Literature Review

TEXTO & CONTEXTO ENFERMAGEM
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GASTROINTESTINAL TUBE INSERTION TECHNIQUES IN CRITICAL PATIENTS: SCOPING REVIEW

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ABSTRACT

Objective: to map the production of knowledge about the different techniques of gastrointestinal tube insertion in critically ill and/or coma patients.
Method: scope review carried out in December 2020 in ten data sources, following the assumptions established by the Joanna Briggs Institute (2020) and the PRISMA-ScR protocol.
Results: 25 studies were selected and analyzed, identifying as the main techniques for insertion of gastrointestinal tube in critically ill and/or coma patients: techniques without the aid of instrumentals, such as head flexion, lateral neck pressure, tube freezing, measurement with corrected formula of the tip of the ear-lobe tip-xiphoid process, Sellick´s maneuver, cricoid cartilage compression, SORT maneuver and gastric insufflation. In addition to techniques with the aid of instruments, such as the use of laryngoscopes and video laryngoscopes. It is noteworthy that, in order to facilitate insertion, the use of ultrasound examination, radiological, endoscopic and fluoroscopy were also identified.
Conclusions: the evidence analyzed reveals that there is no specific gastrointestinal tube insertion technique for universally accepted critically ill patients.

DESCRIPTORS: Eat. Gastrointestinal intubation. Enteral nutrition. Intensive care. Nursing.

HOW CITED: Queiroz CG, Duarte FHS, Sarmento SDG, Dantas JKS, Dantas DV, Dantas RAN. Gastrointestinal tube insertion techniques in critical patients: scoping review. Texto Contexto Enferm [Internet]. 2021 [cited YEAR MONTH DAY]; 30:e20210017. Available from: https://doi.org/10.1590/1980-265X-TCE-2021-0017

TÉCNICAS PARA INSERÇÃO DE SONDA GASTROINTESTINAL EM PACIENTES CRÍTICOS: REVISÃO DE ESCOPO

RESUMO

Objetivo: mapear a produção de conhecimento sobre as diferentes técnicas de inserção de sonda gastrointestinal em pacientes críticos e/ou em coma.
Método: revisão de escopo realizada em dezembro de 2020 em dez fontes de dados, seguindo os pressupostos estabelecidos pelo *Joanna Briggs Institute* (2020) e do protocolo PRISMA-ScR.
Resultados: foram selecionados e analisados 25 estudos, identificando-se como principais técnicas para inserção de sonda gastrointestinal em pacientes críticos e/ou em coma: técnicas sem o auxílio de instrumentais, como flexão de cabeça, pressão lateral do pescoço, congelamento da sonda, medição com fórmula corrigida da ponta do nariz-lóbulo da orelha-processo xifoide, manobra de Sellick, compressão na cartilagem cricoide, manobra SORT e insuflação gástrica. Além de técnicas com o auxílio de instrumentais, como a utilização de laringoscópios e videolaringoscópios. Destaca-se que, para facilitar a inserção, identificaram-se, ainda, a utilização de exame ultrassonográfico, a técnica radiológica, endoscópica e fluoroscopia.
Conclusões: as evidências analisadas revelam que não há uma técnica para inserção de sonda gastrointestinal específica para pacientes críticos universalmente aceita.

DESCRITORES: Coma. Intubação gastrointestinal. Nutrição enteral. Cuidados intensivos. Enfermagem.

TÉCNICAS PARA LA INSERCIÓN DE SONDA GASTROINTESTINAL EN PACIENTES CRÍTICOS: REVISIÓN DEL ALCANCE

RESUMEN

Objetivo: mapear la producción de conocimiento sobre las diferentes técnicas de inserción de tubo gastrointestinal en pacientes críticos y/o comatosos.
Método: revisión de alcance realizada en diciembre de 2020 en diez fuentes de datos, siguiendo las suposiciones establecidas por el Instituto Joanna Briggs (2020) y el protocolo PRISMA-ScR.
Resultados: se seleccionaron y analizaron 25 estudios, identificando las principales técnicas para la inserción de una sonda gastrointestinal en pacientes críticos y/o comatosos: técnicas sin ayuda de instrumentos, como flexión de la cabeza, presión lateral del cuello, congelación de la sonda, medición con punta nasal -Fórmula corregida del lóbulo auricular-apófisis xiphoides, maniobra de Sellick, compresión del cartílago cricoides, maniobra SORT e insuflación gástrica. Además de técnicas con ayuda de instrumental, como el uso de laringoscopios y videolaringoscopios. Es de destacar que, para facilitar la inserción, también se identificó el uso de ecografías, técnicas radiológicas, endoscópicas y fluoroscópicas.
Conclusiones: la evidencia analizada revela que no existe una técnica universalmente aceptada para insertar una sonda gastrointestinal específica para pacientes críticamente enfermos.

