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REVIEW PAPER
ARTIGO DE REVISÃO

Potential for contamination of tourniquets during peripheral venipuncture: a scoping review protocol

Potencial de contaminação de garrotes na punção venosa periférica de utentes: protocolo de *scoping review*

Potencial de contaminación de garrotes en la punción venosa periférica de pacientes: protocolo de *scoping review*

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Abstract

Background: The tourniquet should be placed above the venipuncture site, thus promoting venous distension. Given its characteristics and use in clinical practice, tourniquets can be a source of microbial contamination. However, the results of scientific studies on this topic are scattered in the literature.
Objective: To map the available evidence on the microbial contamination of tourniquets used in peripheral venipuncture, as well as identify health professionals' practices in handling these devices.
Review method: Methodology proposed by the Joanna Briggs Institute. A scoping review protocol was established, which is appropriate to each database/repository, with the purpose of identifying relevant studies that meet the criteria outlined. Two independent reviewers will assess all articles for relevance, as well as perform data extraction and synthesis.
Presentation and interpretation of results: The mapping of the potential for contamination of tourniquets and professionals' practices will contribute to the dissemination of the available evidence.
Conclusion: This scoping review is expected to contribute to the critical analysis of the clinical practices in this area, given their potential impact on the safety of care delivery.

Keywords: tourniquet; equipment contamination; catheterization, peripheral; professional practice

Resumo

Contexto: Na seleção de um acesso venoso, preconiza-se a utilização de um garrote acima do local de punção, potencializando a distensão venosa. Dadas as características e práticas na utilização clínica, o garrote pode representar uma fonte de disseminação de microrganismos. Todavia, os resultados dos estudos científicos neste âmbito encontram-se dispersos na literatura.
Objetivos: Mapear a evidência disponível sobre a contaminação microbiológica de garrotes utilizados na punção venosa periférica, identificando práticas na sua manipulação.
Método de revisão: Metodologia proposta pelo *Joanna Briggs Institute*. Foi definido um protocolo de *scoping review*, adequado a cada base/repositório para identificar estudos relevantes a incluir que respondam aos critérios delineados. A análise de relevância dos artigos, a extração e síntese dos dados será desenvolvida por dois revisores independentes.
Apresentação e interpretação dos resultados: O mapeamento do potencial de contaminação do garrote e práticas dos profissionais contribuirá para a disseminação da evidência disponível.
Conclusão: Espera-se que a *scoping review* contribua para a análise crítica de práticas neste âmbito, dado o potencial impacte na segurança dos cuidados prestados.

Palavras-chave: garrote; contaminação de equipamentos; cateterismo periférico; prática profissional

Resumen

Contexto: En la selección de un acceso venoso, se recomienda la utilización de un garrote por encima del lugar de punción, lo que potencia la distensión venosa. Dadas las características y prácticas en la utilización clínica, el garrote puede representar una fuente de propagación de microorganismos. No obstante, los resultados obtenidos en los estudios científicos de este ámbito se encuentran dispersos en la literatura.
Objetivos: Mapear las pruebas disponibles sobre la contaminación microbiológica de los garrotes utilizados en la punción venosa periférica, e identificar las prácticas en su manipulación.
Método de revisión: Metodología propuesta por el *Joanna Briggs Institute*. Se definió un protocolo de *scoping review* adecuado para cada base o repositorio con el fin de identificar e incluir estudios relevantes que respondan a los criterios definidos. El análisis de relevancia de los artículos, así como la extracción y la síntesis de los datos lo desarrollarán dos revisores independientes.
Presentación e interpretación de los resultados: El mapeo del potencial de contaminación del garrote y las prácticas de los profesionales contribuirá a la diseminación de las pruebas disponibles.
Conclusión: Se espera que la *scoping review* contribuya al análisis crítico de las prácticas en este ámbito, dado el potencial impacto en la seguridad de los cuidados prestados.

Palabras clave: garrote; contaminación de equipos; cateterismo periférico; práctica profesional

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Introduction

Peripheral venipuncture for obtaining venous access or collecting blood is one of the most common invasive procedures in clinical settings (Marsh, Webster, Mihala, & Rickard, 2017; Rickard et al., 2012; Wallis et al., 2014). In order to interrupt venous blood flow in the distal area of the limb to be cannulated and, consequently, promote venous distension, tourniquets should be in place no longer than 60 seconds (Gorski et al., 2016). For this purpose, the tourniquet should be applied 5 to 10 centimeters above the puncture site (Veiga et al., 2011).

With regard to the clinical equipment used during care delivery, the Portuguese Directorate-General of Health (Direção-Geral da Saúde, 2013) highlighted the infection control precautions for each clinical procedure and the associated risks. In several healthcare units, clinical equipment is still inconsistently and sometimes inadequately managed, which, together with economic constraints, leads to the increasingly inappropriate reuse of materials (e.g., tourniquets) and a non-compliance with specific guidelines (World Health Organization, 2016). However, recent studies point to a large gap between nurses' knowledge and practices in this domain (Aftab, Zia, Zahid, Raheem, & Beg, 2015).

Tourniquets used in peripheral venipuncture can be a source of microbial dissemination when inadequately decontaminated; hence, health organizations should ensure that they are disinfected between uses following the manufacturer's instructions (Costa, 2017; World Health Organization, 2010). The latest guidelines recommend that tourniquets should be single-patient use (Gorski et al., 2016) and manufactured using a material with a low risk for microbial contamination, thus discouraging the use of fabric tourniquets (World Health Organization, 2010; Royal College of Nursing, 2016).

