



Methods to unclog nasogastric and nasoenteric catheters: a scoping review

Métodos de desobstrução de cateteres nasogástricos e nasoenterais: uma revisão de escopo

Métodos para la limpieza de catéteres nasogástricos y nasoentéricos: una revisión exploratoria

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ABSTRACT

Objective: To map scientific evidence on methods for unclogging nasoenteric and nasogastric feeding tubes used in enteral nutrition. **Methodology:** This scoping review was conducted according to the JBI manual and reported using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews checklist. The research question followed the Population, Concept and Context strategy, considering individuals receiving enteral nutrition, methods for unclogging nasoenteric and nasogastric tubes, and any care setting. Searches were performed in databases and grey literature, without language or time restrictions, up to June 9, 2025. **Results:** Ten studies were included. The methods identified involved warm-water irrigation, enzymatic solutions, mechanical devices and alternative substances. Warm water was described as an initial, low-cost and accessible approach; however, it was less effective for complex obstructions when compared with mechanical devices and some enzymatic protocols. Soft drinks, acidic juices and meat tenderizer were ineffective or lacked sufficient support regarding safety and efficacy. **Final thoughts:** The mapped evidence indicates that unclogging should prioritize safe and standardized measures, beginning with warm-water irrigation and progressing, when necessary, to enzymatic protocols or institutionally validated mechanical devices.

DESCRIPTORS:

Enteral Nutrition; Nursing Care; Catheter Obstruction.

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RESUMO

Objetivo: Mapear evidências científicas sobre métodos de desobstrução de cateteres nasoenterais e nasogástricos utilizados na nutrição enteral. **Metodologia:** Revisão de escopo conduzida conforme o manual do JBI e relatada de acordo com o checklist *Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews*. A questão de pesquisa foi estruturada pela estratégia Participante, Conceito e Contexto, considerando indivíduos em nutrição enteral, métodos de desobstrução de cateteres nasoenterais e nasogástricos e qualquer cenário assistencial. As buscas foram realizadas em bases de dados e literatura cinzenta, sem restrição de idioma ou recorte temporal, até 9 de junho de 2025. **Resultados:** Foram incluídos 10 estudos. Os métodos identificados envolveram irrigação com água morna, soluções enzimáticas, dispositivos mecânicos e substâncias alternativas. A água morna foi descrita como abordagem inicial, de baixo custo e fácil acesso; entretanto, apresentou menor eficácia em obstruções complexas quando comparada a dispositivos mecânicos e a alguns protocolos enzimáticos. Refrigerantes, sucos ácidos e amaciantes de carne mostraram-se ineficazes ou sem suporte suficiente de segurança e eficácia. **Considerações finais:** As evidências mapeadas indicam que a desobstrução deve priorizar medidas seguras e padronizadas, iniciando-se por irrigação com água morna e progredindo, quando necessário, para protocolos enzimáticos ou dispositivos mecânicos institucionalmente validados.

DESCRIPTORES:

Nutrição Enteral; Cuidados de Enfermagem; Obstrução do Cateter.

RESUMEN

Objetivo: Mapear evidencias científicas sobre métodos de desobstrucción de sondas nasoentéricas y nasogástricas utilizadas en la nutrición enteral. **Metodología:** Revisión de alcance realizada conforme al manual del JBI y reportada de acuerdo con la lista *Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews*. La pregunta de investigación se estructuró mediante la estrategia Participante, Concepto y Contexto, considerando individuos en nutrición enteral, métodos de desobstrucción de sondas nasoentéricas y nasogástricas, y cualquier escenario asistencial. Las búsquedas se realizaron en bases de datos y literatura gris, sin restricción de idioma ni recorte temporal, hasta el 9 de junio de 2025. **Resultados:** Se incluyeron 10 estudios. Los métodos identificados incluyeron irrigación con agua tibia, soluciones enzimáticas, dispositivos mecánicos y sustancias alternativas. El agua tibia se describió como un abordaje inicial, de bajo costo y fácil acceso; sin embargo, presentó menor eficacia en obstrucciones complejas en comparación con dispositivos mecánicos y algunos protocolos enzimáticos. Refrescos, jugos ácidos y ablandadores de carne fueron ineficaces o carecieron de soporte suficiente sobre seguridad y eficacia. **Consideraciones finales:** Las evidencias mapeadas indican que la desobstrucción debe priorizar medidas seguras y estandarizadas, iniciando con irrigación con agua tibia y avanzando, cuando sea necesario, hacia protocolos enzimáticos o dispositivos mecánicos validados institucionalmente.

DESCRIPTORES:

Nutrición Enteral; Atención de Enfermería; Obstrucción del Catéter.

INTRODUCTION

Enteral nutrition therapy is a widely used strategy in clinical practice to maintain or restore the nutritional status of patients unable to meet their nutritional needs orally. Its use can aid in surgical preparation, wound healing, immune response, and functional status, while also reducing care-related risks and hospital length of stay⁽¹⁾. The nursing team plays a central role in this process, participating in

the placement, maintenance, and monitoring of catheters, as well as the administration of the enteral formula, hydration, and medications, and the early identification of device-related complications⁽²⁾.

A two-year study evaluated the incidence of obstructions in 12-French Dobhoff-type nasoenteric catheters using records from a private hospital in southeastern Brazil. The study found that the obstruction rate within 40 days of catheter insertion was 4%; however, when considering the entire two-year study period, this figure doubled to 8%⁽³⁾.

Research involving 306 patients in Spanish hospitals demonstrated that failing to flush the catheter before and after administering enteral formula or medications increases the risk of obstruction⁽⁴⁾. This complication is particularly associated with difficulties in reconstituting solid medications, a lack of standardized preparation procedures, insufficient or omitted flushing between medication doses, and even a lack of staff knowledge regarding proper device management⁽⁵⁾.

According to ASPEN (American Society for Parenteral and Enteral Nutrition), methods for clearing obstructed catheters include using warm water with 30–60 mL syringes and gentle back-and-forth movements; riskier mechanical methods involving brushes inserted into the catheter lumen; and commercial mixtures that are less commonly available in healthcare settings, such as pancreatic enzyme solutions⁽⁶⁾. In this context, understanding methods for clearing enteral catheters is essential; although scientific literature on the subject is limited, these methods serve as important tools that inform and support healthcare professionals in clinical practice.

Given the variability of approaches used in clinical practice, it is important to map the available evidence regarding methods for clearing nasogastric and nasoenteric tube obstructions. This synthesis can support nursing staff decision-making, inform institutional protocols, and identify gaps for future research.

OBJECTIVE

To map scientific evidence regarding methods for clearing nasoenteric and nasogastric catheters used in enteral nutrition.

METHODOLOGY

Type of study

A scoping review methodology was adopted, as recommended by the JBI manual, because it allows for the mapping of concepts, types of evidence, knowledge gaps, and the extent of available literature regarding a specific health phenomenon⁽⁷⁾.