DESCRIPTORES: Coma. Intubación gastrointestinal. Nutrición enteral. Cuidados intensivos. Enfermería.

INTRODUCTION

Intensive Care Units (ICUs) are specialized sectors in the execution of treatments that require greater complexity and in the provision of care to critically ill patients[1]. These individuals need continuous assistance, based on specific equipment and technologies that allow adequate treatment and monitoring of their state[2].

These patients require procedures that can expose them to adverse events and possible complications. Due to their hemodynamic and respiratory instability, they may require changes in sedation and analgesia, intubation, extubation, and catheter removal inadvertently[3]. In addition, critically ill patients are more likely to be diagnosed with malnutrition, and require early nutritional support. It is emphasized that nutrient deficiency reflects negatively on the function of vital organs, reduces the healing process, and may lead to infections and also be associated with postoperative complications[3].

Thus, enteral nutrition (EN) is the method of choice for ICU patients because it provides nutritional support or the administration of medications directly into the gastrointestinal tract, through a tube, catheter or ostomy[4–5]. Gastrointestinal intubation can be performed orally or nasally and should be prioritized in relation to parenteral nutrition in patients with functioning gastrointestinal system[4].

However, despite its important usefulness, this procedure is strongly associated with complications resulting from its incorrect insertion, relating to a significant increase in morbidity and mortality[6]. Usually, accidental insertion of the tube occurs mainly in the respiratory system, which may cause atelectasis, pneumothorax, pneumonia and broncholeural fistulas[6]. Added to this are nasal injury, dumping syndrome, nasal irritation and sinusopathy, and it is important that health professionals immediately recognize possible signs of its incorrect insertion[7].

This procedure is commonly performed by a nurse. Nurses have an important role in the success of nutritional therapy, since they are responsible for access to the gastrointestinal system, fixation and maintenance of the tube, administration of the diet and the establishment of conducts when faced with complications[8].

This practice is based on Resolution of the Federal Nursing Council (COFEN) Nº. 453/2014, which deals with the performance of the nursing team in nutritional therapy. According to this resolution, it is the responsibility of nurses, among other attributions, to provide enteral access via gastric or transpyloric route for the administration of enteral nutrition[9].

A randomized clinical trial conducted in China shows that procedures such as nasogastric intubation present greater complexity, especially in coma patients, as they are unable to assist in the procedure[10].

Physiological or induced, the coma patient presents loss or decreased brain activities, resulting in non-responsiveness[11]. Accordingly, it is evident that these patients tend to have glossoptosis, a phenomenon in which the tongue blocks the passage into the larynx, which makes insertion of the tube difficult. Furthermore, the pyriform sinus and the arytenoid cartilage are described as anatomical obstacles. Thus, gastrointestinal intubation with the patient in the lateral decubitus position can facilitate this procedure[10].

In this context, proper management of this device should be carried out, ensuring its correct positioning. Being aware of the risks inherent to the tube insertion procedure, considering the evidence-based practice for the execution of care, the reduction of possible complications arising from the procedure is of extreme importance[7].

Thus, the importance for nurses is perceived in relation to insertion techniques described in the literature, as well as their effectiveness, considering the importance of best practices aimed at patient safety.

Therefore, the objective is to map the production of knowledge about the different techniques for inserting a gastrointestinal tube in critically ill and/or comatose patients.

METHOD

A scope review, elaborated according to the theoretical framework provided by the Joanna Briggs Institute (JBI)[12]. This type of review aims to map the main scientific evidence and limitations on a given theme available in the literature[10]. As well as following the recommendations proposed by preferred reporting items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) for scoping reviews[13].

The five steps proposed by Arksey and O'Malley were followed for the preparation of the review: construction of the research-based question; verification of relevant studies; process of selection and inclusion of studies; organization of the data obtained; analysis and summary of the data obtained[14].

Firstly, a search was conducted to identify similar scope reviews on the following platforms: International Prospective Register of Systematic Reviews (PROSPERO), Open Science Framework (OSF) and Database of Abstracts of Reviews of Effects (DARE). There were no studies with the same objective of this study. Thus, the review was registered in the OSF, and a Uniform Resource Locator (URL)[15] was generated for its identification.