A preliminary search conducted in the JBI Database of Systematic Reviews and Implementation Reports, the Cochrane Database of Systematic Reviews, CINAHL (via EBSCO), and MEDLINE (via PubMed) found no literature reviews (published or underway) on this topic. Therefore, the authors decided to conduct a scoping review, based on the methodology proposed by the Joanna Briggs Institute for Scoping Reviews (Peters et al., 2017), with the purpose of mapping the available evidence on the microbial contamination of tourniquets during peripheral venipuncture, while identifying health professionals' practices during this procedure. More specifically, this review aims to answer the following questions: What is the most common microbial contamination found in tourniquets used in peripheral venipuncture (based on contamination rate, counts of microorganisms, their status as species or subspecies, and their resistance profiles)? What are the characteristics of the tourniquets used in peripheral venipuncture (material and design)? What are the health professionals' practices related to handling these devices (hand hygiene, glove use, tourniquet disinfection, sharing tourniquet with other professionals, storage and transport conditions)?

Systematic review method

A scoping review was chosen because its main purpose is to map the evidence available on a given research focus and identify gaps as a preliminary effort to justify the development of a systematic literature review (Peters et al., 2017). In addition, it can be an information tool to assist health professionals in decision-making and clinical practice.

Search strategy and study identification

The scoping review will use the participants, concept, and context strategy (PCC). With regard to participants, the review will include studies which only include health professionals with the appropriate skills to perform peripheral venipuncture (nurses, physicians, phlebotomists, etc.). As regards the concept, it will include studies focused on the potential microbial contamination of tourniquets during peripheral venipuncture and professionals' practices related to handling these devices. Microbial contamination is defined as the soiling of inanimate objects with potentially infectious microorganisms (World Health Organization, 2016). As regards the context, all clinical settings and geographical regions will be included. With regard to study design, this review will consid-

er experimental and epidemiological designs, including randomized controlled studies, quasi-experimental studies, before-and-after studies, and case studies. In addition, it will also consider literature reviews, observational studies, cross-sectional and longitudinal descriptive designs, dissertations, and gray literature. Other texts will also be considered such as opinion documents and reports.

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

Initial keywords and search expressions to be used will be: "tourniquet", "contamination", "colonisation", "colonization", "infection", "microorganism", "bacter*", "viral", "virus*", "fung*", "yeast", and "pathogen*".

The search strategy will consider studies published until November 2017 in Portuguese, Spanish, French, and English.

Data extraction

Data will be extracted by two independent reviewers, using the extraction tool which was developed by the researchers in line with the review objective and questions (Figure 1). During the data extraction process, this instrument can be revised and changed depending on the researchers' needs.

Review title

Potential for contamination of tourniquets during peripheral venipuncture: a scoping review protocol

Review questions

- What is the most common microbial contamination found in tourniquets used in peripheral venipuncture (based on contamination rate, counts of microorganisms, their status as species or subspecies, and their resistance profiles)?

- What are the characteristics of the tourniquets used in peripheral venipuncture (material and design)?

- What are the health professionals' practices related to handling these devices (hand hygiene, glove use, tourniquet disinfection, sharing with other professionals, storage and transport conditions)?

Inclusion criteria (PCC):

- Population

Studies which only include health professionals with the appropriate skills to perform peripheral venipuncture procedures (nurses, physicians, phlebotomists, etc.)

- Concept

Studies focused on the potential microbial contamination of tourniquets used in peripheral venipuncture procedures and health professionals' practices in handling these devices

- Context

All clinical settings and geographical regions.

Extraction of details and study characteristics

Authors: _____

Year of Publication: _____

Country of origin: _____

Study objectives: _____

Clinical setting: _____

Number of tourniquets analyzed: _____

Source of the tourniquets: _____

Number of health professionals involved: _____

Relevant concepts for the review question: _____

Figure 1. Data extraction tool.

Extracted data will provide specific details about the population, study designs, and relevant outcomes for the research question and specific objectives. The authors of the studies will be contacted to clarify any doubts or request further information during this process. Any disagreements that may arise between the reviewers will be resolved through discussion, or with a third reviewer.

Data synthesis

Data will be presented in narrative form, using tables, in line with the objective and focus of the scoping review. This process will be achieved through consensus between two reviewers. Any disagreement will be resolved with a third reviewer. In the review question "What is the most common microbial contamination found in tourniquets used in peripheral venipuncture?", the tables and charts can include data indicated in Figure 2.

Study	Number of tourniquets	Laboratory method	Microbial contamination rate	Isolated species and subspecies	Reported resistance	(...)

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

In the review question "What are the characteristics of the tourniquets used in peripheral venipuncture?", the tables and charts can include data indicated in Figure 3.

Study	Tourniquet material	Reuse	Presence of organic matter	Existence of other clinical equipment used as tourniquets	(...)

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

In the review question "What are the health professionals' practices related to handling these devices?", the tables and charts can include data indicated in Figure 4.

Study	Professionals' hand hygiene	Glove use	Reuse between procedures and patients	Tourniquet disinfection	Tourniquet sharing among professionals	(...)

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

Presentation and interpretation of results

The mapping of the potential for tourniquet contamination, as well as the description of the tourniquets' characteristics and the health professionals' practices in handling them, will contribute to the dissemination of the available evidence on this topic.

Conclusion

The analysis of specific domains related to the use of tourniquets during peripheral venipuncture, which are intrinsically associated with health professionals' practices, is essential to ensure quality care, enhance patient and professionals' safety, and reduce the costs associated with this procedure. As contributions to clinical practice, the mapping of the available evidence on the potential for contamination of these devices is expected to inform the analysis of the current practices in this area, as well as to promote the redesign of these practices and the implementation of quality assurance systems in health institutions. In addition, as a research implication, this scoping review is expected to be a preliminary exercise to justify the formulation of specific questions and the development of systematic reviews on the effectiveness of some practices in reducing the potential for contamination of tourniquets during peripheral venipuncture.

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