To ensure the quality of the review report, the study was conducted in accordance with the recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR)⁽⁸⁾. The included studies were classified by level of evidence based

on the following hierarchy: level 1, systematic review or meta-analysis of randomized clinical trials; level 2, randomized clinical trials; level 3, non-randomized clinical trials; level 4, cohort and case-control studies; level 5, systematic review of descriptive and qualitative studies; level 6, descriptive or qualitative study; and level 7, expert opinion⁽⁹⁾.

Creation of the research question

The research question was formulated based on the Participants, Concept, and Context (PCC) strategy. Participants were individuals receiving enteral nutrition via nasogastric or nasogastric tubes; the Concept referred to the methods or procedures used to clear obstructions in these tubes; and the Context encompassed any care setting, including hospitals, outpatient clinics, primary care, health services, and home care.

Thus, the following research question was developed: "What scientific evidence is available regarding methods for clearing obstructions in nasogastric and nasogastric tubes in individuals receiving enteral nutrition?"

Data collection

Studies were selected up to June 9, 2025, with no restriction on the start date. This decision was made due to the scarcity of publications on the topic and the objective of the scoping review, which is to map the extent of available literature, including older studies still cited in clinical practice and institutional protocols.

A preliminary one-week search was conducted in MEDLINE and the Cochrane Database of Systematic Reviews, following JBI Evidence Synthesis recommendations; no protocols, scoping reviews, or systematic reviews addressing the proposed question were identified as being in progress. The review was not registered on a specific platform, given that registration for scoping reviews is not mandatory and no similar protocol in progress was found.

The search strategies were developed in consultation with a specialized librarian; the main descriptors, obtained using the Health Science Descriptors (DeCS)/Medical Subject Headings (MeSH), were adapted for all databases used, as shown in Table 1.

Table 1. Arrangement of descriptors for article searches in the databases.

Database	Search strategy
Medline / PubMed	("Enteral Nutrition"[MeSH Terms] OR "Enteral Nutrition"[Title/Abstract] OR "Tube Feeding"[Title/Abstract] OR "enteral feeding*"[Title/Abstract] OR "feeding tube*"[Title/Abstract] OR "force feeding*"[Title/Abstract] OR "intubation, gastrointestinal"[MeSH Terms] OR "gastrointestinal intubation*"[All Fields] OR "nasogastric"[Text Word] OR "Nasoenteral"[Text Word] OR "nasoenteric"[Text Word]) AND (((("Catheters"[MeSH Terms:noexp] OR "Catheter"[Title/Abstract] OR "Catheters"[Title/Abstract] OR "tube*"[Title/Abstract] OR "cannula*"[Title/Abstract]) AND ("obstruct*"[Title/Abstract] OR "blockage"[Title/Abstract] OR "clog"[Title/Abstract] OR "clogs"[Title/Abstract] OR "clogging*"[Title/Abstract] OR "unclog*"[Title/Abstract])) OR "Catheter Obstruction"[MeSH Terms] OR "Catheter Obstruction"[Title/Abstract:~5] OR "Catheter Obstructions"[Title/Abstract:~5]) AND ("Patient Care Management"[MeSH Terms:noexp] OR "manag*"[Title/Abstract] OR "treatment*"[Title/Abstract] OR "mechanism*"[Title/Abstract] OR "conduct*"[Title/Abstract] OR "procedure*"[Title/Abstract] OR "technique*"[Title/Abstract] OR "technic*"[Title/Abstract] OR "intervention*"[Title/Abstract] OR "guideline*"[Title/Abstract] OR "protocol*"[Title/Abstract])
Embase	('enteric feeding'/exp OR 'enteral nutrition':ti,ab,kw OR 'tube feeding':ti,ab,kw OR 'enteral feeding*':ti,ab,kw OR 'feeding tube*':ti,ab,kw OR 'force feeding*':ti,ab,kw OR 'digestive tract intubation'/exp OR 'gastrointestinal intubation*' OR 'nasogastric':ti,ab,kw,de,dn,df,mn,tn OR 'nasoenteral':ti,ab,kw,de,dn,df,mn,tn OR 'nasoenteric':ti,ab,kw,de,dn,df,mn,tn) AND (('catheter'/de OR 'catheter':ti,ab,kw OR 'catheters':ti,ab,kw OR 'tube*':ti,ab,kw OR 'cannula*':ti,ab,kw) AND ('obstruct*':ti,ab,kw OR 'blockage':ti,ab,kw OR 'clog':ti,ab,kw OR 'clogs':ti,ab,kw OR 'clogging*':ti,ab,kw OR 'unclog*':ti,ab,kw) OR 'catheter occlusion'/exp OR (('catheter' NEAR/6 'obstruction'):ti,ab,kw) OR (('catheter' NEAR/6 'obstructions'):ti,ab,kw)) AND ('patient care'/de OR 'manag*':ti,ab,kw OR 'treatment*':ti,ab,kw OR 'mechanism*':ti,ab,kw OR 'conduct*':ti,ab,kw OR 'procedure*':ti,ab,kw OR 'technique*':ti,ab,kw OR 'technic*':ti,ab,kw OR 'intervention*':ti,ab,kw OR 'guideline*':ti,ab,kw OR 'protocol*':ti,ab,kw) AND [embase]/lim NOT ([embase]/lim AND [medline]/lim)
Scopus	TITLE-ABS-KEY("Enteral Nutrition" OR "Tube Feeding" OR "Enteral Feeding*" OR "Feeding Tube*" OR "Force Feeding*" OR "Gastrointestinal Intubation*" OR nasogastric OR Nasoenteral OR nasoenteric) AND TITLE-ABS-KEY(((Catheter OR Catheters OR tube* OR Cannula*) AND (Obstruct* OR blockage OR clog OR clogs OR clogging* OR unclog*))) AND TITLE-ABS((Patient W/5 manage*) OR treatment OR treatments OR mechanism OR mechanisms OR conduct OR procedure OR procedures OR Technique OR Technic OR techniques OR Technics OR Intervention OR Interventions OR Guideline OR Guidelines OR Protocol OR Protocols)
Web of Science	TS=("Enteral Nutrition" OR "Tube Feeding" OR "Enteral Feeding*" OR "Feeding Tube*" OR "Force Feeding*" OR "Gastrointestinal Intubation*" OR nasogastric OR Nasoenteral OR nasoenteric) AND TS=(((Catheter OR Catheters OR tube* OR Cannula*) AND (Obstruct* OR blockage OR clog OR clogs OR clogging* OR unclog*))) AND TS=(((Patient NEAR/5 manage*) OR treatment OR treatments OR mechanism OR mechanisms OR conduct OR procedure OR procedures OR Technique OR Technic OR techniques OR Technics OR Intervention OR Interventions OR Guideline OR Guidelines OR Protocol OR Protocols))
Cochrane Library	([mh "Enteral Nutrition"] OR "Enteral Nutrition":ti,ab,kw OR "Tube Feeding":ti,ab,kw OR ("Enteral" NEXT Feeding*):ti,ab,kw OR ("Feeding" NEXT Tube*):ti,ab,kw OR ("Force" NEXT Feeding*):ti,ab,kw OR [mh "Intubation, Gastrointestinal"] OR ("Gastrointestinal" NEXT Intubation*) OR nasogastric:ti,ab,kw OR Nasoenteral:ti,ab,kw OR nasoenteric:ti,ab,kw) AND ((([mh ^Catheters] OR Catheter:ti,ab,kw OR Catheters:ti,ab,kw OR tube*:ti,ab,kw OR Cannula*:ti,ab,kw) AND (Obstruct*:ti,ab,kw OR blockage:ti,ab,kw OR clog:ti,ab,kw OR clogs:ti,ab,kw OR clogging*:ti,ab,kw OR unclog*:ti,ab,kw)) OR [mh "Catheter Obstruction"]) AND ([mh ^"Patient Care Management"] OR manage*:ti,ab OR treatment*:ti,ab OR mechanism*:ti,ab OR conduct*:ti,ab OR procedure*:ti,ab OR Technique*:ti,ab OR Technic*:ti,ab OR Intervention*:ti,ab OR Guideline*:ti,ab OR Protocol*:ti,ab)