The mnemonic PCC was followed for the formulation of the research-based question, where P (Population): critically ill and/or coma patients; C (Concept): techniques for insertion of gastrointestinal tube; C (Context): critical care. The following research question was established: "what are the techniques for insertion of gastrointestinal tubes in critically ill and/or coma patients?".

The inclusion criteria adopted were: publications available online, in full, in any language and without time frame, from access via the Federated Academic Community (CAFe). Editorial studies, letter to the editor, opinion articles and duplicate studies in the data sources were excluded.

The search was developed in December 2020, in ten data sources: PubMed Central, Medical Literature Analysis and Retrieval System Online (CINAHL), Scopus, Web of Science, Cochrane Library, ScienceDirect, Gale Academic Onefile, Catalogue of Theses and Dissertations (CAPES), Digital Library of Theses and Dissertations of the University of São Paulo (USP) and Google Scholar. From the controlled descriptors: "Coma", "Gastrointestinal intubation" and "Critical care, according to the Descriptors in Health Sciences (DeCS); and "Coma", "Intubation, Gastrointestinal" and "Critical Care", according to the Medical Subject *Headings* (MeSH) and the keywords (Portuguese/English): "Comatose/ *Comatose", "Critical* patients*"*, "Nasogastric intubation/Intubation, Nasogastric*", "*Gastrointestinal intubation/Gastrointestinal intubation"*,* "Intensive Care","Intensive Care,I ntensive Surgical Intensive Therapy"*,* "Intensive Care, Intensive Care" *and* "Intensive Intensive Care"*.* Chart 1 shows the descriptors and keywords used in the search according to the PCC strategy.

Chart 1 – Descriptors and keywords used. Natal, RN, Brazil, 2020.

PCC	MESH/DeCS		Keywords (Ing/En)
Population	Coma/*Coma*	***OR***	*Critical patients*/ Pacientes críticos **OR** *Comatose*
	AND		
Concept	Intubation, Gastrointestinal / *Intubação gastrointestinal*	***OR***	*Intubation, Nasogastric*/ Intubação nasogástrica **OR** *Gastrointestinal intubation*/ Gastrointestinal intubation
	AND		
Context	*Critical Care*	***OR***	*Intensive Care* / Intensive Care ***OR*** *Care, Intensive Surgical* / Intensive Care *Cirúrgica* ***OR*** *Care,* Intensive / Intensive Care ***OR*** *Surgical Intensive Care*

Thus, based on these descriptors and keywords, a search syntax was elaborated and applied according to the particularities of each data source, as illustrated by Chart 2.

Chart 2 – Search syntax used in data sources. Natal, RN, Brazil, 2020.

Data sources	Search syntax
Pubmed*	(Coma OR Comatose OR Critical patients) AND (Intubation, Gastrointestinal OR Intubation, Nasogastric OR Gastrointestinal intubation) AND (Critical Care OR Intensive Care OR Care, Intensive Surgical OR Care, Intensive OR Surgical Intensive Care).
CINAHL†	(Coma OR Comatose OR Critical patients) AND (Intubation, Gastrointestinal OR Intubation, Nasogastric OR Gastrointestinal intubation) AND (Critical Care OR Intensive Care OR Care, Intensive Surgical OR Care, Intensive OR Surgical Intensive Care).
Scopus‡	TITLE-ABS-KEY (“Coma” OR “Comatose” OR “Critical patients”) AND TITLE-ABS-KEY (“Intubation, Gastrointestinal” OR “Intubation, Nasogastric” OR “Gastrointestinal intubation”) AND TITLE-ABS-KEY (“Critical Care” OR “Intensive Care” OR “Care, Intensive Surgical” OR “Care, Intensive” OR “Surgical Intensive Care”).
Web of Science§	TS= (Coma OR Comatose OR Critical patients) AND TS= (Intubation, Gastrointestinal OR Intubation, Nasogastric OR Gastrointestinal intubation) AND TS= (Critical Care OR Intensive Care OR Care, Intensive Surgical OR Care, Intensive OR Surgical Intensive Care).
Cochrane‖	(Coma OR Comatose OR Critical patients) AND (Intubation, Gastrointestinal OR Intubation, Nasogastric OR Gastrointestinal intubation) AND (Critical Care OR Intensive Care OR Care, Intensive Surgical OR Care, Intensive OR Surgical Intensive Care).
ScienceDirect¶	(Coma OR Comatose) AND (Intubation, Gastrointestinal OR Intubation, Nasogastric OR Gastrointestinal intubation) AND (Critical Care OR Intensive Care OR Surgical Intensive Care).

