e interpretação dos resultados: Dois estudos foram incluídos na revisão. A intervenção oscilou entre 1 e 3 horas de duração, entre a utilização do fato de simulação completo e apenas alguns constritores. Foram implementados instrumentos de avaliação de empatia e de eficácia na aprendizagem. Ambos os estudos foram implementados em estudantes do 2º ano da licenciatura.
Conclusão: As características da intervenção, duração e os instrumentos de avaliação diferem entre estudos. Mais estudos devem ser realizados para determinar o efeito/vivências da implementação do simulador de velhice na aquisição e desenvolvimento de competências.

Palavras-chave: revisão; envelhecimento; enfermagem; simulação

Resumen

Contexto: El uso de la simulación en la formación de enfermeros ha aumentado en las últimas décadas y ha proporcionado la adquisición y el desarrollo de varias competencias. Sin embargo, los datos relativos al uso específico del simulador de vejez se encuentran dispersos en la literatura.
Objetivo: Mapear intervenciones con el simulador de vejez implementadas en estudiantes de enfermería.
Método de revisión: Evaluación del impacto (*scoping review*) basada en los principios establecidos por el Joanna Briggs Institute. Dos revisores independientes realizaron el análisis de relevancia de los artículos, así como la extracción y síntesis de los datos.
Presentación e interpretación de los resultados: Se incluyeron dos estudios en la revisión. La duración de la intervención osciló entre 1 y 3 horas, entre la utilización de la simulación completa y solo algunos constrictores. Se implementaron instrumentos de evaluación de la empatía y la eficacia en el aprendizaje. Ambos estudios se implementaron en los estudiantes del segundo año de la licenciatura.
Conclusión: Las características de la intervención, la duración y los instrumentos de evaluación difieren entre los estudios. Se deben realizar más estudios para determinar el efecto/las experiencias de la implementación del simulador de vejez en la adquisición y el desarrollo de competencias.

Palabras clave: revisión; envejecimiento; enfermería; simulación

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Introduction

The aging of the world population is a reality which imposes new challenges and new demands for health systems (Organização Mundial da Saúde [OMS], 2015).

Nurses must acquire specific skills to meet the needs of a growing population of older people, particularly attitudes such as empathy, availability, understanding, interest, and competence (Chen, Kiersma, Yehle, & Plake, 2015b; Tremayne, Burdett, & Utecht, 2011). These attributes are the pillars to successfully deliver nursing care and obtain health gains in older people.

However, nursing students may have difficulties in understanding and adopting some of these attitudes toward older people, since they have never experienced the challenges associated with aging (Chen et al., 2015b).

Vanlaere, Coucke, and Gastmans (2010) emphasize that an attitude of empathy toward the other should be taught, acquired, and cultivated by health sciences students to avoid reducing care to nothing more than the performance of technical acts and interventions. Therefore, several strategies have been developed and implemented with a view to preparing and encouraging students in this area to better meet the needs of a growing population of older people (Robinson & Rosher, 2001; Samra, Griffiths, Cox, Conroy, & Knight, 2013; Williams & Stickley, 2010).

One of these strategies is simulation. Over the past decades, the use of simulation in the training of health professionals, particularly nurses, has made a valuable contribution to skills acquisition and development in pre-clinical settings. Literature has shown its educational potential, as well as the outcomes related to patient safety and development of competencies and skills (Gonçalves, Coutinho, & Lobão, 2014). Simulation is a complementary teaching/learning modality. Although it does not exclude the need for direct practice with human beings, it generates a complex network of conscious and unconscious responses, which includes interpersonal skills such as empathy and effective communication (Ventura, 2014).

The aged simulation suit is a low-fidelity simulator through which students use a series of motor and/or sensory restrictors to experience the areas of motor and/or sensory impairment caused by the aging process, as well as the main difficulties in performing activities of daily living (Almeida, 2013; Tremayne et al., 2011).

The aged simulation suit can promote both the acquisition of knowledge in the area of elderly health and geriatric nursing (Pacala, Boult, Bland, & O'Brien, 1995; Tremayne et al., 2011) and a better understanding of older people's difficulties to improve care delivery (Chen, Kiersma, Yehle, & Plake, 2015a; Chen et al., 2015b; Williams & Stickley, 2010). However, data on its use are scattered in the literature, which hinders the formulation of targeted questions about its effectiveness and, consequently, the development of systematic reviews.