LILACS	("Enteral Nutrition" OR "Tube Feeding" OR "Enteral Feeding" OR "Feeding Tube" OR "Feeding Tubes" OR "Force Feeding" OR "Gastrointestinal Intubation" OR nasogastric OR nasoenteral OR nasoenteric OR "Nutrição Enteral" OR "Alimentação Enteral" OR "Alimentação Forçada" OR "alimentação por sonda" OR "alimentação por tubo" OR "sondas gástricas" OR "sondas de alimentação gástrica" OR "nutrición enteral" OR "alimentación enteral" OR "alimentación forzada" OR "alimentación por sonda" OR "alimentación por tubo" OR "sondas gástricas" OR "nutrição enteral" OR "alimentação enteral" OR "alimentação forçada" OR "Alimentação por Sonda" OR "Alimentação por Tubo" OR "Sondas Gástricas" OR "Sondas de Alimentação Gástrica" OR "Nutrición Enteral" OR "Alimentación Enteral" OR "Alimentación Forzada" OR "Alimentación por Sonda" OR "Alimentación por Tubo" OR "Sondas Gástricas" OR "Intubación Gastrointestinal" OR "Intubación Nasogástrica") AND (((catheter OR catheters OR tube OR tubes OR cannula OR cannulas) AND (obstruction OR blockage OR clog OR clogs OR clogging OR unclogging)) OR "Obstrução do Cateter" OR "Obstrucción del Catéter") AND ("Patient Care Management" OR treatment OR treatments OR mechanism OR mechanisms OR conduct OR procedure OR procedures OR technique OR technic OR techniques OR technics OR intervention OR interventions OR guideline OR guidelines OR protocol OR protocols OR "Administração dos Cuidados ao Paciente" OR "Manejo de Atención al Paciente" OR "gestión de la atención al paciente" OR manejo OR conduta OR estratégia OR guias OR diretivas OR diretrizes OR protocolo OR protocolos OR directivas OR directrices) AND db:("LILACS") AND instance:"regional"
BDENF	("Enteral Nutrition" OR "Tube Feeding" OR "Enteral Feeding" OR "Feeding Tube" OR "Feeding Tubes" OR "Force Feeding" OR "Gastrointestinal Intubation" OR nasogastric OR nasoenteral OR nasoenteric OR "Nutrição Enteral" OR "Alimentação Enteral" OR "Alimentação Forçada" OR "alimentação por sonda" OR "alimentação por tubo" OR "sondas gástricas" OR "sondas de alimentação gástrica" OR "nutrición enteral" OR "alimentación enteral" OR "alimentación forzada" OR "alimentación por sonda" OR "alimentación por tubo" OR "sondas gástricas" OR "nutrição enteral" OR "alimentação enteral" OR "alimentação forçada" OR "Alimentação por Sonda" OR "Alimentação por Tubo" OR "Sondas Gástricas" OR "Sondas de Alimentação Gástrica" OR "Nutrición Enteral" OR "Alimentación Enteral" OR "Alimentación Forzada" OR "Alimentación por Sonda" OR "Alimentación por Tubo" OR "Sondas Gástricas" OR "Intubación Gastrointestinal" OR "Intubación Nasogástrica") AND (((catheter OR catheters OR tube OR tubes OR cannula OR cannulas) AND (obstruction OR blockage OR clog OR clogs OR clogging OR unclogging)) OR "Obstrução do Cateter" OR "Obstrucción del Catéter") AND ("Patient Care Management" OR treatment OR treatments OR mechanism OR mechanisms OR conduct OR procedure OR procedures OR technique OR technic OR techniques OR technics OR intervention OR interventions OR guideline OR guidelines OR protocol OR protocols OR "Administração dos Cuidados ao Paciente" OR "Manejo de Atención al Paciente" OR "gestión de la atención al paciente" OR manejo OR conduta OR estratégia OR guias OR diretivas OR diretrizes OR protocolo OR protocolos OR directivas OR directrices) AND db:("BDENF") AND instance:"regional"
Scielo	("Enteral Nutrition" OR "Tube Feeding" OR "Enteral Feeding" OR "Feeding Tube" OR "Feeding Tubes" OR "Force Feeding" OR "Gastrointestinal Intubation" OR nasogastric OR nasoenteral OR nasoenteric OR "Nutrição Enteral" OR "Alimentação Enteral" OR "Alimentação Forçada" OR "alimentação por sonda" OR "alimentação por tubo" OR "sondas gástricas" OR "sondas de alimentação gástrica" OR "nutrición enteral" OR "alimentación enteral" OR "alimentación forzada" OR "alimentación por sonda" OR "alimentación por tubo" OR "sondas gástricas" OR "nutrição enteral" OR "alimentação enteral" OR "alimentação forçada" OR "Alimentação por Sonda" OR "Alimentação por Tubo" OR "Sondas Gástricas" OR "Sondas de Alimentação Gástrica" OR "Nutrición Enteral" OR "Alimentación Enteral" OR "Alimentación Forzada" OR "Alimentación por Sonda" OR "Alimentación por Tubo" OR "Sondas Gástricas" OR "Intubación Gastrointestinal" OR "Intubación Nasogástrica") AND (((catheter OR catheters OR tube OR tubes OR cannula OR cannulas) AND (obstruction OR blockage OR clog OR clogs OR clogging OR unclogging)) OR "Obstrução do Cateter" OR "Obstrucción del Catéter") AND ("Patient Care Management" OR treatment OR treatments OR mechanism OR mechanisms OR conduct OR procedure OR procedures OR technique OR technic OR techniques OR technics OR intervention OR interventions OR guideline OR guidelines OR protocol OR protocols OR "Administração dos Cuidados ao Paciente" OR "Manejo de Atención al Paciente" OR "gestión de la atención al paciente" OR manejo OR conduta OR estratégia OR guias OR diretivas OR diretrizes OR protocolo OR protocolos OR directivas OR directrices)

