Pará Research Medical Journal

Ensino em saúde

REVISÃO INTEGRATIVA

Training models of male urinary catheterization: an integrative review

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Summary **Purpose:** To evaluate which alternative models of simulation there is in the literature regarding the teaching of male urinary catheterization. **Methods:** It is an integrative review of literature; the PubMed and the Health Virtual Library were consulted using the databases SciELO, Medline and Lilacs. The keywords catheter, urinary, model, training were used with the Boolean operator "AND". Were included studies in Portuguese, English or Spanish and they were published until January 2018. **Results:** In the analysis of the six articles found, three articles were related to models for insertion of suprapubic catheters. One of the articles used a computer software associated to sensors in the mannequin to evaluate precisely the quality of the procedure; other article proposed a model with cadavers and the last one a porcine model. Regarding the publication dates of the works, the oldest was published in 2000 and the most recent in 2015. **Conclusion:** In contrast with the importance and the efficiency proven in the teaching in simulation models, both for other procedures and for the urinary catheterization itself, the quantity of the articles found in the present review was very scarce and only one model was valid for use.

Keywords: simulation training; urinary catheterization; male; medical education.

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Financial support: None.
Conflict of interests: The authors declare no conflicts of interest.
Received: January 23, 2019
Accepted: March 15, 2019

Study carried out at Universidade do Estado do Pará – UEPA, Belém, PA, Brasil.

Introduction

The simulation teaching, which we know today, has begun in the aviation area in the beginning of the 20th century, but even before that, there were board games created in the 19th century that simulated war situations. Thus, since the introduction of the aviation simulation, the concept has expanded to other areas such as motoring, urban planning and medical teaching[1,2].

In the medical area, the simulation as a teaching method started to grow only in the 60's with the creation of the doll "Ressuci-Anne" (idealized for training mouth-to-mouth of resuscitation procedures and after improved for the training of cardiac massage). However, with the improvement of computation in the 80's, the simulation teaching started to grow in the medical area and expanded to other areas such as anesthesia, obstetrics, laparoscopic surgery and urology[1,2].

The importance of this modality of teaching is based on the students' learning from their own mistake and the repetition of a determinate assignment. Which is accomplished without exposing real patients to any inherent risks to the trained procedure[1-4]. Therefore, several societies and medical colleges in Brazil and worldwide has recognized the important role simulation has in the medical education and encourage its practice[2,4-6].

However, one of the biggest obstacles to the popularization of this modality of teaching are the simulators themselves, that usually possess a high cost or are bound to ethical conflicts (in the case of animals or cadavers utilization)[1,3,7,8]. Thus, the development of low cost training models that also possess a certain level of realism and are validate as a teaching tool is pursued[3,7,8].

Thereby, the present article aim to evaluate which alternative models of simulation are in the literature about the teaching of male urinary catheterization, which is a relatively common procedure in several medical specialties and the models available on the market are often expensive.

Objective

To evaluate which alternative models of simulation there is in the literature regarding the teaching of male urinary catheterization.

Methodology

The present article is an integrative review of the literature regarding the alternative training models available for male urinary catheterization, based on the following stages: selection of the thematic question (elaboration of the guiding question), determination of inclusion and exclusion criteria, screening of articles (sample selection), evaluation of included studies, results interpretation and synthesis of knowledge.

To accomplish such goal, the PubMed and the *Biblioteca Virtual em Saúde* (BVS) were consulted using the database from SciELO (Scientific Electronic Library Online), Medline (Medical Literature Analysis and Retrieval System Online) e and Lilacs (*Literatura Latino-Americana e do Caribe em Ciências da Saúde*). We chose to use the following keywords: catheter, urinary, model and training. The Boolean operator "AND" was used to associate the keywords.

Were included studies that were indexed in the cited databases that has a direct relation with the keywords in different languages such as Portuguese, English and Spanish and articles published until January 2018. The collecting of data followed these inclusion criteria by two researchers, independently, and afterwards, the results were confronted. Were deleted the articles that do not match the quoted criteria.