No scoping reviews (published or ongoing) on the use of aged simulation suits in nursing students were found in a preliminary search conducted in the Joanna Briggs Institute Database of Systematic Reviews and Implementation Reports, Cochrane Library, MEDLINE, and CINAHL. As a result, a scoping review was conducted based on the methodology proposed by the Joanna Briggs Institute for Scoping Reviews (Peters, Godfrey, Khalil et al., 2015; Peters, Godfrey, McInerney et al., 2015) with the purpose of analyzing and mapping interventions implemented and evaluated in nursing students using the aged simulation suit.

More specifically, this review aims to answer the following questions:

What are the characteristics of interventions using the aged simulation suit (duration, restrictors, and scenarios used)?

What are the characteristics of the population in which the aged simulation suit is implemented and evaluated?

How are the results of interventions using the aged simulation suit evaluated?

Systematic review method

The synthesis of evidence in systematic reviews is at the center of evidence-based practice (Pearson, Wiechula, Court, & Lockwood, 2005). Different objectives and review

questions require the development of new approaches, such as scoping reviews, to synthesize evidence in a more effective and rigorous way (Peters, Godfrey, McInerney et al., 2015).

The scoping review approach was selected because this type of review aims to map the existing evidence underpinning a research area and identify gaps in the existing evidence. It is a preliminary exercise that justifies and informs the development of a systematic literature review (Peters, Godfrey, McInerney et al., 2015).

One of the peculiarities of this methodology is that it does not aim to analyze the methodological quality of included studies or find the best scientific evidence, but rather map the existing scientific evidence (Peters, Godfrey, Khalil et al., 2015; Peters, Godfrey, McInerney et al., 2015).

Using the Participants, Concept, and Context (PCC) strategy, this scoping review included studies that focused on: (a) nursing students as participants; b) the use of an aged simulation suit, through the use of motor and/or sensory restrictors, as the concept; (c) higher education (1st, 2nd, and 3rd cycles) as the context. Primary qualitative and quantitative studies were included.

Search strategy

The search strategy included published and unpublished studies and was composed of three steps: 1) Limited initial search in MEDLINE (via PubMed) and CINAHL complete (via EBSCO), followed by an analysis of text words in titles and abstracts and index terms used to describe the article; 2) Second search using all keywords and index terms identified in the included databases (Table 1); 3) The references of all articles and reports found in the search were analyzed to identify additional studies.

Studies written in English, Spanish, and Portuguese were considered for inclusion in this review, regardless of the year of publication.

Table 1

Search strategy and limiters applied per database and search results per database

Database: MEDLINE (via PubMed)
Results: 21
Search strategy (04 January 2017)

(((((((((((((((((((((((((((((((("age simulation"[Title/Abstract]) OR "age simulations"[Title/Abstract]) OR "age simulator"[Title/Abstract]) OR "age simulators"[Title/Abstract]) OR "geriatric simulation"[Title/Abstract]) OR "geriatric simulations"[Title/Abstract]) OR "geriatric simulator"[Title/Abstract]) OR "geriatric simulators"[Title/Abstract]) OR "aging simulation"[Title/Abstract]) OR "aging simulations"[Title/Abstract]) OR "aging simulator"[Title/Abstract]) OR "aging simulators"[Title/Abstract]) OR "ageing simulation"[Title/Abstract]) OR "ageing simulations"[Title/Abstract]) OR "ageing simulator"[Title/Abstract]) OR "ageing simulators"[Title/Abstract]) OR "elderly simulation"[Title/Abstract]) OR "elderly simulations"[Title/Abstract]) OR "elderly simulator"[Title/Abstract]) OR "elderly simulators"[Title/Abstract]) OR "simulation suit"[Title/Abstract]) OR "simulation suits"[Title/Abstract]) OR "aging suit"[Title/Abstract]) OR "aging suits"[Title/Abstract]) OR "gerontologic suit"[Title/Abstract]) OR "gerontologic suits"[Title/Abstract]) OR "age suit"[Title/Abstract]) OR "age suits"[Title/Abstract]) OR "ageing suit"[Title/Abstract]) OR "ageing suits"[Title/Abstract])) AND (((((((student[Title/Abstract] OR human[Title/Abstract]) OR persons[Title/Abstract]) OR peoples[Title/Abstract]) OR populations[Title/Abstract]) OR adults[Title/Abstract]) OR (students[Title/Abstract] OR humans[Title/Abstract]) OR "students"[MeSH Terms] OR "humans"[MeSH Terms] OR person[Title/Abstract] OR people[Title/Abstract] OR population[Title/Abstract] OR adult[Title/Abstract] OR "adult"[MeSH Terms] OR ("population"[MeSH Terms] OR "population groups"[MeSH Terms])))