ProQuest Dissertations & Theses Citation Index	TS=("Enteral Nutrition" OR "Tube Feeding" OR "Enteral Feeding*" OR "Feeding Tube*" OR "Force Feeding*" OR "Gastrointestinal Intubation*" OR nasogastric OR Nasoenteral OR nasoenteric) AND TS=(((Catheter OR Catheters OR tube* OR Cannula*) AND (Obstruct* OR blockage OR clog OR clogs OR clogging* OR unclog*))) AND TS=(((Patient NEAR/5 manage*) OR treatment OR treatments OR mechanism OR mechanisms OR conduct OR procedure OR procedures OR Technique OR Technic OR techniques OR Technics OR Intervention OR Interventions OR Guideline OR Guidelines OR Protocol OR Protocols))
Google Scholar	("Enteral Nutrition" OR "Tube Feeding" OR "Enteral Feeding" OR "Feeding Tube" OR nasogastric OR nasoenteral OR "Nutrição Enteral" OR "Alimentação Enteral" OR "alimentação por sonda" OR "nutrición enteral" OR "alimentación por tubo" OR "Intubación Gastrointestinal") AND ("Catheter Obstruction" OR "Obstrução do Cateter" OR "Obstrucción del Catéter") AND ("Patient Care Management" OR treatment OR mechanism OR procedure OR technique OR intervention OR guideline OR protocol OR "Manejo de Atención al Paciente" OR manejo OR conduta OR diretrizes OR protocolo)

Studies were selected using Rayyan® software (Qatar Computing Research Institute, Doha, Qatar), an online platform used for managing reviews. Screening was initially conducted by two reviewers independently, based on titles and abstracts; a third reviewer was consulted in the event of disagreements. After removing duplicates and excluding records that did not align with the study objective, potentially eligible studies were evaluated in full⁽¹⁰⁾.

Data extraction was performed using an instrument adapted from nursing researchers, covering the following⁽¹¹⁾: study identification; year of publication; city, state, and country; database; language; study design; population/sample; implementation setting; clearance method; main results; and level of evidence.

Studies conducted in any care setting—such as hospitals, homes, outpatient clinics, primary care, health services, or laboratory environments focused on catheter obstruction simulation—were included. Full-text documents published up to June 9, 2025, were considered, with no restrictions regarding language or sample size.

Regarding the approach, the inclusion criteria encompassed qualitative, quantitative, and mixed-methods studies; experimental and observational studies; reviews; guidelines; books; meta-analyses; primary studies; expert opinions; and published protocols. No age-group restrictions were applied, in order to broaden the scope of the mapping, given that catheter obstruction can occur across various age groups receiving enteral nutrition.

Studies without content aligned with the research objective, materials containing only an abstract, illegible information, studies outside the scope of the research, or those employing inadequate or incongruent methods.

The extracted information was organized into a summary table containing: authors, title, year, city, state, and country of development, database, language, sample size, implementation setting,

clearance method, main results, and level of evidence. The data were compiled in Microsoft Excel 2019 and presented using a flowchart, tables, and figures.

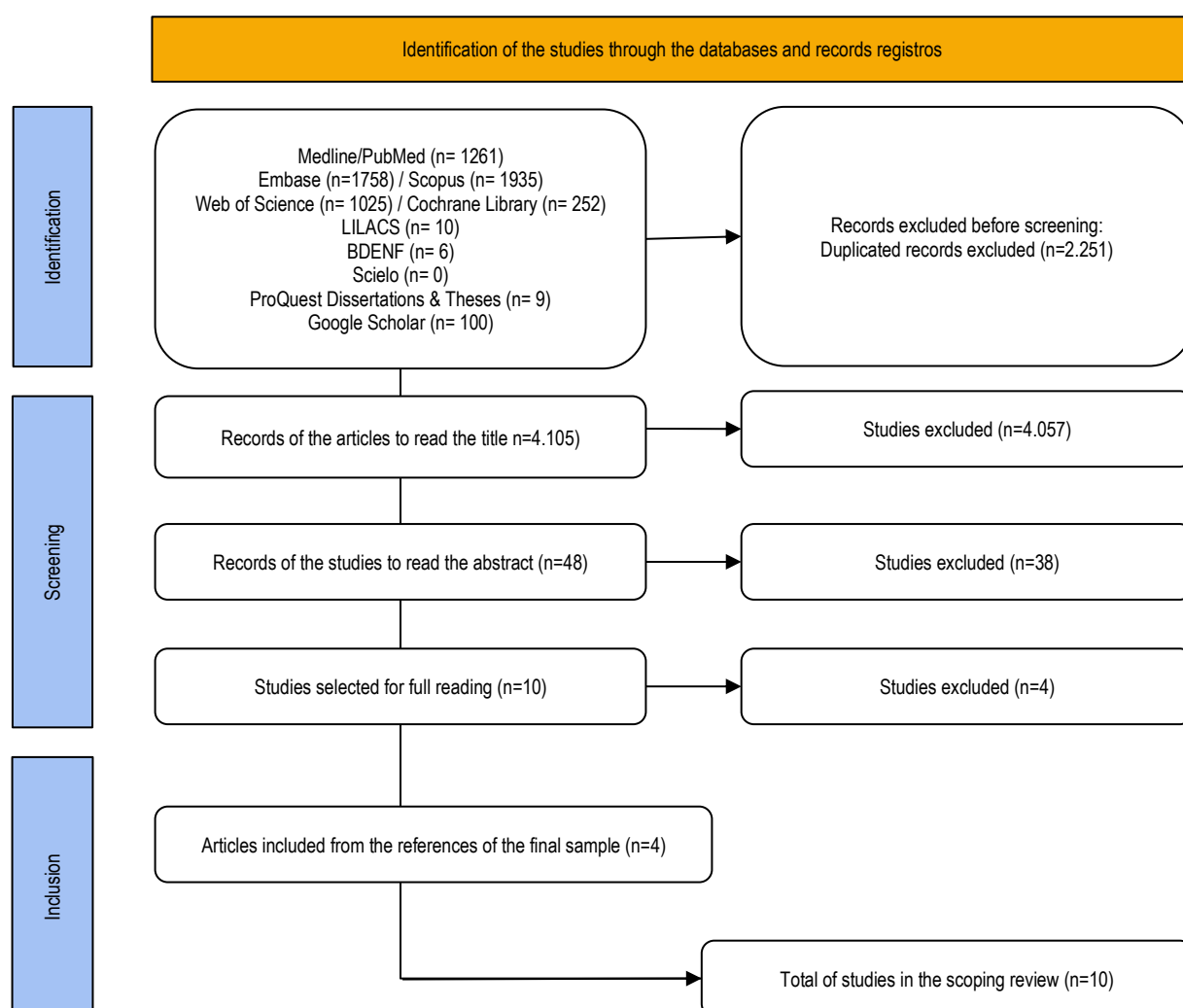
Ethical aspects

Since the study is based on data already published in the literature, review by a research ethics committee was not required. However, it was conducted with scientific and professional rigor and seriousness.

