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Identifying classification systems regarding vascular access for haemodialysis: protocol for a scoping review

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ABSTRACT

Introduction Classifications are important clinical tools that enable data arrangement, patient categorisation and comparative research. The care of patients with end-stage renal disease who have vascular access requires collaboration of several specialists. In such a field, where several different specialties overlap, strong evidence and well-grounded recommendations for good practice are essential. In this protocol, we aim to search the literature to identify classification systems regarding vascular access for haemodialysis. This protocol serves as a pragmatic tool for setting a systematic approach using scoping review methodology. It also aims to make the study transparent and avoid potential duplication.

Methods and analysis We will follow the Joanna Briggs Institute methodology for the conduct of scoping reviews during the course of the proposed review. Scopus, Web of Science, PubMed, Google Scholar and the ClinicalTrials.gov registry will be searched by two researchers. Titles and abstracts will be screened and articles featuring classifications regarding vascular access for haemodialysis will be eligible for full-text analysis. There will be no age, sex or race limitation for the study populations. The title and abstract (if abstract available) must be in English but there will be no language restrictions for full-text review. Databases will be searched from inception to the date of search. All patients indicated for creation or placement of vascular access will be eligible, as well as patients with already existing vascular access. Classifications regarding preprocedural assessment, vascular access insertion or creation, complications and their management will be included in the study. Classifications regarding peritoneal dialysis will not be eligible. A comprehensive summary of the available evidence will be presented.

Ethics and dissemination The protocol and the review are exempt from ethical approval as there is no direct patient involvement and the review will summarise data from already published literature. The final article will be submitted to a peer-reviewed scientific journal.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ Our review follows the methodological framework of Joanna Briggs Institute.
⇒ Scopus, Web of Science, PubMed, Google Scholar and the ClinicalTrials.gov registry will be used for the literature search, and grey literature will also be eligible.
⇒ There will be no language restrictions for full-text review.
⇒ The review will not include classifications regarding peritoneal dialysis.

INTRODUCTION

Classification systems form basic pillars for data collection, compilation and categorisation. Methodical organisation of a large amount of information into well-defined categories with coherent structure allows transparent data identification and is essential for statistical analysis.[1] A large amount of unorganised data is often impossible to evaluate and process. All medical fields contain an infinite amount of information that is constantly increasing. Classifications help to systematically arrange the data and enable easy and effective processing. Any scores should be simple, logical and easily applicable. In medicine, ideally, they should reflect outcomes and serve as predictive parameters.[2] Such organised data sets are effectively analysed and serve clinical and scientific purposes.[3]

Chronic kidney disease and end-stage renal disease are increasingly common. A total of 850 million people were estimated to be living with chronic kidney disease in 2017.[4] And the world-wide dialysis population is rising.[5–7] Haemodialysis is the most common dialysis modality, accounting for approximately 89% of all dialysis and 69% of all renal replacement therapy.[8] Patients who are dependent on haemodialysis require vascular access, which can either be a dialysis catheter placed into central vein, or an arteriovenous access created typically by a vascular access surgeon. Care of the patients with vascular access is complex and demands a multidisciplinary

approach. Variability in classifying dialysis access makes interprofessional communication and research in this developing field difficult. Well-designed classification systems could improve communication on a professional level, enhance patient management and quicken scientific progress.

METHODS AND ANALYSIS

Scoping review methodology

Our aim is to explore all the available classification systems in the literature to describe and categorise vascular accesses used in haemodialysis populations. To our knowledge, there is no review, summary or published protocol regarding this topic. We selected a scoping review as the appropriate approach to use. A methodological framework of Joanna Briggs Institute[9] for conducting scoping reviews has been used in the design of this protocol and will guide the future scoping review. The protocol and the scoping review adhere to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR).[10]

Objectives

To clarify and map what classification systems regarding vascular access for haemodialysis are published in the current literature and to present a comprehensive summary

Eligibility criteria

Participants

The study population is limited to patients who are assessed for the creation of arteriovenous access (AVA) or have existing vascular access (used or unused). Patients with current or previous dialysis catheter insertion will also be included. Studies will be included from all populations independent of age, sex or race.

Concept

All articles that contain classification systems regarding vascular access for haemodialysis are eligible. Classification systems regarding preprocedural assessment, AVA creation, dialysis catheter placement, postprocedural care and follow-up, AVA-related perioperative, postoperative, central venous dialysis catheter placement complications and their management will be included. Potential studies for inclusion must contain the terms 'classification' or 'classification system' or 'score' in their description and the classification systems must present an idea of grouping or organising vascular access-related information into groups, categories and/or subcategories. The number of created categories is not relevant.