Database: CINAHL Complete (via EBSCO)
Results: 17
Search strategy (04 January 2017):
S1   TI "age simulation" OR AB "age simulation"
S2   TI "age simulations" OR AB "age simulations"
S3   TI "age simulator" OR AB "age simulator"
S4   TI "age simulators" OR AB "age simulators"
S5   TI "geriatric simulation" OR AB "geriatric simulation"
S6   TI "geriatric simulations" OR AB "geriatric simulations"
S7   TI "geriatric simulator" OR AB "geriatric simulator"
S8   TI "geriatric simulators" OR AB "geriatric simulators"
S9   TI "aging simulation" OR AB "aging simulation" 9
S10   TI "aging simulations" OR AB "aging simulations"
S11   TI "aging simulator" OR AB "aging simulator"
S12   TI "aging simulators" OR AB "aging simulators"
S13   TI "ageing simulation" OR AB "ageing simulation"
S14   TI "ageing simulations" OR AB "ageing simulations"
S15   TI "ageing simulator" OR AB "ageing simulator"
S16   TI "ageing simulators" OR AB "ageing simulators"
S17   TI "elderly simulation" OR AB "elderly simulation"
S18   TI "elderly simulations" OR AB "elderly simulations"
S19   TI "elderly simulators" OR AB "elderly simulators"
S20   TI "simulation suit" OR AB "simulation suit"
S21   TI "simulation suits" OR AB "simulation suits"
S22   TI "aging suit" OR AB "aging suit"
S23   TI "aging suits" OR AB "aging suits"
S24   TI "gerontologic suit" OR AB "gerontologic suit"
S25   TI "gerontologic suits" OR AB "gerontologic suits"
S26   TI "age suit" OR AB "age suit"
S27   TI "age suits" OR AB "age suits"
S28   TI "ageing suit" OR AB "ageing suit"
S29   TI "ageing suits" OR AB "ageing suits"
S30   TI "elderly simulator" OR AB "elderly simulator"
S31   S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14 OR S15 OR S16 OR S17 OR S18 OR S19 OR S20 OR S21 OR S22 OR S23 OR S24 OR S25 OR S26 OR S27 OR S28 OR S29 OR S30
S32   (TI students OR AB students) OR (TI student OR AB student) OR (TI humans OR AB humans) OR (TI human OR AB human) OR (TI persons OR AB persons) OR (TI person OR AB person) OR (TI peoples OR AB peoples) OR (TI people OR AB people) OR (TI populations OR AB populations) OR (TI population OR AB population) OR (TI adults OR AB adults) OR (TI adult OR AB adult)
S33   (MH "Students") OR (MH "Human") OR (MH "Adult") OR (MH "Population")
S34   S32 OR S33
S35   S31 AND S34

Database: Cochrane Central Register of Controlled Trials (via EBSCO)
Results: 3
Search strategy (04 January 2017):