RESULTS

The search strategy identified 6,356 records, 6,256 from databases and repositories and 100 from Google Scholar, taking into account the platform's automated ranking, the high volume of non-specific results retrieved, and the need to ensure feasibility and transparency regarding grey literature. Additionally, four studies were identified through a manual search of the references of articles assessed in full text. At the end of the selection process, 10 studies comprised the corpus of this scoping review.

Figure 1. PRISMA-ScR flow diagram.



After removing 2,251 duplicate records, 4,105 records underwent title screening, of which 4,057 were excluded for failing to meet inclusion criteria. Subsequently, 48 studies were evaluated by abstract, and 38 were excluded. Ten studies were evaluated in full; four were excluded due to incompatibility with eligibility criteria, resulting in six studies included from the database search. A manual search of references added four studies, bringing the total to 10 included studies.

Chart 1 presents the characteristics of the 10 included studies, covering authors, title, year, database, country/language, sample size, implementation setting, clearance method, main results, and level of evidence. Location information was also recorded when available in the original study; in cases where the city and state were not reported, the abbreviation “NI” was used.

Regarding the temporal distribution of the included studies, a concentration of publications was observed in 1989 and 1990, with two studies in each year, followed by a long interval with no eligible publications until 2013. After that period, publications were identified in 2013, 2014, 2016, and 2018, highlighting a lack of continuity in scientific output on the subject (Figure 2).

Figure 2. Temporal distribution of included studies

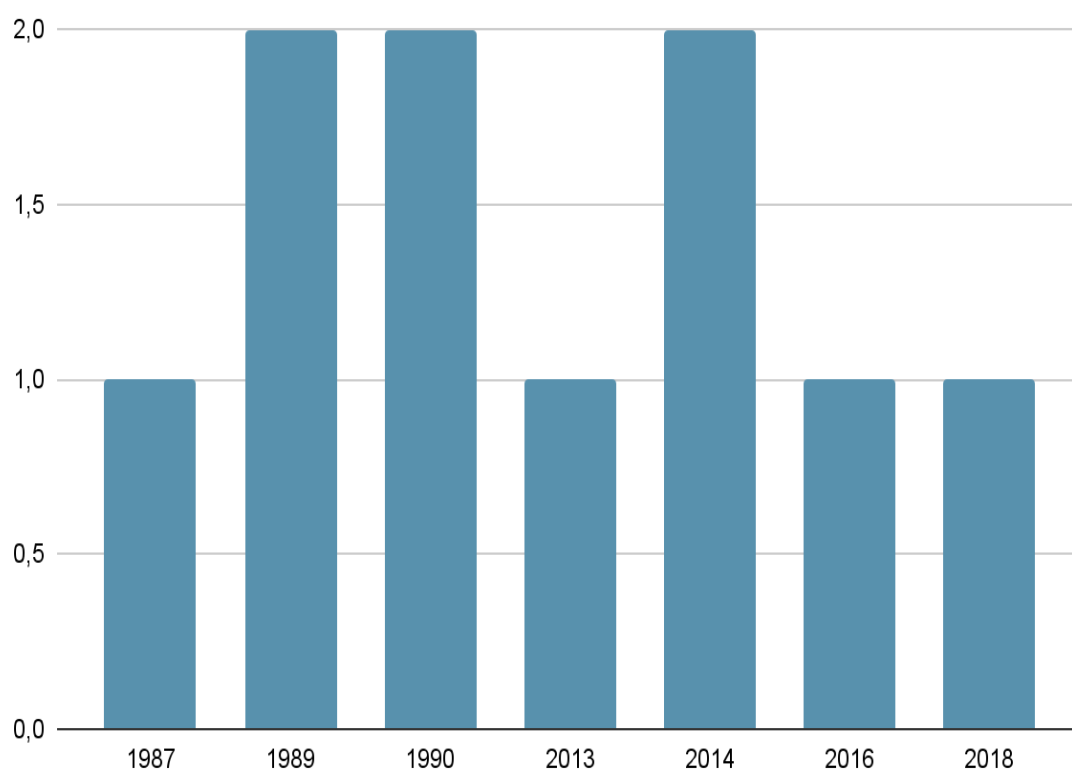


Chart 1. Description of the studies included in the scoping review. 1. Description of the studies included in the scoping review.

Authors/ Title	Database/ Year	Country/ Language	Sample amount	Implementation scenario	Unblocking method	Main results	Level
Marcason W. What is the protocol used to unclog an enteral feeding tube? ⁽¹²⁾	PubMed 2013	USA English	NS	Hospitals and Clinical Services	- Instillation of 5 mL of warm water near the site of the blockage + back-and-forth movement using a 30–50 mL syringe - Use of commercial mechanical devices for clearing the obstruction - Pancreatic enzymes in new formulations and delivery systems - Papain, bromelain, and chymotrypsin are cited as having been used historically	- Warm water, used with the proper technique, remains the safest and most recommended method. - There is no robust evidence that enzymes or other solutions are superior to water. - Well-conducted clinical trials are needed to evaluate the safety and efficacy of new commercial products. - Prevention through regular irrigation and appropriate technique is the best method to avoid blockages.	7
Garrison C. Enteral Feeding Tube Clogging: What Are the Causes and What Are the Answers? A Bench Top Analysis ⁽¹³⁾	PubMed 2018	USA English	45 simulated in vitro obstructions: - Three clog formulations (I, II, III) were tested in 8 Fr tubes, with 5 replicates per treatment group: 3 treatments × 3 clog types × 5 tubes = 45 tubes.	Experimental laboratory using an anatomical model that simulates upper digestive anatomy. Use of small-bore tubes (8 Fr, 107 cm) with clogs simulated using tofu (coagulated protein) and aspirin (crushed medication).	- Warm water flush (60 mL via syringe at 27°C–43°C for 5 min + 20-min dwell time, if necessary) - Commercial enzymatic treatment (Clog Zapper®, Corpak Medsystems, with an action time of up to 1 hour) - Actuated mechanical device (TubeClear®, Actuated Medical, with internal movement that breaks up the clog)	- The mechanical device had the highest success rate (93%), followed by enzymatic treatment (33%) and warm water (20%) ($p < 0.005$). - The device was also the fastest, requiring the least total time and the least active nursing time. - Dried protein clogs were the most difficult to remove, highlighting the importance of not allowing residues to dry. - The device was effective even against the most difficult clogs (Type III), whereas the other methods failed.	6
Bagwell R. Aippersbach S. Becker N. Dillon D., Mulvihill M. The TubeClear® System - On the market for clearing clogged feeding tubes - and evaluating increasingly challenging tubes in the body: SBIR funded medical device platform ⁽¹⁴⁾	PubMed 2016	USA English	Benchtop: 30 tests using 14 Fr Levin tubes; Clinical: report on use in a case series over 11 months involving an unspecified number of patients, all of whom were adults.	Laboratory (benchtop test) and clinical environment (hospital bed, ICU – e.g., Walter Reed National Military Medical Center)	- TubeClear® mechanical device: an electronically driven flexible shaft (Clearing Stem) that moves inside the tube to break up obstructing material while the tube remains in the patient.	- Benchtop: 100% success in 2.8 minutes (medication and formula); better performance than warm water (86.7%) and enzymes (93–100%). - Clinical: 100% patency restored in an average of 14 minutes, with no adverse events reported.	6

