Enteral nutrition for the intubated adult intensive care unit patient prior to general anesthesia: a scoping review protocol

Christy Barrick1,2 · Mary W. Stewart1,2

1 School of Nursing, University of Mississippi Medical Center, United States, 2 UMMC School of Nursing Evidence Based Practice and Research Team: a Joanna Briggs Institute Affiliated Group

Review question: The objectives of this scoping review are to examine and map fasting times for adult intubated intensive care unit (ICU) patients prior to general anesthesia and patient outcomes following the cessation of enteral nutrition, to examine and conceptually map the evidence, and identify any gaps. Specifically, the review questions are:

- What fasting times are implemented prior to general anesthesia among adult intubated ICU patients?
- Do fasting times vary, depending on the type of surgical intervention?
- What outcomes, including but not limited to aspiration, malnutrition and mortality, have been reported following the cessation of enteral nutrition prior to general anesthesia among adult intubated ICU patients?

Keywords anesthesia; endotracheal-tube; enteral-nutrition; fasting; preoperative

Introduction

Malnutrition in the critically ill ICU patient has been associated with increased infectious morbidity, increased length of ICU and hospital stay, increased rate of infections, increased number of ventilator days, and impaired wound healing.1,2 Enteral nutrition (EN) is an alternative way to provide nourishment for an intubated patient. Enteral nutrition provides nutrients and water to the stomach or small bowel through a tube passed through the oral or nasal cavity to the stomach or small bowel or a tube surgically inserted directly into the stomach or small bowel.3,4 Many patients require surgery with general anesthesia during their ICU stay.5 General anesthesia is defined as an induced state of unconsciousness with loss of sensation and reflexes for a surgical procedure.3 The American Society of Anesthesiologists has developed recommendations to guide preoperative fasting requirements; however, these recommendations do not include patients that have a cuffed endotracheal tube prior to surgery.6 Cuffed endotracheal tubes include any airway tube that has an inflatable cuff that is inflated surrounding the tube in the trachea to help secure the tube and prevent aspiration of foreign material into the bronchus.3 Preoperative fasting is defined as an approved time prior to general anesthesia that oral intake is restricted or prohibited.6 No standard protocol exists to decrease or eliminate preoperative fasting times for adult ICU patients with cuffed endotracheal tubes; however, multiple institutions in the United States and internationally have implemented their own protocol with adjusted times for the intubated patient.7-10 Some institutions stop patients’ enteral feedings after midnight for surgery when possibly not warranted.9,11 The highest risk of aspiration during a procedure requiring general anesthesia is during the intubation period. Aspiration into the lungs can cause the development of aspiration pneumonitis which can lead to prolonged ventilator days or death.12 Stopping or postponing initiation of EN for a patient who requires surgery has been shown to greatly decrease caloric intake, possibly leading to malnutrition and worsened outcomes.2,5,13 The purpose of this scoping review is to explore necessary fasting times for intubated patients prior to general anesthesia and related outcomes.

Enteral nutrition is decreased or held for critically ill patients for numerous reasons, including a prolonged period of time prior to general anesthesia or...
Enteral nutrition and parenteral nutrition (PN) are two ways to provide nutrition to critically ill patients requiring mechanical ventilation. Parenteral nutrition is the delivery of nutrition through a central or peripheral intravenous catheter. Parenteral nutrition does not require cessation during surgery or position changes and does not increase the risk of aspiration; although, PN is associated with other risk factors such as infection and increased length of ICU stay.

According to clinical guidelines determined by the American Society of Parenteral and Enteral Nutrition (ASPEN), the Society of Critical Care Medicine (SCCM), and the National Institute for Health and Care Excellence (NICE), EN is the preferred method of providing nutrition to the critically ill patient. Due to EN being the preferred method, factors that decrease the ability to provide adequate EN need to be explored. Also, the ASPEN and SCCM recommend minimizing fasting times prior to surgery; however, neither gives guidelines to follow.

Improving nutrition in the critical ill patient is pertinent to obtaining nutritional goals. A meta-analysis performed of 21 randomized control trials determined that providing early EN at appropriate amounts was associated with a reduction in mortality and infectious morbidity.

Enteral nutrition supports gut integrity and decreases the risk of systemic infection from an immunologic standpoint. When gut integrity is compromised, intestinal permeability is increased which can lead to systemic infections from normal gut bacteria. Critically ill patients typically have a systemic stress response leading to hypermetabolism. The inflammatory response worsens organ dysfunction, increases infectious morbidity, and leads to longer length of hospital stays. This stressed state is exasperated in a malnourished patient, thus, early provision of nutrition to meet metabolic needs improves patient outcomes.