Context

All study methodological types will be eligible. The title and abstract (if abstract available) must be in English, however there will be no language limitation in assessing full-text articles.

Articles where full texts cannot be obtained and those with non-English titles or abstracts will be excluded. Publications focused on definitions and nomenclature concerning vascular access for dialysis that do not explicitly introduce a classification system will not be included. Classifications regarding peritoneal catheters for dialysis will also not be included.

Search strategy

Information sources

A search of Scopus, Web of Science, PubMed, Google Scholar and the ClinicalTrials.gov registry will be performed. Grey literature found via Google Scholar will also be eligible for inclusion and references included studies will be evaluated for further studies eligible articles.

Date range

The search will be from database inception to the date when formal search is initiated for the review. The date of the search is not currently known as it will be assessed after publication of this protocol.

Search terms

The search terms will be combinations of the following: classification, classification system, score, categorisation, arteriovenous fistula, arteriovenous shunt, arteriovenous access arteriovenous graft, dialysis catheter, vascular access, permcath, central venous catheter, dialysis, haemodialysis and renal replacement therapy. A detailed search strategy is presented in the online supplemental material.

Study records and data items

Data management

All the retrieved articles will be downloaded and organised into arranged datasheets (table 1). Duplicates will be identified and eliminated using software R v.4.2.2. The full texts of the eligible articles will be uploaded into Mendeley Reference Management Software.

Selection process

Two independent reviewers (KL and JB) will perform the database searches. After the elimination of duplicates, the titles and the abstracts will be screened for eligibility. The articles assessed as eligible will undergo full-text analysis. If discrepancies between the two researchers occur, a third researcher (PB or SO) will be consulted. All efforts will

Table 1 Datasheet arrangement for retrieved articles

Number	ID	DOI	Author	Title	Journal	Year	Type of article	Excluded/ included	Reason/ classification

DOI, Digital Object Identifier.

Table 2 Charting form for data collection

Title
Author
Date of publication
Journal
Type of article
Language
Classification system name, if available
Presentation and purpose of the classification
Methodology of development, if available
Methodology of validation, if available
Use in clinical practice?
Use in research?
Cited in guidelines or recommendations?
Does a similar system exist? If yes, specify.

be made to obtain full texts of the selected articles. This will include search of the web, help from the librarian of Charles University in Prague or contacting the author directly if necessary. A translator will be employed if translations of full texts are required. A flowchart of the selection process (PRISMA 2020 flow diagram) will be used in reporting the results of the study.[11]

Data collection process

A charting form will be used for the collection of relevant data from the included studies by two independent researchers (KL and JB) and will be saved in electronic form. Data collection form can be seen in table 2.

Data analysis

To critically evaluate the classifications, each classification system will be assessed by using the individual classification systems appraisal by Buchbinder *et al*,[12] which has been used previously by other authors for the evaluation of classification systems.[13 14] This system includes items covering purpose, content validity, face validity, feasibility, construct validity, reliability and generalisability.[12]

The scoring system will be applied by four independent reviewers (KL, JB, MC and PB). The answers to the questions will be scored by following rules: 'Yes' = 1, 'Partial' = 0.5, 'No', 'Don't know' and 'Not applicable' = 0. The exception for scoring is in the question: 'Are special skills, tools or training required?' (fourth category), where 'No' = 1 point and 'Yes' = 0.

The overall scores and weighted scores will be calculated, where an overall score ≤3 indicates low quality, a score of 3–5 as moderate and ≥5 as good quality respectively.

To evaluate the reliability of the appraisal system, the inter-rater reliability between the reviewers will be assessed by using Cohen's kappa.

Data presentation

The data will be presented in a summary table that will include the title of the classification, type of classification system, author's name, year of publication, type of article, language, purpose of the classification system, method of development (if available), method of validation (if available), citation in guidelines (number of citations) and Buchbinder's critical appraisal score with Cohen's kappa score.

Time frame

The whole process of the literature search, data extraction, evaluation of the classification system, writing the scoping review and submitting the review to scientific journal is planned for years 2022–2023.

Patient and public involvement

None.

ETHICS AND DISSEMINATION

The proposed scoping review aims to give the reader comprehensive information about the current state of classification systems in the vascular access field. As the review will synthesise the information from already published literature and the patients are not directly involved, the study is spared of ethical committee approval.

We would like to present a clear summary of known and less known classifications, their qualitative appraisal and their use for evidence-based medicine and clinical practice. We also aim to show gaps and possibilities for improvements via a thorough understanding of the current literature.