S1   TI "age simulation" OR AB "age simulation"
S2   TI "age simulations" OR AB "age simulations"
S3   TI "age simulator" OR AB "age simulator"
S4   TI "age simulators" OR AB "age simulators"
S5   TI "geriatric simulation" OR AB "geriatric simulation"
S6   TI "geriatric simulations" OR AB "geriatric simulations"
S7   TI "geriatric simulator" OR AB "geriatric simulator"
S8   TI "geriatric simulators" OR AB "geriatric simulators"
S9   TI "aging simulation" OR AB "aging simulation" 9
S10   TI "aging simulations" OR AB "aging simulations"
S11   TI "aging simulator" OR AB "aging simulator"
S12   TI "aging simulators" OR AB "aging simulators"
S13   TI "ageing simulation" OR AB "ageing simulation"
S14   TI "ageing simulations" OR AB "ageing simulations"
S15   TI "ageing simulator" OR AB "ageing simulator"
S16   TI "ageing simulators" OR AB "ageing simulators"
S17   TI "elderly simulation" OR AB "elderly simulation"
S18   TI "elderly simulations" OR AB "elderly simulations"
S19   TI "elderly simulators" OR AB "elderly simulators"
S20   TI "simulation suit" OR AB "simulation suit"
S21   TI "simulation suits" OR AB "simulation suits"
S22   TI "aging suit" OR AB "aging suit"
S23   TI "aging suits" OR AB "aging suits"
S24   TI "gerontologic suit" OR AB "gerontologic suit"
S25   TI "gerontologic suits" OR AB "gerontologic suits"
S26   TI "age suit" OR AB "age suit"
S27   TI "age suits" OR AB "age suits"
S28   TI "ageing suit" OR AB "ageing suit"
S29   TI "ageing suits" OR AB "ageing suits"
S30   TI "elderly simulator" OR AB "elderly simulator"
S31   S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14 OR S15 OR S16 OR S17 OR S18 OR S19 OR S20 OR S21 OR S22 OR S23 OR S24 OR S25 OR S26 OR S27 OR S28 OR S29 OR S30
S32   (TI students OR AB students) OR (TI student OR AB student) OR (TI humans OR AB humans) OR (TI human OR AB human) OR (TI persons OR AB persons) OR (TI person OR AB person) OR (TI peoples OR AB peoples) OR (TI people OR AB people) OR (TI populations OR AB populations) OR (TI population OR AB population) OR (TI adults OR AB adults) OR (TI adult OR AB adult)
S33   (MH "Students") OR (MH "Human") OR (MH "Adult") OR (MH "Population")
S34   S32 OR S33
S35   S31 AND S34

Database: Scopus
Filters: Excluding MEDLINE
Results: 66
Search strategy (04 January 2017):
(((TITLE-ABS-KEY ("age simulation") OR TITLE-ABS-KEY ("age simulations") OR TITLE-ABS-KEY ("age simulator") OR TITLE-ABS-KEY ("age simulators") OR TITLE-ABS-KEY ("geriatric simulation") OR TITLE-ABS-KEY ("geriatric simulations") OR TITLE-ABS-KEY ("geriatric simulator") OR TITLE-ABS-KEY ("geriatric simulators") OR TITLE-ABS-KEY ("aging simulation") OR TITLE-ABS-KEY ("aging simulations") OR TITLE-ABS-KEY ("aging simulator") OR TITLE-ABS-KEY ("aging simulators") OR TITLE-ABS-KEY ("ageing simulation") OR TITLE-ABS-KEY ("ageing simulations") OR TITLE-ABS-KEY ("ageing simulator") OR TITLE-ABS-KEY ("ageing simulators") OR TITLE-ABS-KEY ("elderly simulation") OR TITLE-ABS-KEY ("elderly simulations") OR TITLE-ABS-KEY ("elderly simulator") OR TITLE-ABS-KEY ("elderly simulators") OR TITLE-ABS-KEY ("simulation suit") OR TITLE-ABS-KEY ("simulation suits") OR TITLE-ABS-KEY ("aging suit") OR TITLE-ABS-KEY ("aging suits") OR TITLE-ABS-KEY ("gerontologic suit") OR TITLE-ABS-KEY ("gerontologic suits") OR TITLE-ABS-KEY ("age suit") OR TITLE-ABS-KEY ("age suits") OR TITLE-ABS-KEY ("ageing suit") OR TITLE-ABS-KEY ("ageing suits"))) AND ((TITLE-ABS-KEY (students) OR TITLE-ABS-KEY (student) OR TITLE-ABS-KEY (humans) OR TITLE-ABS-KEY (human) OR TITLE-ABS-KEY (persons) OR TITLE-ABS-KEY (person) OR TITLE-ABS-KEY (peoples) OR TITLE-ABS-KEY (people) OR TITLE-ABS-KEY (populations) OR TITLE-ABS-KEY (population) OR TITLE-ABS-KEY (adults) OR TITLE-ABS-KEY (adult)))) AND NOT ((((PMID (1*)) OR (PMID (2*)) OR (PMID (3*)) OR (PMID (4*)) OR (PMID (5*)) OR (PMID (6*)) OR (PMID (7*))) OR (PMID (8*)) OR (PMID (9*)))))