Chart 2 – Cont.

Data sources	Search syntax
Gale**	(Coma OR Comatose OR Critical patients) AND (Intubation, Gastrointestinal OR Intubation, Nasogastric OR Gastrointestinal intubation) AND (Critical Care OR Intensive Care OR Care, Intensive Surgical OR Care, Intensive OR Surgical Intensive Care).
Catalogue of Theses and Dissertations††	(Coma OR Comatoso OR Critically Ill Patients) AND (Gastrointestinal intubation OR Nasogastric intubation OR Gastrointestinal intubation) AND (Critical Care OR Intensive Care OR Surgical Intensive Care OR Intensive Care OR Intensive Care OR Intensive Surgical Care).
Usp‡‡ Digital Library of Theses and Dissertations	(Coma or comatose) AND (Gastrointestinal intubation OR Nasogastric Intubation OR Gastrointestinal Intubation) AND (Critical Care OR Intensive Care OR Intensive Surgical Care).
Google Academic§	(Coma OR Comatose OR Critically Ill Patients) AND (Gastrointestinal intubation OR Nasogastric intubation OR Gastrointestinal intubation) AND (Critical Care OR Intensive Care OR Surgical Intensive Care OR Intensive Care OR Intensive Care OR Intensive Surgical Care).

*PubMed Central; †Medical Literature Analysis and Retrieval System Online; ‡Elsevier's SCOPUS; §Web of Science; || Cochrane Library; ¶ScienceDirect; **Gale Academic Onefile; ††Catalogue of Theses and Dissertations (CAPES); ‡‡Digital Library of Theses and Dissertations of the University of São Paulo; §§Google Academic.

The search was performed by two researchers, using different computers, in order to avoid the unnecessary exclusion of studies. In cases of divergence between the two, a full reading and peer discussion was carried out.

The data were organized according to author, year of publication and country, methodological design, study population, description of techniques for insertion of the gastrointestinal tube and outcome. In addition, the level of evidence and degree of recommendation according to the Oxford Centre for Evidence-based Medicine (OXFORD) was also included[16].

It is important to mention that the level of evidence varies from 1 to 5, in which, the smaller the number, the higher the level of evidence, and with a degree of recommendation ranging from "A" to "D", with the letter "A" being the highest degree of recommendation. It is important to point out that, although JBI does not require this type of analysis in the structuring of a scoping review, this technique was used to support the methodological quality of the selected studies.

RESULTS

A total of 14,349 publications were identified based on the search strategy adopted. Among these,14,293 were excluded due to the information in the title and abstract. Among the 56 studies selected for full reading, after excluding studies that did not meet the objective of this review and duplicates, 25 scientific articles were selected for the final sample, as shown in Figure 1. Among the ten databases surveyed, the Catalogue of theses and dissertations (CAPES) did not add studies to the sample.

Regarding the years of publication, the studies were conducted between 2000 and 2020, with a higher predominance of publications in 2020, 2015, 2011 and 2005, representing 12% (n=3) of the articles selected for each year. Regarding the type of study, 72% (n=18) are a randomized clinical trial, 20% (n=5), cohort studies and 8% (n=2) case reports. In addition, 84% of the studies were conducted in adult patients (n=21).