Bommarito A, Heinzmann M, Boysen D. A New Approach to the Management of Obstructed Enteral Feeding Tubes ⁽¹⁵⁾	PubMed 1989	USA English	NS	Hospital	- "Intro-Reducer" device inserted into the catheter lumen with hot water irrigation and, in more difficult cases, enzymatic solution with intermittent irrigation; includes mechanical back-and-forth maneuvers to clear the obstruction.	- An effective method for clearing obstructed tubes, reducing costs associated with tube replacement and preventing interruptions to enteral nutrition. Safe use demonstrated in vitro and in vivo, including in pediatric patients.	6
Ficher C. Blalock B. Clogged Feeding Tubes: A Clinician's Thorm ⁽¹⁶⁾	PubMed Scopus 2014	USA English	NS	Hospital, home, and outpatient settings; the article discusses strategies based on clinical experience and institutional guidelines.	- Flushing with warm water using a 30–60 mL syringe and a push-pull motion - Use of pancreatic enzymes (Viokase + sodium bicarbonate + water) - Commercial products: Clog Zapper™, Bard Brush, Bionix Declogger, TubeClear® - Use of soft drinks, juice, and meat tenderizer is contraindicated.	- Warm water is the first line of treatment. - Enzymes such as Viokase are effective but require a prescription. - Products like Clog Zapper are accessible for home use; TubeClear is promising but restricted to institutional use. - Popular methods (soft drinks, juice) are ineffective or unsafe.	7
Stumpf J, Kurian R, Vuong J, Dang K, Kraft M. Efficacy of a Creon Delayed-Release Pancreatic Enzyme Protocol for Clearing Occluded Enteral Feeding Tubes ⁽¹⁷⁾	PubMed 2014	USA English	83 patients with 115 evaluable cases of tube obstruction; the analysis excluded mechanical causes and cases lacking documentation, resulting in 110 cases effectively evaluated.	University Hospital	- Protocol: 1 Creon capsule (12,000 U lipase, 38,000 U protease, and 60,000 U amylase) opened and mixed with 1 sodium bicarbonate tablet (650 mg) dissolved in 5–10 mL of warm sterile water. Instillation into the tube with a dwell time of 5–15 minutes, followed by flushing.	- 48.2% success rate in unblocking tubes (53 out of 110 non-mechanical cases). - Lower efficiency than the Viokase protocol (95.8%). - Higher Creon dosage indicated a higher success rate (20% to 67%), but without statistical significance. - No documented adverse events.	6
Nicholson L. Declogging Small-Bore Feeding Tubes ⁽¹⁸⁾	PubMed 1987	USA English	41 enteral formula-filled tubes placed in an incubator at 27°C	Pharmaceutical laboratory in a controlled environment	- 9 substances: Viokase, Pancrease, porcine pancreatin, bromelain, papain, chymotrypsin, cranberry juice, Coca-Cola, and distilled water. Application of 1 cc of the substance with irrigation every 30 minutes for up to 4 hours, or a final attempt using an air-filled syringe.	- No substance was able to clear the tubes using pressure irrigation (900 mm) within 4 hours. Chymotrypsin, papain, and distilled water allowed for syringe irrigation after 4 hours (in 3/3, 2/3, and 1/3 of cases, respectively). Acidic substances (Coca-Cola, cranberry juice) were ineffective.	6

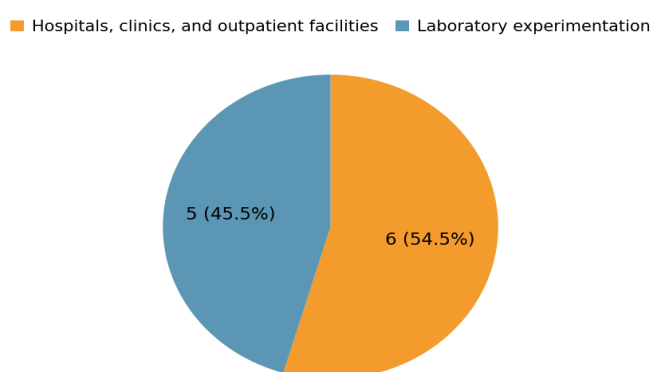
Bommarito A. Boysen D. Heinzelman M. Unclogging Feeding Tubes with Pancreatic Enzyme ⁽¹⁹⁾	PubMed 1990	USA English	There is no formal experimental design involving a clinical sample.	Simple laboratory tests simulating tube obstruction using dry Ensure Plus HN (no use on patients).	- Adolph's meat tenderizer - Enzymatic solution (pancreatin with bicarbonate, similar to the Viokase protocol) - Intro-Reducer device with hot water (100°–150°F) using a back-and-forth motion.	- Enzymatic solution: complete dissolution in 6 hours. - Meat tenderizer: dissolution begins in 6 hours. - Intro-Reducer with hot water: channel formation in less than 2 minutes, or less than 1 minute with a cutting tip — the fastest and most effective method.	7
Marcuard S. Stegall K. Trogon S. Clearing Obstructed Feeding Tubes ⁽²⁰⁾	PubMed Scopus 1989	USA English	In vitro: 8 Dobbhoff tubes (8 French) occluded with Ensure Plus; In vivo: 10 patients with occluded tubes	Laboratory (in vitro tests) Hospitalized patients receiving enteral nutrition in a clinical hospital setting	- For the in vitro tests: 8 Dobbhoff tubes (Fr 8) were occluded with Ensure Plus; initially, irrigation with 5 mL of Pepsi was tested, injected via syringe under manual pressure for 1 minute, followed by clamping for 5 minutes. In cases where Pepsi failed, 5 mL of Viokase solution (pH 7.9)—prepared from one crushed Viokase tablet adjusted with NaOH—was used. The solution was administered under manual pressure with a 5-minute clamping period; the process was repeated up to twice, if necessary. - For the clinical tests: Initially, 5 mL of water was injected via syringe under pressure for 1 minute, followed by clamping for 5 minutes. If the tube remained occluded, the Viokase solution (pH 7.9) was administered (1 crushed tablet + 1 sodium bicarbonate tablet [324 mg] + 5 mL of tap water). The tube was clamped again for 5 minutes. This process could be repeated up to twice. Administration was performed using a drum-cartridge type catheter connected to the syringe.	- In vitro tests: The Viokase solution adjusted to pH 7.9 demonstrated the greatest efficacy in dissolving enteral formula clots, with a mean score of 2.9 (on a scale of 0 to 3). Pepsi restored patency in 2 of the 8 artificially obstructed tubes. The remaining 6 tubes were cleared using the Viokase solution (pH 7.9)—two during injection and the others after the tube had been clamped for 5 minutes. - Clinical tests: Water failed in all cases. The Viokase solution (pH 7.9) successfully cleared 7 of the 10 tubes within a maximum of two attempts. The 3 failures were attributed to: 1 tube with a knot, 1 obstruction caused by impacted crushed tablet powder at a bend in the tube, and 1 extensive obstruction caused by coagulated formula (45 cm in length and present for 24 hours). No complications or adverse effects occurred with the use of the enzyme.	6