Two studies have evaluated safety of reducing the time of fasting prior to surgery for the adult patient with a cuffed endotracheal tube. Pousman et al. conducted a prospective, controlled trial in a trauma ICU involving patients with cuffed endotracheal tubes. Patients were divided into two groups. The control group had EN held eight hours prior to planned surgery. The intervention group had EN held 45 minutes prior to surgery if EN was being delivered to the small bowel. Results indicated no adverse effects in the intervention group related to aspiration or regurgitation. Further, the intervention group had greater improvement in nutritional goals verses the control group in the 10 days followed for the study (31.68% more calories consumed in the intervention group verses the control group). Yeh et al. found similar results with patients who received EN prior to elective tracheostomy surgery. There were no gastrointestinal/respiratory complications in the control or intervention groups the day of surgery; however, the control group received 34% of prescribed calories and the intervention group received 92% of prescribed calories.

Literature, including systematic reviews on the national and international levels, have determined the need for enteral nutrition for the critically ill patient whenever possible. Gaps exist in the literature related to perioperative risk and continuing EN prior to general anesthesia. Additional literature gaps include approved standard protocols for preoperative fasting times for the patient with a cuffed endotracheal tube. A preliminary search was conducted in PubMed, JBI Database of Systematic Reviews and Implementation Reports, Cochrane Database of Systematic Reviews, Database of Abstracts of Reviews of Effectiveness, PROSPERO, and Campbell Library on May 20, 2017. No systematic reviews or scoping reviews were found related to fasting times in the preoperative period for the adult ICU patient with a cuffed endotracheal tube. The JBI methodology will be used to complete this scoping review.

Inclusion criteria
Participants
This scoping review will consider studies that include patients who meet the following criteria: 18 years or over, in an adult ICU, with a cuffed endotracheal tube, requiring EN, and undergoing surgery requiring general anesthesia. Patients not requiring general anesthesia for operative procedure will be excluded.

Concept
This scoping review will consider studies that evaluate the outcomes (including aspiration, ICU length of stay, malnutrition and mortality), based on preoperative fasting times for patients with cuffed endotracheal tubes prior to surgical procedures with
general anesthesia. This review will also map outcomes (including aspiration, ICU length of stay, malnutrition and mortality) related to the location EN is being delivered (i.e. stomach or small bowel via a tube passing from the nasal cavity, oral cavity, or surgical implanted directly to the stomach or small bowel of the digestive tract) when specified. This review will also look at available protocols for preoperative fasting times for patients with cuffed endotracheal tubes prior to surgical procedures requiring anesthesia.

Context
This scoping review will consider studies that have been conducted in adult ICUs in all geographic locations.

Types of studies
This review will consider both experimental and quasi experimental study designs, including randomized controlled trials, non-randomized controlled trials, before and after studies and interrupted time-series studies. In addition, analytical observational studies including prospective and retrospective cohort studies, case-control studies and analytical cross-sectional studies will be considered for inclusion. This review will also consider descriptive observational study designs including case series, individual case reports and descriptive cross-sectional studies for inclusion. This review will include standard protocols in other adult ICU settings that can be found on hospital or organizational websites. These standard protocols may be published or unpublished. Studies or protocols published in English will be included. Due to the limited amount of primary research to this specific patient population, no specific date range will be used.

Methods
Search strategy
The search strategy will aim to find both published and unpublished studies. An initial limited search of MEDLINE and CINAHL has been undertaken to identify articles on this topic, followed by analysis of the text words contained in the titles and abstracts, and of the index terms used to describe these articles. This informed the development of a search strategy including identified keywords and index terms which will be tailored for each information source. A proposed search strategy for the databases listed below is detailed in Appendix I. The reference lists of all studies selected for critical appraisal will be screened for additional studies.

Information sources
The databases to be searched include: PubMed, CINAHL, Scopus, Embase and Europe PubMed Central.

The trial registers to be searched include: Cochrane Central Register of Controlled Trials, ClinicalTrials.gov, and NHS Research Register.

The search for unpublished studies and gray literature will include: MedNar, ProQuest Dissertation and Theses Global, and websites of hospitals. Full lists of hospital websites that will be searched can be found in the search strategy. To narrow the search, the websites of the top 50 hospitals for pulmonology in the USA, as determined by the latest U.S. News and World Report rankings, will be searched for available protocols. Pulmonology specialty was chosen as this closely relates to our protocol participants. Attempts will be made to locate international protocols by searching the websites of ABC News Point and Top Ten Best Hospitals in the World.

Data extraction
Data will be extracted from papers included in the scoping review using the draft data extraction tool listed in Appendix II by two independent reviewers. The data extracted will include specific details about the populations, concept, context and study methods of relevance to the scoping review question and specific objectives, and any disagreements that arise between the reviewers will be resolved through discussion or with a third reviewer. Authors of papers will be contacted to request missing or additional data where required. The draft data extraction tool will be modified and revised as necessary during the process of extracting data from each included study. Modifications will be detailed in the full scoping review report.

Data mapping
The extracted data will be presented in diagrammatic or tabular form in a manner that aligns with the objectives and scope of the scoping review. The tables and charts will report on: authors, year of publication, concept, population, aim of study or protocol, context and setting, study methods, intervention or approved protocol, outcomes and key...
findings related to the scoping review. A narrative summary will accompany the tabulated and/or charted results and will describe how the results relate to the review’s objectives and questions.