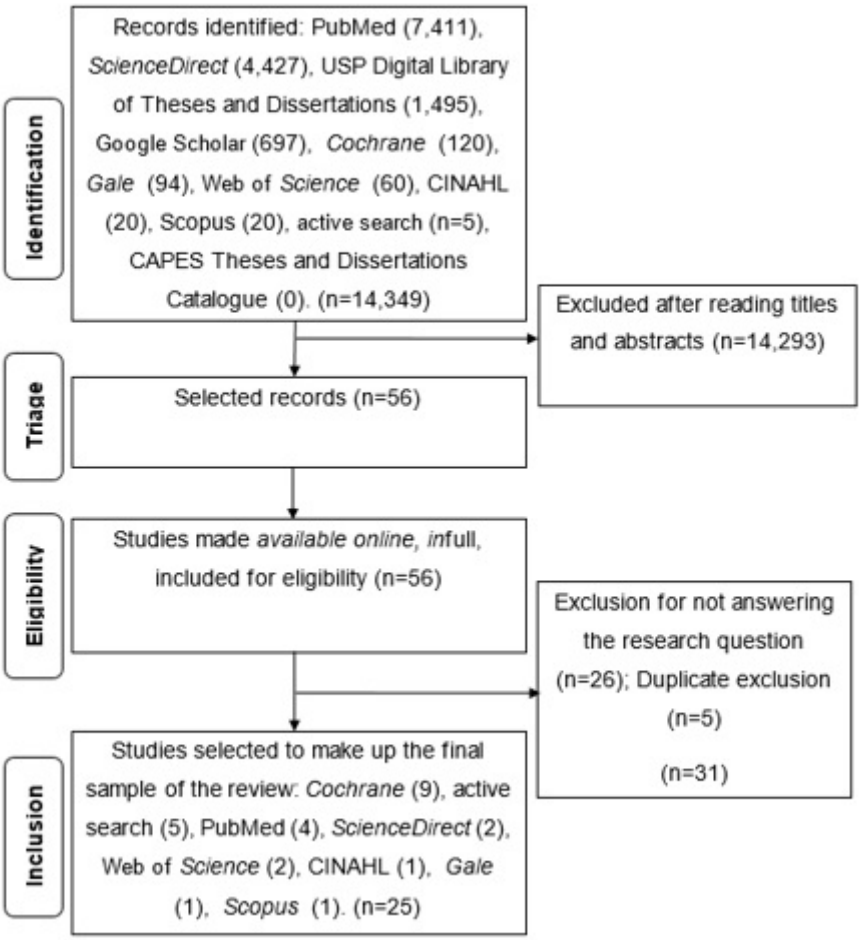

Figure 1 – Flow diagram of the literature search and inclusion of articles based on the guidelines of PRISMA-ScR (adapted). Natal, RN, Brazil, 2020.

Thus, first, the studies included in this review were characterized regarding the authors, year and place, type of study, level of evidence/degree of recommendation and population studied, as provided in Chart 3.

Chart 3 – Characterization of the year, location, type of study, level of evidence/degree of recommendation and population studied. Natal/RN, Brazil, 2020.

Study Year/Location	**Type of study/Level of evidence*/Degree of recommendation***	**Study population**
E1 2020 – USA[17]	Cohort study /2B/B	601 patients undergoing induced coma.
E2 2020 – Belgium[18]	Cohort study /2B/B	218 critically ill ICU patients.
E3 2020 – Iran[19]	Randomized clinical trial /1B/A	396 critically ill patients.
E4 2018 – India[20]	Randomized clinical trial /1B/A	195 anesthetized and intubated adult patients undergoing abdominal surgeries.
E5 2017 – Turkey[21]	Randomized clinical tria l/1B/A	200 adult patients who received general anesthesia for elective abdominal surgeries.

Chart 3 – Cont.

Study Year/Location	Type of study/Level of evidence*/Degree of recommendation*	Study population
E6 2017 – Italy[22]	Cohort study /2B/B	114 patients in critical condition, 100 mechanically intubated and two tracheostomized.
E7 2016 – Malaysia[23]	Randomized clinical trial /1B/A	96 anesthetized and intubated adult patients scheduled for surgery.
E8 2016 – Japan[24]	Case report /5/D	84-year-old patient in physiological coma.
E9 2015 – Netherlands[25]	Randomized clinical trial /1B/A	154 patients in surgical patients (sedated).
E10 2015 - Turkey[26]	Cohort study /2B/B	56 patients using mechanical ventilation hospitalized in ICU.
E11 2015 – China[27]	Randomized clinical trial /1B/A	156 critically ill patients with acute gastrointestinal injury admitted to the ICU.
E12 2013 – India[28]	Case report /5/D	one patient in physiological coma.
E13 2013 – Taiwan[29]	Randomized clinical trial /1B/A	150 anesthetized and intubated adult patients undergoing gastrointestinal surgeries.
E14 2012 – Taiwan[30]	Randomized clinical trial /1B/A	103 anesthetized and intubated adult patients undergoing gastrointestinal or hepatic surgeries.
E15 2011 – USA[31]	Randomized clinical trial /1B/A	Critically ill patients who do not tolerate intragastric nutrition.
E16 2011 – USA[32]	Randomized clinical trial /1B/A	49 critically ill children admitted to ICU.
E17 2011 – Germany[33]	Cohort study /2B/B	27 critically ill patients undergoing trans nasal endoscopy and pylorus intubation.
E18 2010 – China[34]	Randomized clinical trial /1B/A	50 children admitted to pediatric ICU.
E19 2010 – Netherlands[35]	Randomized clinical trial /1B/A	210 critically ill patients.
E20 2005 – USA[36]	Randomized clinical trial /1B/A	14 patients admitted to neurosurgical ICU, with Glasgow score less than 8 (mean of 6.8 ± 0.36).
E21 2005 – USA[37]	Randomized clinical tria l/1B/A	100 untestable ICU patients.
E22 2005 – USA[38]	Randomized clinical trial /1B/A	75 critical pediatric patients admitted to the ICU.
E23 2004 – USA[39]	Randomized clinical trial /1B/A	43 critically ill ICU patients.
E24 2000 – USA[40]	Randomized clinical trial /1B/A	30 severely ill patients tracheostomized or with endotracheal tube.
E25 2000 – USA[41]	Randomized clinical trial /1B/A	50 children admitted to pediatric ICU.

