

◆ Revisão Sistemática

Medical devices used in the subcutaneous hydration (hypodermoclysis) of the elderly: a scoping review protocol

Dispositivos médicos utilizados na hidratação subcutânea (hipodermóclise) de idosos: protocolo de scoping review

Dispositivos médicos utilizados en la hidratación subcutánea (hipodermóclisis) de ancianos: protocolo de scoping review

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ABSTRACT

Background: Subcutaneous hydration is one of the oldest known techniques used in a state of dehydration, a common cause of hospitalization and death among the elderly. However, despite the multiple studies published around this issue, as well as its shifting popularity in clinical practice, there are no studies that map which medical devices are commonly used in the subcutaneous hydration of the elderly. **Objective:** To map the available evidence on the medical devices used in the subcutaneous hydration of the elderly, as well as identify its characteristics. **Review method:** Methodology proposed by the Joanna Briggs Institute. A scoping review protocol was established, suitable to each data- base/repository, with the purpose of identifying relevant studies that meet the outlined criteria. Two independent reviewers will assess all articles for relevance, as well as perform data extraction and synthesis. **Conclusion:** This scoping review is expected to contribute to the critical analysis of the current devices in use, highlighting their potentialities and gaps, guiding health professionals and managers in the selection of the best available technologies. Furthermore, this review may substance the development of a new medical device that enhances the efficacy and quality of the care provided.

Keywords: Hypodermoclysis, Subcutaneous Hydration, Medical Devices, Elderly, Scoping Review.

RESUMO

Introdução: A hidratação subcutânea é uma das mais antigas técnicas utilizadas em estados de desidratação, uma causa comum de hospitalização e morte entre os idosos. No entanto, apesar dos múltiplos estudos publicados em torno desta questão, bem como a mudança da sua popularidade na prática clínica, não há estudos que mapeiem quais os dispositivos médicos que são comumente usados na hidratação subcutânea de idosos. **Objetivo:** Mapear as evidências disponíveis sobre os dispositivos médicos utilizados na hidratação subcutânea de idosos, bem como identificar as suas principais características. **Método de Revisão:** Metodologia proposta pelo Joanna Briggs Institute. Foi estabelecido um protocolo de *scoping review*, adequado a cada base de dados/repositório, com o objetivo de identificar estudos relevantes que atendam aos critérios delineados. Dois revisores independentes avaliarão todos os artigos quanto à sua relevância, bem como realizarão a extração e síntese de dados.

Conclusão: Espera-se que esta *scoping review* contribua para a análise crítica dos dispositivos atuais em uso, destacando as suas potencialidades e lacunas, orientando os profissionais e gestores de saúde na seleção das melhores tecnologias disponíveis. Além disso, esta revisão poderá substanciar o desenvolvimento de um novo dispositivo médico que potencie a eficácia e a qualidade dos cuidados prestados.

Palavras-chave: Hipodermoclise, Hidratação Subcutânea, Dispositivos Médicos, Idosos, Scoping Review.

Introduction

The increase of the average life expectancy is a reality, with global projections for 2050 estimating a 60% increase in the number of people over 65 years of age (He, Goodkind, & Kowal, 2016). Elderly population is a risk group for dehydration because of physiological (e.g. decreased thirst, high prevalence of comorbidities associated with chronic diseases, polymedication, swallowing alterations), social (e.g. social isolation, negligence or absence of informal caregivers for older adults living in their residences), and environmental factors (e.g. higher temperatures) (Begum & Johnson, 2010; Remington & Hultman, 2007; Schols et al., 2009). This reality gains new contours when we focus on the institutionalized elderly, who reduced fluid intake due to fear of triggering episodes of urinary incontinence or due to the existence of functional limitations that constrain their access to beverages (Remington & Hultman, 2007; Schols et al., 2009).

Frequently, dehydration is associated to recurrent episodes of hospitalization due to the clinical significance that this condition can present in the hemodynamic state and well-being of the elderly (e.g. weight loss, renal failure, respiratory and urinary tract infections) (Begum & Johnson, 2010; Thomas et al., 2008). Even in hospitalized older adults, dehydration levels can be significant because of the difficulty in the early identification of symptoms by health professionals (Begum & Johnson, 2010).