On the search, 80 articles were identified (43 in PubMed and 37 in BVS). Then, the following stages were adopted: (1) reading the title of the articles as well as their abstracts; (2) selection of four articles in PubMed and six articles in BVS; (3) comparison between the selected articles, where four of them were duplicated (Figure 1).

Results and discussion

On the analysis of the six articles found, it was verified that three of them are related to the insertion of suprapubic catheters models[9-11], one article described the use of a computer software associated to sensors in the mannequin to evaluate precisely the quality of the procedure[12]; other article proposed a model with cadavers and the last one a porcine model[13] (Table 1). Regarding the publication dates of the papers, the oldest one was published in the year 2000 and the most recent in 2015.

Therefore, the six articles were grouped in four categories, idealized according to the main thematic of the articles: suprapubic catheters, computer software associated to mannequin, cadaver and porcine models (Figure 2).

Table 1. Description of the selected articles to compose the review

Author(s)	Title	Year of Publication	Journal
Singal et al.[9]	A validated low-cost training model for suprapubic catheter insertion	2015	Urology
Hossack et al.[10]	A cost-effective, easily reproducible, suprapubic catheter insertion simulation training model	2013	Urology
Shergill et al.[11]	A training model for suprapubic catheter insertion: the UroEmerge suprapubic catheter model	2008	Urology
Jöud et al.[12]	Feasibility of a computerized male urethral catheterization simulator	2010	Nurse education in practice
Ocel et al.[14]	Formal Procedural Skills Training Using a Fresh Frozen Cadaver Model: A Pilot Study	2006	Clinical Anatomy
Balén et al.[13]	Anatomía del cerdo aplicada a la experimentación en cirugía general	2000	Cirugía española

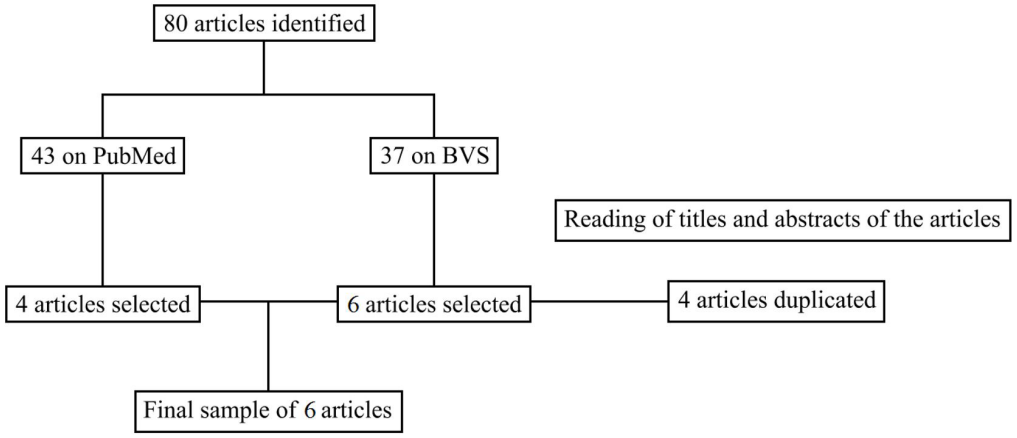

Figure 1. Description of the stages followed in the articles selection.