Subsequently, the studies included in this review were characterized regarding the authors, year, study technique and outcome, according to Chart 4.

Chart 4 – Characterization of the studies included in the review regarding the techniques of tubing and outcome. Natal, RN, Brazil, 2020.

Study Year/Local	Tubing technique	Denouement
E17 2011 – Germany[33]	Insertion of the tube under radiological or endoscopic guidance.	Early placement of a feeding tube during abdominal surgery was beneficial in trauma patients with severe intracranial injury.
E18 2010 – China[34]	"Blind" insertion and patient in *semi-fowler position*; application of corrected formula to measure how far the tube will be inserted.	The corrected formula of the nose-lobe distance of the ear-xiphoid process as a precise method to determine the insertion length of the nasogastric tube.
E19 2010 – Netherlands[35]	The SORT maneuver (patient positioning, NGT orientation, contralateral rotation and torsional movement) *versus* neck flexion lateral pressure method (NFLP).	The SORT maneuver has a high success rate. Therefore, this method can be executed, but there is still no consensus on a standard approach.
E20 2005 – USA[36]	Conventional technique, tube freezing and reverse Sellick´s maneuver.	Nasogastric tube insertion using reverse Sellick´s maneuver shows the highest success rate and fewer adverse events among the three methods compared in anesthetized and intubated adult patients.
E5 2017 – Turkey[21]	"Blind" insertion, laterally positioned head, tracheal tube assistance as an introducer "guide" and video laryngoscope aid in anesthetized and intubated adult patients.	The use of video laryngoscope and tracheal tube during tube insertion compared to conventional ones increased the success rate and reduced tube folding, in addition to reducing mucosal bleeding.
E6 2017 – Italy[22]	Tip measurement of the ear-lobe tip-xiphoid process/Ultrasound examination.	Ultrasound is effective in verifying the correct positioning of the tube.
E7 2016 – Malaysia[23]	GlideScope-guided laryngoscope ® MacIntosh laryngoscope.	The use of GlideScope® to facilitate nasogastric tube insertion was comparable to Macintosh laryngoscope use for insertion success rate and complications.
E8 2016 – Japan[24]	Fluoroscopy.	The insertion of the fluoroscopy tube was successful in gastric decompression, assisting in nutrition until the preparation of a percutaneous endoscopic gastrostomy.
E9 2015 – Netherlands[25]	Patient in supine position. Insertion of post-pyloric feeding tube via electromagnetic transmitter and endoscopy in surgical patients.	Effective techniques for insertion of nasoenteral feeding tube. More scientific studies are needed to strengthen the evidence.
E10 2015 – Turkey[26]	Ultrasound examination/head in supine position.	The passage of the tube with the aid of this method can be used as an adjuvant.
E11 2015 – China[27]	Placement of nasojejunal tube guided by ultrasound at the bedside versus "blind" insertion at the bedside.	Placement of the ultrasound-guided jejunal nasal tube is better than the blind method.
E12 2013 – India[28]	"Blind" insertion with neck flexion, identification of cricoid cartilage (all 20 cm inserted), and insertion of approximately 50 cm of nasogastric tube.	Easy and useful technique for insertion in unconscious intubated patients. It does not alter vital responses or increase intracranial pressure as in laryngoscopy.

Chart 4 – Cont.