There are several dehydration treatments known in the literature, with subcutaneous hydration (also known as hypodermoclysis) firstly appearing in the literature in 1865, by the Italian physician Cantani (Lopez & Reyes-Ortiz, 2010). By 1903, it was widely used in hospitals for treating dehydrated patients; however, several reports from the 1950s associated its use with severe complications. In the 1980s, the technique was resurrected, but despite its multiple advantages, it still remains underused by health professionals (Lopez & Reyes-Ortiz, 2010).

Despite alternating periods of greater and lesser popularity, the technique of subcutaneous hydration remained constant. Generically, it involves the infusion of fluids in subcutaneous tissues through a needle, and can be done in a single or multiple anatomical regions. After appropriate skin care, a cannula (22 to 24-gauge needle) is inserted at a 45° angle into the subcutaneous space and aimed toward the head/thorax (Caccialanza, Constans, Cotogni,

Zaloga & Pontes-Arruda, 2016). After insertion, the needle is covered with a bandage/transparent semipermeable dressing, and connected to the fluid bag through a giving set. With this technique, in 24 hours of treatment, it is possible to infuse up to 1.5 liters to 3 liters of fluid, pending on the number of regions used (Remington & Hultman, 2007).

Subcutaneous hydration seems to be particularly useful in those patients whose venous accesses are difficult (e.g., cancer patients, palliative patients), as well as for cases of malnutrition or severe electrolyte dysfunction that require a rapid administration of higher volumes of fluids (Remington & Hultman, 2007). In fact, this technique is a safe and effective alternative to the intravenous administration of fluids. Moreover, subcutaneous hydration can be considered efficient, not requiring an increased volume of material or time in its preparation and maintenance (Remington & Hultman, 2007). This technique can also be used in several settings, for example, hospitals, nursing homes, and hospices. Subcutaneous hydration can be also used in home care by informal caregivers (Vidal et al., 2016), reducing the need for hospitalization.

However, although there are several published studies on subcutaneous hydration, especially focused on different insertion and maintenance care-related topics (e.g., technique, route of administration, compatibility and effectiveness of the different infusions and drugs administered), there are no known studies focused on the characteristics of the medical devices currently used.

Review Method

The conduction of a scoping review was preferred because its main purpose is to map the evidence available on a particular research focus and identify gaps as a primary effort to substantiate the development of a systematic literature review (Peters et al., 2017). Furthermore, specific scoping reviews can assist health professionals during their decision-making process and clinical practice.

Search strategy and study identification

This scoping review will use the participants, concept, and context strategy (PCC), as defined by the Joanna Briggs Institute (Peters et al., 2017). Concerning the participants, this review will focus on studies that include elderly people who are undergoing subcutaneous hydration. For the purpose of this review, we will adopt the cutoff age of 60+ years proposed by the United Nations to refer to elderly persons.

As regards the concept, it will include studies focused on medical devices used for subcutaneous hydration. For the purpose of this scoping review, we will use the definition proposed by the European Regulatory System that defines medical device as “any instrument,

appliance, apparatus, material or other article, whether used alone or in combination, including the software necessary for its proper application, intended by the manufacturer to be used for human beings for the purpose of: (i) diagnosis, prevention, monitoring, treatment or alleviation of disease; (ii) diagnosis, monitoring, alleviation of or compensation for an injury or handicap; (iii) investigation, replacement or modification of the anatomy or of physiological process; (iv) control of conception and which does not achieve its principal intended action in or on the human body by pharmacological, immunological or metabolic means, but which may be assisted in its function by such means” [Regulation (EU) 2017/745 of the European Parliament and of the Council of 5 April 2017 on medical devices].

Concerning the context, all clinical settings and geographical regions will be included in this review. With regard to study design, this review will consider experimental and epidemiological designs, including randomized controlled studies, quasi-experimental studies, case and before-and-after studies. Moreover, this review will also consider literature reviews, observational studies, cross-sectional and longitudinal descriptive designs. Recognizing that the research question is intrinsically linked to the areas of innovation and technological development, other forms of gray literature such as academic dissertations and theses, opinion documents, reports and newsletters will be considered.