Acknowledgement

This scoping review will contribute toward a Doctor of Nursing Practice (DNP) degree.

References

Appendix I: Search strategy

PubMed
1. “Enteral nutrition”[Mesh] OR “enteral feed” OR “gastric feed” OR “risk of aspiration”
2. “Intubation, Intratracheal”[Mesh] OR intubation OR intratracheal OR endotracheal OR “protective airway” OR “cuffed endotracheal” OR “cuffed intratracheal” OR “respiration, artificial”[Mesh] OR “artificial respiration” OR tracheostomy
3. Fasting [Mesh] OR fast OR npo OR “nil per os”
5. S1+S2+S3+S4

CINAHL
1. (MH “enteral nutrition”) OR “enteral feed” OR “gastric feed” OR ‘risk of aspiration’
2. (MH “Intubation”) OR (MH “intubation, intratracheal”) OR (MH “artificial, respiration”) OR “endotracheal intubation” OR “tracheostomy” OR “protected airway”
3. (MH “preoperative period”) OR (MH “preprocedure fasting”) OR (MH “fasting”) OR (MH “anesthesia, general”) OR “surgery” OR “procedure” OR “NPO” OR “nil per os”
4. S1+S2+S3

Embase
1. ‘Enteric feeding’ OR ‘enteral nutrition’ OR ‘gastric feed’ OR ‘risk of aspiration’
2. ‘Endotracheal intubation’ OR ‘intubation’ OR ‘artificial ventilation’ OR ‘tracheostomy’
3. ‘General anesthesia’ OR ‘surgery’ OR ‘preoperative period’ OR ‘fasting’ OR ‘procedure’
4. S1+S2+S3

Scopus, MedNar, ProQuest Dissertations and Theses Global, and Europe PubMed Central
1. “Enteral nutrition” OR “enteral feed” OR “gastric feed” OR “risk of aspiration”
2. “Intubation, Intratracheal” OR intubation OR intratracheal OR endotracheal OR “protective airway” OR “cuffed endotracheal” OR “cuffed intratracheal” OR “respiration, artificial” OR “artificial respiration” OR tracheostomy
3. Fasting OR fast OR npo OR “nil per os”
4. Anesthesia, General OR “preoperative period” OR surgery OR procedure OR “surgical procedures, operative”
5. S1+S2+S3+S4

ClinicalTrials.gov
1. “Enteral Nutrition”
2. Fasting
3. S1+S2

Search websites of the following hospitals for published protocols for preoperative fasting times for the adult patient with a cuffed endotracheal tube. Search narrowed by using U.S. News and World Reports: Top 50 Best Hospitals for Pulmonology
1. Mayo Clinic, Rochester, MN
2. National Jewish Health, Denver-University of Colorado Hospital
3. Cleveland Clinic
4. Massachusetts General Hospital
5. Duke University Hospital
6. Hospital of the University of Pennsylvania- Penn Presbyterian
7. UPMC Presbyterian Shadyside
SEARCH WEB SITES OF THE FOLLOWING HOSPITALS FOR PUBLISHED PROTOCOLS FOR PREOPERATIVE FASTING TIMES FOR THE ADULT PATIENT WITH A CUFFED ENDOTRACHEAL TUBE TO INCLUDE INTERNATIONAL HOSPITALS. SEARCH NARROWED BY USING ABC NEWS POINT: TOP TEN BEST HOSPITALS IN THE WORLD.25

1. Johns Hopkins Hospital, Maryland, USA
2. Chris Hani Baragwanath Hospital, Johannesburg, South Africa
3. Stanford Hospitals and Clinics, California, USA
4. Great Ormond Street Hospital, London, UK
5. University of Texas MD Anderson Cancer Centre, Texas, USA
6. Harvard Medical School, Massachusetts, USA
7. Karolinska Hospital, Stockholm, Sweden
8. The Priory Hospital, United Kingdom
9. Bumrungrad International Hospital, Bangkok, Thailand
10. Cedars-Sinai Medical Center, USA
Appendix II: Data extraction tool

<table>
<thead>
<tr>
<th>Publication data</th>
<th>Reviewer’s response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authors</td>
<td></td>
</tr>
<tr>
<td>Year of publication</td>
<td></td>
</tr>
<tr>
<td>Concept</td>
<td></td>
</tr>
<tr>
<td>Population</td>
<td></td>
</tr>
<tr>
<td>Aim of study/protocol</td>
<td></td>
</tr>
<tr>
<td>Context and settings</td>
<td></td>
</tr>
<tr>
<td>Study methods</td>
<td></td>
</tr>
<tr>
<td>Intervention/approved protocol</td>
<td></td>
</tr>
<tr>
<td>Outcomes</td>
<td></td>
</tr>
<tr>
<td>Key findings related to scoping review</td>
<td></td>
</tr>
</tbody>
</table>