Marcuard S. Stegal K.I Unclogging Feeding Tubes with Pancreatic Enzyme ⁽²¹⁾	PubMed 1990	USA English	During the eight-month follow-up period, 90 patients receiving enteral nutrition via Dobbhoff-type tubes were monitored. Of these, 32 patients (35%) experienced at least one episode of tube obstruction, totaling 60 recorded episodes. Of these 60 cases, 44 were reported to the Nutrition Support Team, which was responsible for performing the unblocking procedures.	Hospital	Initially, irrigation with water and clamping for 5 minutes were attempted; in the event of failure, an activated enzymatic solution of pancreatin (Viokase + 324 mg sodium bicarbonate dissolved in 5 mL of warm water) was injected via a drum-cartridge catheter, followed by re-clamping for 5 minutes and irrigation with water using a 50 mL syringe;	12/44 (27%) of the obstructions were resolved using only water; 32/44 (73%) required the enzymatic solution; of these 32, 23 were successfully resolved (72%) with the solution; Excluding 9 failures attributed to mechanical causes (knotted tube, impacted tablet, seed), the success rate was 96% (23/24) when the clog consisted exclusively of formula; primary cause of obstructions: coagulation of intact-protein formula.	4
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This distribution highlights the scarcity and sporadic nature of scientific research on the subject, justifying the inclusion of older studies in the review. Despite the time lag, these studies remain relevant as they constitute a significant portion of the available evidence regarding methods for clearing catheter obstructions in enteral nutrition therapy.

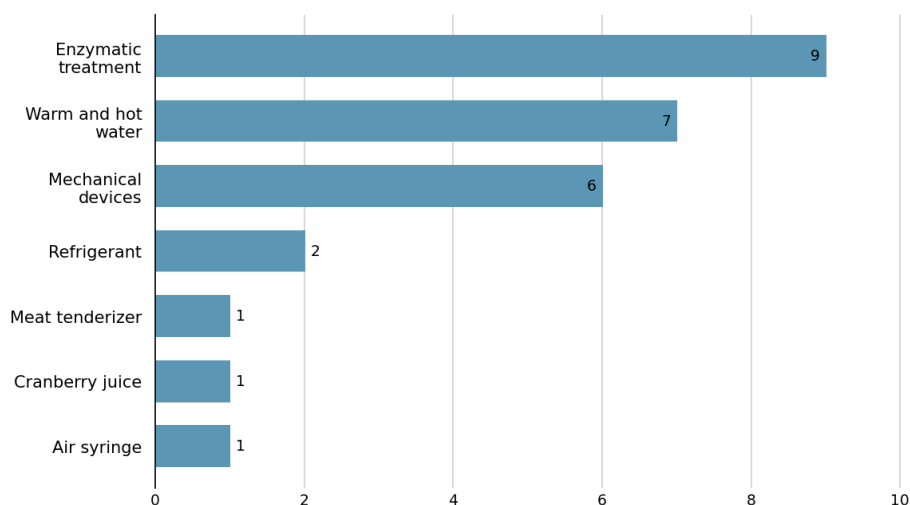
Concerning the implementation setting, the studies were conducted in clinical care environments, laboratory settings, or through a combined approach. Some evaluated practices in hospitals, clinics, outpatient facilities, or home settings, while others employed experimental models to test the technical efficacy of the obstruction-clearing methods (Figure 3).

Figure 3. Distribution of studies by implementation scenario.



All studies included were published in English. The most frequently described method was enzymatic treatment, followed by the use of warm or hot water and mechanical devices. This distribution indicates a predominance of international evidence and highlights the gap in domestic studies on the subject (Figure 4).

Figure 4. Distribution of clearance strategies mentioned by studies.



The use of warm or hot water, mentioned in seven studies, highlights its widespread adoption as a potential approach, likely due to its simplicity, low cost, and easy accessibility. Mechanical devices were also tested to clear obstructions, identified in six studies, reflecting an interest in instrumental methods that restore flow through physical action.

Other, less frequently reported methods included the use of soft drinks, meat tenderizer, and cranberry juice. These strategies appeared in few studies and showed limited evidence, particularly regarding safety, efficacy, and the potential for damage to the catheter or harm to the patient.

In relation to the outcomes of these clearing strategies, the studies consistently showed that acidic substances, such as soft drinks and juices, and meat tenderizers have low efficacy. These findings underscore the need to avoid empirical practices lacking scientific backing and to prioritize safe institutional protocols.

DISCUSSION

Analysis of the findings demonstrates that the literature on clearing nasogastric and nasoenteric tube obstructions is limited, heterogeneous, and marked by long intervals without new publications. This characteristic does not invalidate the mapping; on the contrary, it highlights a significant gap in nursing practice, where clinicians must often manage obstructions based on institutional protocols and fragmented evidence.

Regarding the implementation setting, the included studies alternated between clinical care environments and laboratory settings. Clinical studies bring findings closer to daily practice but often feature small sample sizes or less robust study designs. Conversely, laboratory studies allow for greater control over the type of obstruction and enable comparisons between methods, although their findings are less generalizable to actual patients.

Regarding clearing methods, the findings focused on three main categories: irrigation with warm water, enzymatic solutions, and mechanical devices. Irrigation with warm water, using a 30–60 mL syringe and gentle back-and-forth movements, emerges as the initial approach due to its simplicity, low cost, and lower potential for harm. However, its efficacy tends to be lower for dense or long-standing obstructions, or those caused by crushed medications^(12,16).

Among studies employing activated pancreatic enzymes, protocols using Viokase® combined with sodium bicarbonate for pH adjustment stood out. A clinical study involving 90 patients observed a high success rate when mechanical causes of obstruction were excluded. Another study, involving both *in vitro* and *in vivo* assessments, demonstrated superior performance of the enzymatic solution compared to the use of soft drinks. However, protocols using Creon® showed lower efficacy, suggesting

that the type of enzyme, dosage, formulation, and contact time directly influence the results⁽²¹⁾.