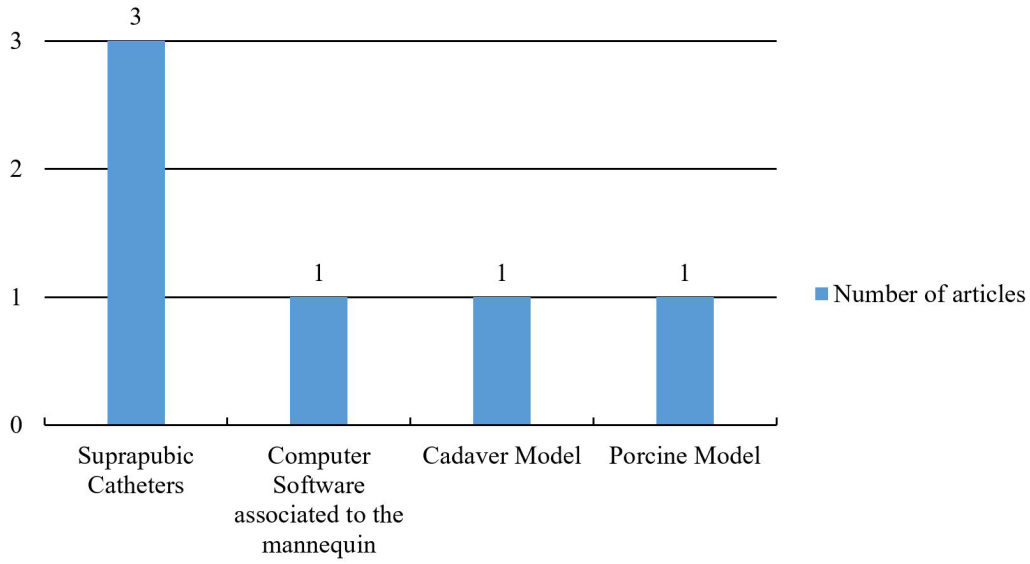

Figure 2. Number of articles by category.

Suprapubic catheters

It is important to point out that the three models were published at the same journal (Urology), however in different years: the Singal et al.[9] model is the most recent one and was published in January 2015; the Hossack et al.[10] model was published in October 2013 and the oldest model, from Shergill et al.[11] was published in July 2008.

The three models are easy to reproduce and have low cost, which bring them closer of the ideal training model. Out of the three articles found, only Singal et al.[9] model was evaluated to be used as a teaching tool. The Hossack et al.[10] model and Shergill et al.[11] model were used and evaluated only by surgery residents and newly graduated physicians, respectively.

Computer software associated to mannequin

The Jöud et al.[12] work is an evaluation of the viability of a hybrid simulator prototype for the training of male urinary catheterization. Nurses and nursing students evaluated the model and reported satisfaction of the prototype as a whole; however, two negative points were highlighted: the lack of resistance of the urethra to insert anesthesia gel or the catheter itself and the lack of realism of the penis appearance.

The article also emphasizes the importance of the patient's feedback, which verbally expresses pain and/or anxiety during the procedure, features that will be included in later prototypes to increase the realism[12].

Cadaver models

The study of Ocel et al.[14] compared the use of fresh frozen cadavers to the use of mannequins for the training of some basic clinical abilities, with the casuistic composed by medical students.

The performed procedures consisted of placement of peripheral venous access, nasogastric catheterization, lumbar puncture and urinary catheterization. It is important to mention that the study did not use a mannequin for urinary catheterization for comparison with the cadaver performance[14], being an important limitation for the study. Furthermore, another limitation of the work was the small casuistic, fact that made the statistics analysis of the data impossible[14] and consequently created a bias in the study.

Porcine model

Balén et al.[13] described the pig anatomy applied to the teaching of experimental surgery and according to his conclusions the urinary catheterization is only possible on female pigs due to the anatomic peculiarities in the male urethra, which make this procedure impossible.

Conclusion

In contrast with the importance and the efficiency of the teaching in simulation models, for the urinary catheterization and others procedures, the quantity of the articles found in the present review was very scarce. Another relevant point is that of the few articles found, only one model was valid to be used as a teaching tool.

The limitations of the present study were the low number of articles focused on the theme, and the terms used in the search, that may not have covered all articles with that thematic.

Thus, in order to improve the teaching of male urinary catheterization and to reduce the number of complications resulting from poorly done procedures, models that are more accessible still need to be developed.

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Author contributions

LLS conception and design of the study; critical revision of the manuscript; final approval of the manuscript; ALT analysis and interpretation of data; manuscript preparation; critical revision of the manuscript; article selection; ACSC analysis and interpretation of data; manuscript preparation; critical revision of the manuscript; article selection; GMP analysis and interpretation of data; manuscript preparation; critical revision of the manuscript; MSP conception and design of the study; critical revision of the manuscript; final approval of the manuscript; CAVB conception and design of the study; critical revision of the manuscript; final approval of the manuscript.

All authors have read and approved the final version of the article submitted to Pará Research Medical Journal.