Study Year/Local	Tubing technique	Denouement
E13 2013 – Taiwan[29]	Conventional insertion, neck flexion with lateral pressure and cricoid cartilage lifting.	Neck flexion with lateral pressure and cricoid cartilage lifting are reliable for inserting the tube without the use of other instruments.
E14 2012 – Taiwan[30]	Insertion of the tube with the head in the supine position versus insertion with the aid of a "Rusch" intubation stylus tied at the ends by a knot.	The "Rusch" stiletto-guided method of intubation is reliable, with a high success rate in anesthetized and intubated patients.
E15 2011 – USA[31]	Insertion of a jejunal feeding tube electromagnetically or endoscopically.	The placement of the tube electromagnetically was as fast, safe and successful as the endoscopic tube.
E16 2011 – USA[32]	Insertion of transpypiloric feeding tube using conventional blind technique with the help of a noninvasive electromagnetic device.	Insertion by non-invasive electromagnetic device significantly increases the time required for placement.
E17 2011 – Germany[33]	Insertion of feeding tube by transnasal endoscopy.	The procedure is safe and reliable, having a good success rate. Complications such as bleeding are rare.
E18 2010 – China[34]	Patients in supine position. Insertion by optical endoscope fiber. Concomitantly, an electromagnetic technology is used. The image is displayed as the tube is inserted.	Bedside electromagnetic-guided placement is as fast, safe, and successful as endoscopic placement. It may be considered the preferred technique in critically ill patients.
E19 2010 – Netherlands[35]	Patient in supine position. The stylus is inserted inside the tube and allows the visualization of its position and path traveled.	The procedure was considered feasible and safe and can be used in critically ill patients.
E20 2005 – USA[36]	Blind procedure. Position without reclining, with the head slightly tilted back.	The specifically designed nasojejunal tube showed greater efficacy in transpyloric placement after the Treitz ligament, when compared to the nasogastric tube in patients with severe head trauma.
E21 2005 – USA[37]	Endoscopic insertion of NES with a 5.1 mm ultra-thin tube endoscope and by fluoroscopic technique.	The success of placing NES with an ultrathin transnasal endoscope is equivalent to fluoroscopy.
E22 2005 – USA[38]	Standard technique, standard technique with gastric insufflation and standard technique with the use of pre-insertion erythromycin.	Most feeding tubes can be placed in critically ill children on the first or second attempt, regardless of the technique used.
E23 2004 – USA[39]	Endoscopic vs. fluoroscopic placement of post-pyloric feeding tubes in critically ill patients.	There is no significant difference in relation to the success rate or time of placement via endoscope and fluoroscopic of post-pyloric feeding tubes.
E24 2000 – USA[40]	Patients were randomized in group A (fluoroscopy) or group B (blind insertion).	Intubated or tracheostomized patients should place feeding nasoenteric tubes with fluoroscopy guidance.
E25 2000 – USA[41]	Gastric insufflation as a complement to the placement of feeding tubes in the small intestine. And insertion through the nostrils without the aid of adjuvant method.	Gastric insufflation allows the rapid placement of feeding tubes in the small intestine with fewer attempts, compared to a standard insertion technique in children.

DISCUSSION

The existence of multiple methods for the proper insertion of the nasoenteric tube and the introduction of several new methods in day to day life indicates that none of them is perfect or universally accepted[20]. Traditionally, it is inserted “blindly”, with the head in a neutral position, through the nostrils, without instrumental assistance or any external manipulation of the larynx. This procedure sometimes becomes difficult and traumatic, especially in coma patients[10].

In the present study, it was observed that, in comparison with the conventional technique, several authors reported different techniques that showed success rates. These are less common procedures that introduce more objectivity and safety in the placement of the enteric tube. For this, methods without the aid of instruments are described, i.e.: head flexion[28], lateral neck pressure[29], tube freezing[20], measurement with corrected formula of the tip of the ear-lobe to the xiphoid process[22–18], reverse Sellick´s maneuver[20], compression on the cricoid cartilage[28–29], sort maneuver[19] and gastric insufflation[41].

Regarding reverse Sellick´s maneuver, it is emphasized that the insertion of nasogastric tube in intubated patients and under the effect of general anesthesia is a procedure with a higher degree of complexity, due to the occlusion of the esophagus due to the presence of the endotracheal tube and swallowing difficulty[42]. In addition, it may increase the risk of the tube entering the lung due to the opening of the glottis[43]. In view of these situations, this method is commonly used for its simple execution, high success rate (77.5%) and rare complications[43].

A cohort study conducted in Belgium aimed to test the accuracy of the corrected technique of the tip-of-the-nose-lobe to the ear-xiphoid process formula for measuring the insertion length of the tube in ICU patients. According to the study, the formula (tip of the ear-lobe tip-xiphoid process (cm) × 0.38696) + 30.37 + 6 cm showed great efficacy in the correct positioning of the tube in the stomach (> 3 cm under the lower esophageal sphincter), obtaining success in gastric aspiration, besides avoiding complications such *a*s dumping syndrome[18].