Mechanical devices have emerged as a promising alternative, particularly for resolving difficult obstructions. TubeClear® demonstrated high success rates in both *in vitro* tests and clinical use, achieving rapid restoration of patency with no reported adverse events⁽¹³⁻¹⁴⁾. However, its availability may be limited by cost, the need for training, and institutional adoption requirements, thereby restricting its applicability in settings with limited technological resources.

Evaluations of alternative methods, such as acidic juices, soft drinks, and meat tenderizers, have shown low efficacy and a lack of scientific evidence to support their routine use^(18,20-21). These findings are significant because such practices may still persist empirically in clinical settings, even though they are not recommended as safe methods for clearing obstructions.

An additional finding emerged from a study on the prophylactic use of pancreatic enzymes, which demonstrated a lower incidence of obstructions among critically ill patients in the intervention group compared to the control group⁽²²⁾. Despite this preventive potential, the result should be interpreted with caution, as it requires confirmation through multicenter studies with greater standardization of outcomes.

Finally, the coagulation of protein-based formulas and the improper use of crushed medications were identified as key factors contributing to catheter obstruction. Thus, prevention remains central to patient care, encompassing practices such as flushing before and after the administration of enteral feeds and medications, ensuring proper dilution, conducting pharmaceutical assessments for alternative dosage forms, and providing ongoing training for nursing staff.

Therefore, the findings reinforce that the discussion regarding airway clearance should not be limited to the choice of a technique but should encompass prevention, patient safety, institutional availability, and professional training. The synthesis provided by the PAGER Framework, presented in Chart 2, organizes the standards, advances, gaps, evidence for practice, and recommendations for future research⁽²³⁾.

Chart 2. PAGER Framework Analysis.

Dimension	Highlights
Patterns	• Most studies were produced in the United States. • All studies were published in English. • The three main clearing methods employed were enzymatic treatment, followed by mechanical devices and warm water. • The studies involved a balance of laboratory/in vitro experiments and hospital-based settings. • The studies generally presented lower levels of evidence. • PubMed is the database containing the highest concentration of articles.
Advances	• Development of safe mechanical technologies for clearing obstructions, without the risk of catheter perforation • Recognition of the need for low-cost, easily accessible measures, such as the use of warm water, that can be implemented in all countries • Recognition that the use of soft drinks, juices, or meat tenderizers is ineffective in clinical practice
Gaps	• Scarcity of studies with robust methodologies or comparative multicenter trials • Many expert opinion studies evaluating older techniques • Absence of current studies and a long gap in new research on the subject
Evidence for practice	• Unclogging strategies using mechanical devices are the most promising. • The use of warm and/or hot water is the most accessible option for practical application. • Enzymatic treatment is highly promising but entails higher costs for institutional acquisition.
Research recommendation	• Conducting randomized clinical trials involving real-world patient testing • Designing longitudinal studies with larger sample sizes and improved measurement of airway clearance methods • Developing standardized methods to facilitate better implementation in clinical practice

Study Limitations

This scoping review presents certain limitations that should be considered when interpreting the results. First, significant methodological heterogeneity was observed among the included studies, regarding both experimental design (in vitro, clinical, observational, case series) and outcome measurement methods, which hindered direct comparison of results and precluded a quantitative synthesis.

Furthermore, many of the analyzed studies featured small sample sizes and lacked control groups or robust clinical designs. Only one study employed a prophylactic approach with a statistical comparison between groups (control vs. intervention), highlighting the lack of well-designed randomized clinical trials on the subject - a gap that compromises the level of evidence available to support standardized clinical practices.

Another limiting factor is the scarcity and sporadic nature of scientific output, with long intervals between publications, indicating a weakness in the cumulative advancement of knowledge in the field. This scenario hinders the updating of protocols based on contemporary evidence and limits confidence in the generalizability of the findings. These limitations underscore the need for further studies with greater methodological rigor that evaluate the efficacy and safety of methods for clearing nasoenteric and nasogastric catheters in a standardized manner, thereby helping to consolidate evidence that can guide clinical practice with greater precision.

Contributions for the Nursing Area, Health or Public Policy

In the nursing field, the results reinforce the professional's pivotal role in the prevention, early identification, and resolution of enteral catheter obstructions, given that the majority of the studies analyzed took place in clinical settings under the direct responsibility of the nursing staff. Technical knowledge regarding effective clearing methods, such as the appropriate use of enzymatic solutions and mechanical devices, alongside the adoption of preventive practices (e.g., regular flushing with warm water and correct medication administration), can reduce complications, prevent interruptions in nutrition, and improve patient clinical outcomes. This highlights the need for continuous professional training based on up-to-date evidence and standardized protocols.

Regarding healthcare service organization, data indicate that failures to maintain the patency of nasoenteric and nasogastric catheters result in significant financial and care-related impacts, including costs associated with device replacement and nursing time, delays in nutritional therapy, and an increased risk of morbidity. Therefore, incorporating evidence-based protocols, standardizing care procedures, and ensuring access to supplies such as pancreatic enzymes or devices like TubeClear® can enhance the quality of care and optimize the use of available resources.

From a public health policy perspective, the scarcity of specific national clinical guidelines on clearing nasoenteric and nasogastric catheters reveals a regulatory gap that compromises equity and safety in care. The knowledge systematized in this review can inform the development of institutional protocols and national guidelines, particularly within the contexts of hospital care and enteral nutritional therapy. Furthermore, public policies ensuring access to enzymatic solutions or assistive technologies within public health services could expand access to quality care and promote patient safety nationwide. Thus, this review contributes to enhancing professional practice, guiding clinical decisions, and strengthening the health system by incorporating evidence into the care of patients receiving enteral nutrition, particularly regarding the prevention and management of catheter obstruction.

FINAL THOUGHTS

This scoping review mapped scientific evidence regarding methods for clearing nasogastric and nasoenteric tubes used in enteral nutrition. The findings indicate that flushing with warm water remains the initial approach due to its simplicity, low cost, and safety, whereas enzymatic solutions and mechanical devices may be considered in specific situations and depending on institutional availability. There is insufficient evidence to recommend the use of soft drinks, acidic juices, or meat tenderizers, strategies that demonstrated low efficacy and a lack of adequate safety data. Therefore, empirical practices should be replaced by standardized, evidence-based protocols aligned with patient safety.

The primary gap identified relates to the scarcity of recent studies featuring robust clinical designs, larger sample sizes, and standardized comparisons between methods. This limitation underscores the need for clinical trials and multicenter studies to inform safer care protocols applicable to nursing practice. Thus, this review contributes to guiding clinical practice, supporting the development of institutional protocols, and directing future research on the prevention and management of tube obstruction in enteral nutritional therapy.

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