In relation to the search strategy and study identification, the following online databases will be searched: Cochrane Central Register of Controlled Trials, JBI Database of Systematic Reviews and Implementation Reports, Scopus, MEDLINE (via PubMed), CINAHL Complete (via EBSCO), and SciELO. The search for unpublished studies will be performed in OpenGrey, ProQuest, Scientific Open Access Repository of Portugal, and Banco de Teses CAPES.

Initial keywords and search expressions to be used will be: “elder*”, “old*”, “aged”, “geriatric”, “subcutaneous hydration”, “subcutaneous rehydration”, “hypodermoclysis”, “dehydration therapy”, “subcutaneous infusion”, “fluid therapy”, “device”, “technol*”, “innovat*”. The search strategy will consider studies published until November 2018 in Portuguese, Spanish, French, and English.

Data extraction

Data will be extracted by two independent reviewers, using an extraction tool developed by the researchers consistent with the scoping review objective and questions (Figure 1).

Throughout the data extraction process, this instrument can be revised and altered contingent on the researchers’ requirements.

Review title

Medical devices used in the subcutaneous hydration (*hypodermoclysis*) of the elderly: a scoping review protocol

Review questions

- What are the most common devices used in the subcutaneous hydration of the elderly?
- What are the fluids most commonly administered during the subcutaneous hydration of the elderly?
- What are the health professionals and/or caregivers' practices related to handling these devices?

Inclusion criteria

- **Population**
Studies that include elderly people, older than or equal to 60 years of age, who are undergoing subcutaneous hydration.
- **Concept**
Studies focused on medical devices used for subcutaneous hydration
- **Context**
All clinical settings and geographical regions.

Extraction of details and study characteristics

Authors:	
Year of Publication:	
Country of origin:	
Type of study:	
Study objectives:	
Clinical setting:	
Number of participants:	
Relevant concepts for the review question:	

Figure 1. Extraction tool designed by the research team, which includes the initial approach to the articles to be included in the scoping review.

Data synthesis

Data will be presented in narrative form, using tables, consistent with the objective and focus of this scoping review. This process will be accomplished through consensus between two reviewers. Any disagreement will be resolved with a third reviewer.

In the review question “What are the most common devices used in the subcutaneous hydration of the elderly?”, the tables and charts can include data indicated in Figure 2.

Study	Type of Device	Brand (if known)	Characteristics of the device	(...)

Figure 2. Data synthesis grid for the first review question.

In the review question “What are the fluids most commonly administered during the subcutaneous hydration of the elderly?”, the tables and charts can include data indicated in Figure 3.

Study	Type of Fluid	Dosage	Rate of Infusion	Frequency	(...)

Figure 3. Data synthesis grid for the second review question.

In the review question “What are the health professionals and/or caregivers’ practices related to handling these devices?”, the tables and charts can include data indicated in Figure 4.

Figure 4. Data synthesis grid for the third review question.

Study	Who is responsible for the device management?	Is the caregiver involved? If so, how?	Recorded care practices during:			(...)
			Device Insertion	Device Maintenance	Device Removal	

Conclusion

The elderly constitute a risk group for dehydration, which may lead to significant health-related complications and consequent decrease in their quality of life. Given the worldwide increase in average life expectancy, this reality is expected to take on new proportions in the near future. Subcutaneous hydration constitutes one of the earliest clinical interventions performed in these situations, particularly used in elderly patients with poor venous access, difficulties in oral fluid intake or in palliative care. However, despite the technological revolution witnessed in the health sector, the technique and devices used do not seem to have undergone significant changes.

Therefore, this scoping review will allow the mapping of the available evidence on current medical devices used in the subcutaneous hydration of the elderly, contributing to the identification of their potentialities and possible gaps, guiding health professionals and managers in the selection of the best existing technologies. Moreover, this review can substantiate the creation of new medical devices that may enhance the efficacy and quality of the care provided in this domain.

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