In critically ill patients, the insertion of the tube becomes a challenge due to anatomical obstacles[42]. After several failed attempts, complication rates usually increase. It is also necessary to observe changes in heart rate, respiratory rate and blood pressure in response to vagal stimulus when introducing the tube[30].

In unconscious patients, the tongue displaced backwards makes it difficult to insert the tube. In addition, the pyriform sinus and arytenoide cartilage are often reported places as obstacles to passage[10].

Thus, there are reports of devices used in tracheal intubation that facilitated the insertion of the enteral tube, such as laryngoscopes and video laryngoscopes. Moreover, the use of ultrasound examination as a guide for the insertion of the tube, as well as the radiological, endoscopic and fluoroscopy technique can also facilitate the insertion of the tube when compared to conventional techniques.

The insertion technique of the electromagnetic-guided tube showed satisfactory results[25,31–32,34]. It is evident that this technique is financially favorable when compared to endoscopic, and it usually does not require confirmation of positioning by radiography. However, professionals must be properly qualified in order to perform this technique[25].

A randomized clinical trial conducted with 52 critically ill children compared the efficacy of the gastrointestinal tube insertion method by electromagnetic orientation with “blind” insertion. The study verified a success rate of 96.4% for the electromagnetic technique and 66.7% for the conventional technique. Regarding time, electromagnetic insertion had an average duration of 2.5 minutes, while “blindly”, 19 minutes, in addition, the electromagnetic method presented a reduced need to confirm the positioning by radiography examination[44].

The endoscopic technique for the insertion of gastrointestinal intubation was frequent among the studies[17,25,33–34,37,39]. A randomized clinical trial conducted in the United States of America demonstrated that the use of the endoscopic technique for the insertion of feeding tube in the jejunum presented a 90% success rate, however, it is a high cost method, requiring more time for its completion, in addition to requiring the presence of an experienced endoscopist[31].

The fluoroscopy tube insertion technique was approached by four studies[24,37,39–40]. This method showed success in gastric decompression of a critical patient, as well as improving enteral nutrition[24]. Thus, the technique has a high success rate, but has a high cost, low availability and difficulties related to the need to remove patients from the ICU[45].

It is important to mention that most of the studies included in this review (72%) are randomized clinical trial type studies, which, according to the Oxford Centre for Evidence-based Medicine[16], has a level of evidence "1B" and recommendation grade "A"; 5% are cohort studies, with evidence level "2B" and degree of recommendation "B"; and only 8% are configured as case reports. Thus, it is evident that the studies used in the scope review have a high level of evidence and reliability.

There is no universally accepted specific method that is assigned the highest success rate. Thus, the importance of basing evidence-based nursing care is reinforced, in order to expand the nursing skills in the management of the insertion of gastrointestinal tubes, in view of the complexity of this public.

Thus, the need for further studies in the area is clear, in order to achieve a more successful method for the insertion of nasoenteric tube in critically ill and/or coma patients, for offering safer care and with a lower risk of complications to this public. Additional experimental studies with a high level of evidence are needed to reveal the most appropriate, effective, rapid and safe technique to improve the execution of this procedure.

The main limitation found was the lack of information from most studies related to the population of critically ill patients, since they did not detail the level of awareness of these patients, as well as the ventilatory support used during the procedure in question.

CONCLUSION

The evidence analyzed reveals that the main methods of non-instrumental insertion of enteric tubes are: head flexion, lateral pressure of the neck, freezing the tubes, measurement with corrected formula of the tip of the nose-lobe to the ear-xiphoid process, Sellick´s maneuver, compression in the cricoid cartilage, SORT maneuver and gastric insufflation.

There is also the insertion of the tube with the aid of instruments. Devices used in tracheal intubation facilitate enteral tube insertion, such as laryngoscopes and video laryngoscopes. In addition, the use of ultrasound examination, radiological, endoscopic and fluoroscopy were identified as a guide for the insertion of the tube. Thus, it is concluded that there is no universally accepted technique for insertion of a specific gastrointestinal tube for critical patients.

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CONFLICT OF INTEREST

There is no conflict of interest.

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Associated Editors: Mara Ambrosina de Oliveira Vargas, Gisele Cristina Manfrini, Ana Izabel Jatobá de Souza.
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HISTORICAL

Received: February 20, 2021.
Approved: April 26, 2021.

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