Database: OpenGrey
Filters: Languages; Publication Dates
Results: 59
Search strategy (04 January 2017):
(students OR student OR humans OR human OR persons OR person OR peoples OR people OR populations OR population OR adults OR adult) AND ("age suits" OR "age suit" OR "simulation suits" OR "simulation suit" OR "aging simulations" OR "aging simulation" OR "age simulations" OR "age simulation") lang:"en" lang:"pt"

Database: SciELO
Results: 57
Search strategy (04 January 2017):
(((ti:("age simulation")) OR (ab:("age simulation"))) OR ((ti:("age simulations")) OR (ab:("age simulations"))) OR ((ti:("age simulator")) OR (ab:("age simulator"))) OR ((ti:("age simulators")) OR (ab:("age simulators"))) OR ((ti:("geriatric simulation")) OR (ab:("geriatric simulation"))) OR ((ti:("geriatric simulations")) OR (ab:("geriatric simulations"))) OR ((ti:("geriatric simulators")) OR (ab:("geriatric simulators"))) OR ((ti:("aging simulation")) OR (ab:("aging simulation"))) OR ((ti:("aging simulations")) OR (ab:("aging simulations"))) OR ((ti:("aging simulator")) OR (ab:("aging simulator"))) OR ((ti:("aging simulators")) OR (ab:("aging simulators"))) OR ((ti:("ageing simulation")) OR (ab:("ageing simulation"))) OR ((ti:("ageing simulations")) OR (ab:("ageing simulations"))) OR ((ti:("ageing simulator")) OR (ab:("ageing simulator"))) OR ((ti:("ageing simulators")) OR (ab:("ageing simulators"))) OR ((ti:("elderly simulation")) OR (ab:("elderly simulation"))) OR ((ti:("elderly simulations")) OR (ab:("elderly simulations"))) OR ((ti:("elderly simulator")) OR (ab:("elderly simulator"))) OR ((ti:("elderly simulators")) OR (ab:("elderly simulators"))) OR ((ti:("simulation suit")) OR (ab:("simulation suit"))) OR ((ti:("simulation suits")) OR (ab:("simulation suits"))) OR ((ti:("aging suit")) OR (ab:("aging suit"))) OR ((ti:("aging suits")) OR (ab:("aging suits"))) OR ((ti:("gerontologic suit")) OR (ab:("gerontologic suit"))) OR ((ti:("gerontologic suits")) OR (ab:("gerontologic suits"))) OR ((ti:("age suit")) OR (ab:("age suit"))) OR ((ti:("age suits")) OR (ab:("age suits"))) OR ((ti:("ageing suit")) OR (ab:("ageing suit"))) OR ((ti:("ageing suits")) OR (ab:("ageing suits")))) AND ((ti:(students)) OR (ab:(students)) OR (ti:(student)) OR (ab:(student)) OR (ti:(humans)) OR (ab:(humans)) OR (ti:(human)) OR (ab:(human)) OR (ti:(persons)) OR (ab:(persons)) OR (ti:(person)) OR (ab:(person)) OR (ti:(peoples)) OR (ab:(peoples)) OR (ti:(people)) OR (ab:(people)) OR (ti:(populations)) OR (ab:(populations)) OR (ti:(population)) OR (ab:(population)) OR (ti:(adults)) OR (ab:(adults)) OR (ti:(adult)) OR (ab:(adult)))

The relevance of the articles to be included in the review was analyzed by two independent reviewers based on the information provided in the title and abstract.

The full-text version of all studies that met the criteria for inclusion in the review was obtained. Whenever the reviewers had doubts about the relevance of a study based on its abstract, the full-text version was obtained.

Two reviewers independently examined the full-text version of the articles to check if they met the inclusion criteria. Disagreements arising between reviewers were resolved through discussion, or by a third reviewer.