The extracted data will be summarised and presented in the scoping review will meet the criteria of the PRISMA-ScR statement checklist[10] and submitted for publication in a scientific journal.

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Contributors The protocol was designed by KL, SO, MC and PW. Draft of the manuscript was written and revised by KL, MC and SO. Review and a final approval of the manuscript was done by all authors: KL, JB, SO, MC, PW and PB.

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Competing interests PB is the lead author and SO and KL are coauthors of the AVAS (Arterio Venous Access Stage) classification system.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

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REFERENCES

1 Hancock A. Best practice guidelines for developing international statistical classifications. *Expert Group Meeting on International Statistical Classifications*; 13-15 May 2013, New York, 2013:1–19.
2 Archie JW. *Society of systematic biologists a new look at the predictive value of numerical classifications*. . Taylor & Francis, Ltd. for the Society of Systematic Biologists Stable, 2016: 33. 30–51. http://www.jstor.org/stable/24131
3 Oprita B, Aignatoaie B, Gabor-Postole DA. Scores and scales used in emergency medicine. practicability in toxicology. *J Med Life* 2014;7 Spec No. 3:4–7.
4 Jager KJ, Kovesdy C, Langham R, *et al*. A single number for advocacy and communication-worldwide more than 850 million individuals have kidney diseases. *Kidney Int* 2019;96:1048–50.
5 Woo K-T, Choong HL, Wong K-S, *et al*. The contribution of chronic kidney disease to the global burden of major noncommunicable diseases. *Kidney Int* 2012;81:1044–5.
6 Neuen BL, Chadban SJ, Demaio AR, *et al*. Chronic kidney disease and the global NCDS agenda. *BMJ Glob Health* 2017;2:e000380–5.
7 Jager KJ, Fraser SDS. The ascending rank of chronic kidney disease in the global burden of disease study. *Nephrol Dial Transplant* 2017;32:ii121–8.
8 Bello AK, Okpechi IG, Osman MA, *et al*. Epidemiology of haemodialysis outcomes. *Nat Rev Nephrol* 2022;18:378–95.
9 Aromataris E, Munn Z (Editors). *JBI manual for evidence synthesis, JBI*, 2020. https://synthesismanual.jbi.global
10 Tricco AC, Lillie E, Zarin W, *et al*. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. *Ann Intern Med* 2018;169:467–73.
11 Page MJ, McKenzie JE, Bossuyt PM, *et al*. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *Syst Rev* 2021;10:89.
12 Buchbinder R, Goel V, Bombardier C, *et al*. Classification systems of soft tissue disorders of the neck and upper limb: do they satisfy methodological guidelines? *J Clin Epidemiol* 1996;49:141–9.
13 Lam KN, Rushton A, Thoomes E, *et al*. Neck pain with radiculopathy: a systematic review of classification systems. *Musculoskelet Sci Pract* 2021;54:102389.
14 Stynes S, Konstantinou K, Dunn KM. Classification of patients with low back-related leg pain: a systematic review. *BMC Musculoskelet Disord* 2016;17:226.

Search strategy

	Database or Registry	Scopus	Web of Science	PubMed	Google Scholar	Clinical Trials Registry
Step 1	Search	Documents	Documents	Not Applicable	Not Applicable	Other terms
Step 2	Search within	Article title, Abstract, Keywords	All Fields	Not Applicable	Not Applicable	Study type and study results: All studies
Step 3	Filters	None				
Step 4	MeSh Terms	((*classification* OR (*classification* AND *system*) OR *score* OR *categorisation*) AND ((*arteriovenous* AND *fistula*) OR (*arteriovenous* AND *shunt*) OR (*arteriovenous* AND *access*) OR (*arteriovenous* AND *graft*) OR (*dialysis* AND *catheter*) OR (*vascular* AND *access*) OR *permcath* OR (*central* AND *venous* AND *catheter*)) AND (*dialysis* OR *haemodialysis* OR (*renal* AND *replacement* AND *therapy*)))				((*classification* OR *score* OR *categorisation*) AND ((*arteriovenous* AND *access*) OR (*dialysis* AND *catheter*) OR (*vascular* AND *access*) OR (*central* AND *venous* AND *catheter*)) AND (*dialysis* OR *haemodialysis* OR (*renal* AND *replacement* AND *therapy*)))
Step 5	Download all articles in csv.form					
Step 6	Elimination of duplicities and export into excel datasheet via software R version 4.2.1.					
Step 7	Manual search and selection of final articles					
Step 8	Manual search in the reference list					