The relevance of studies identified in reference lists was assessed based on their title and abstract.
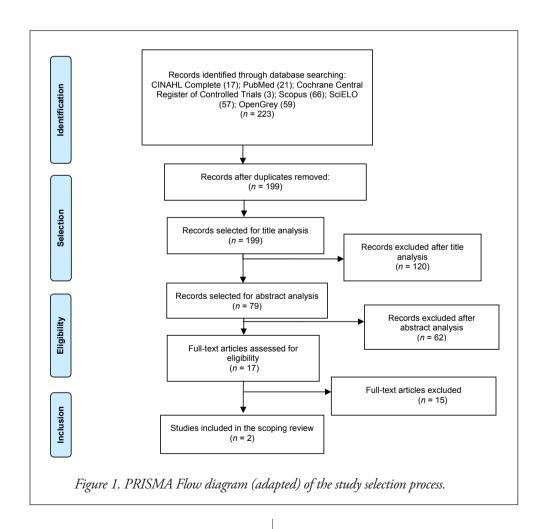
Data extraction

Two independent reviewers extracted the data using an instrument designed by the researchers, in line with the objective and questions of the review.

Disagreements between reviewers were resolved through discussion or by a third reviewer. Whenever necessary, the authors of primary studies were contacted with a view to obtaining more information and/or clarifying data.

Presentation of results

As shown in Figure 1, the search identified 223 potentially relevant studies. Of these, 24 studies were excluded for being duplicates; of the remaining 194 studies, 182 were excluded after title and abstract analysis; 15 of the remaining 17 articles were excluded because they did not meet the inclusion criteria after full-text analysis. Finally, two studies were included in this review; these studies included 148 nursing students.

Figure 1. PRISMA Flow diagram (adapted) of the study selection process.

One of the studies used a quantitative design and was conducted in the Midwestern United States of America; it was published in 2015 (Chen et al., 2015b). Another study used a mixed-method design and was conducted in Leicester, United Kingdom; it was published in 2011 (Tremayne et al., 2011).

Table 2 shows the answers to the review questions in each included study.

Table 2

Answers to the review questions per included study

Study	Intervention characteristics	Participant characteristics	Evaluation of results
Chen et al. (2015b)	*Geriatric Medication Game*® (modified version) Intervention implemented during a 3-hour laboratory class, with previous preparation of scenarios such as physician's office, pharmacy, and nursing station; Motor and/or sensory restrictors (goggles, gloves, hearing protectors, restrictors for upper and lower limbs) were randomly assigned to each student. Some tasks (activities of daily living, preparation of medication, and payments of health services) were performed using the restrictors.	58 2nd-year students of the Bachelor of Science in Nursing.	*Kiersma-Chen Empathy Scale (KCES); Jefferson Scale of Empathy-Health Professions Students (JSE-HPS); Aging Simulation Experience Survey.*
Tremayne et al. (2011)	*Physical and sensory understanding* Intervention implemented during a 1-hour session, with previous preparation of several scenarios such as bedroom and kitchen; Several activities of daily living were performed using an aged simulation suit composed of motor and sensory restrictors: goggles, gloves, hearing protectors, cane, restrictors for upper limbs, lower limbs and dorsolumbar region, and ankle (1kg each) and wrist (500g each) weights.	90 2nd-year students of the Bachelor of Science in Nursing.	Instrument designed by the authors; Analysis of qualitative comments.

Interpretation of results

The purpose of this scoping review was to analyze and map studies that had implemented and evaluated the use of the aged simulation suit among nursing students.

To meet this goal, two primary studies were included in the review.

Only one of these studies mentioned the study design (Chen et al., 2015b). The design of the other study (Tremayne et al., 2011) was identified by the authors of the review. The methodologies used demonstrate the need to conduct qualitative studies, namely phenomenological studies, with the purpose of understanding students' experiences in simulation scenarios.

Although the inclusion of studies in this re-

view did not limit the year of publication, the included studies were published after 2011, which can be explained by the fact that nurses' education and training during the 20th century do not meet the health needs of the 21st century (Institute of Medicine, 2011). Healthcare users and environments are increasingly complex and nurses need to acquire more and better skills, competencies, and attitudes to meet these needs with efficiency, quality, and safety (Institute of Medicine, 2011). In fact, the growing concern with safety, quality, responsibility, and ethics in healthcare delivery has led to the development of innovative educational tools to meet the current needs, as is the case of simulation (Godoy & Marchi-Alves, 2014; Institute of Medicine, 2011).

Although both studies used the aged simulation suit as a teaching/learning intervention/methodology, interventions had different characteristics: the intervention lasted 3 hours in the study of Chen et al. (2015b), whereas the simulation session lasted 1 hour in the study of Tremayne et al. (2011).

Although the reasons for including simulation in health professionals' future training are evident (Martins, Mazzo, Mendes, & Rodrigues, 2014). Dunkin, Adrales, Apelgren, and Mellinger (2007) pointed out that the logistics of its implementation can be daunting. According to these authors, a successful simulation program requires significant planning, particularly in terms of time commitment from those involved. Therefore, more studies are needed to determine the effectiveness of using the aged simulation suit depending on the duration of the intervention.

Another characteristic that differentiates the included studies is the fact that only Tremayne et al. (2011) gave all students the opportunity to experience a wide range of motor and sensory restrictors through the use of the aged simulation suit, enhancing simulation and possibly the results. It would be important to conduct studies on the impact/experiences of using only one or two motor and/or sensory restrictors when compared to the use of the full aged simulation suit.

Both studies were conducted with 2nd-year students of the Bachelor of Science in Nursing, prior to learning in real-world clinical settings, since learning through simulation provides students with more opportunities to practice clinical skills before consolidating them in clinical practice (Martins et al., 2014).

Nevertheless, it would be important to produce scientific evidence on the impact/experiences of using the aged simulation suit among students in the 2nd and 3rd cycles.

The impact of using the aged simulation suit was measured using instruments to assess empathy (Chen et al., 2015b) and the effectiveness of the simulator in learning (Tremayne et al., 2011). Future studies should assess the experiences of students who used the aged simulation suit with a view to understanding them. It would also be important to conduct an empirical-comprehensive research study on students' experiences to guide nursing education with the purpose of emphasizing, or not, the need for implementation of the aged simulation suit as a teaching/learning strategy/methodology.

In addition, it would also be relevant to assess the effect of using the age simulation suit at a broader level of competencies.

Limitations of the studies

Although the methodological quality of the included studies was not appraised since it is not relevant for a scoping review, some limitations should be mentioned in order to provide information for future studies, whether primary studies or systematic reviews. These limitations are related to the small sample size (Chen et al., 2015b), the lack of assessment of the long-term impact of using the aged simulation suit (Chen et al., 2015b; Tremayne et al., 2011), and the lack of a section in the published articles on the limitations of those studies (Tremayne et al., 2011).

In addition, the impact of using the simulator should have been assessed through previously validated tools, which only occurred in the study of Chen et al. (2015b). This would have strengthened the evidence.

These limitations make it difficult to effectively assess the impact of the aged simulation suit on nursing students' skills development and should be considered in future studies, since scientific evidence guides clinical practice.

Limitations of the scoping review

Only articles published in English, Portuguese, and Spanish were included in this review. Articles published in other languages could also have been important for this review.

In addition, given that it is not the purpose of a scoping review to assess the methodological quality of included studies, no recommendations for practice are put forward.

Conclusion

The objectives of this scoping review were to analyze and map interventions implemented and evaluated in nursing students using the aged simulation suit, as well as to identify the characteristics and sampled population of the interventions, and how outcomes were assessed.

Two studies were identified, in which interventions differed in how they were implemented (in one study, the participants wore an aged simulation suit and, in the other one, participants only used some restrictors) and in duration, which ranged from 1 to 3 hours. Both studies were implemented and evaluated in 2nd-year Bachelor's degree students using instruments for the assessment of empathy and learning effectiveness. These data put into evidence gaps that should be addressed in future primary studies, as well as the need to conduct a systematic literature review in order to verify which of the studies has better scientific evidence.

Implications for research

Literature has widely shown the benefits of simulation. Hence, more quantitative and qualitative studies should be conducted to analyze the use of the aged simulation suit as a teaching/learning strategy.

Future studies should clearly identify their methodology and limitations, as well as invest in the implementation of simulation among students in other cycles of education.

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