Barriers to and facilitators for use of augmentative and alternative communication and voice restorative devices in the adult intensive care unit: a scoping review protocol

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Abstract

Background: Mechanically ventilated patients in the intensive care unit (ICU) experience profound communication impairment, placing them at risk for poor physical and psychological outcomes. Patient communication strategies such as augmentative and alternative communication (AAC) and voice restorative devices are recommended to facilitate communication. These strategies, however, are inconsistently adopted in ICU practice signaling utilization barriers. Our objective is to map and synthesize the current evidence-base for stakeholder-reported barriers and facilitators to patient communication strategy utilization for adults with an advanced airway in the ICU.

Methods and analysis: We will use Arsey and O’Malley’s recommended methods to conduct a scoping review using a rapid review framework to streamline the process. A single reviewer will conduct a search and an initial screen of titles and abstracts from five electronic databases (MEDLINE, EMBASE, the Cochrane Library, Cumulative Index to Nursing and Allied Health Literature [CINAHL], and PsychInfo) from 1990 to present to identify English language peer-reviewed studies. Subsequently, two reviewers will independently screen a shorter list of studies for inclusion. We will also search the reference lists of eligible studies. Two reviewers will independently extract study characteristics, communication strategy, and stakeholder reported barriers and facilitators. We will code and categorize the extracted barriers and facilitators according to the Theoretical Domains Framework (TDF), an integrative framework of behavior change.

Discussion: To our knowledge, this will be the first scoping review to map and synthesize reported barriers and facilitators to communication strategy utilization in the adult ICU using a theoretical framework. The results of this scoping review will help to identify trends and gaps in the current evidence-base and support recommendations for improving patient-centered practice, policy, and research related to successfully establishing ICU patient communication.

Keywords: Communication, Critical care, Augmentative and alternative communication, Barriers and facilitators, Theoretical Domains Framework
Background

Treatment and monitoring of patients experiencing life-threatening conditions occur in the intensive care unit (ICU) [1]. The core treatment modality in the ICU is mechanical ventilation through an advanced airway interface, including an oral endotracheal or a tracheostomy tube. For patients requiring mechanical ventilation, the placement of an advanced airway interrupts vocalization and contributes to profound communication impairment. The shifting treatment paradigm from full to light or no-sedation has made communication impairment an increasingly important patient safety priority since less sedation results in patients who are more awake and struggling to be understood [2–5]. One study of mechanically ventilated patients across six specialty ICUs in an American academic health system estimated that over 50% of ICU patients have sufficient alertness to communicate with the people around them but may not be understood due to communication impairment arising from an artificial airway [6].

Mechanically ventilated patients describe communication impairment as one of the most stressful, dehumanizing, and frustrating events of hospital admission [7–9]. Communication impairment places ICU patients at risk for physical and psychological harm as it negatively impacts communication of disease symptoms, treatment responses, as well as participation in decision-making [6, 8, 10, 11]. Impaired patient communication is a modifiable risk factor for over- and under-recognition and treatment of symptoms of critical illness such as pain, anxiety, agitation, and dyspnea [6, 12]. Poor symptom management contributes to delirium, physical restraint use, and prolonged mechanical ventilation [13, 14]. In the long term, patient communication impairment also contributes to the development of chronic pain, depression, and post-traumatic stress disorder [10].

Patient communication in the ICU can be supported by strategies including augmentative and alternative communication (AAC) and voice restorative devices. AAC refers to all forms of communication, other than oral speech, that are used to express messages [15]. AAC can include “unaided” strategies (e.g., facial expressions, mouthing words, and gesturing) or “aided” strategies which include low-tech (e.g., alphabet or picture boards and writing instruments such as paper and pen) and high-tech (e.g., specialized computer communication interfaces) devices [15]. Phonation or voice restorative devices for patients with an advanced airway refer to voice enabling tracheostomy-based communication aids such as those that require cuff deflation (e.g., one-way speaking valves and ventilator-adjusted leak speech) and those that do not require cuff deflation (e.g., talking tracheostomy with dynamic cuff and fenestrated inner cannula) [16, 17]. Two recent systematic reviews report aided AAC strategies are effective in improving ICU patient satisfaction and reducing communication difficulty [18, 19]. Voice restorative devices are also demonstrated to enhance communication by restoring voice in the presence of an advanced airway [17].

Despite the range of available strategies and reported efficacy in reducing communication difficulties, patient communication strategies are inconsistently adopted in ICU practice [20–22]. Variable adoption of communication strategies in ICU practice signals the presence of utilization barriers [20–23]. A better understanding of the barriers to and facilitators for the utilization of patient communication strategies from the perspective of key stakeholders (e.g., patients, patient communication partners such as nurses, physicians, interdisciplinary clinicians, family members) can potentially improve patient communication strategy utilization in the adult ICU.

One recent systematic review reporting barriers to AAC use in the ICU only included experimental, quasi-experimental, and observational studies [18]. This review reported barriers to usage were device characteristics, the clinical condition of the patient, and constraints in staff time. The lack of inclusion of qualitative and mixed method approaches may inhibit understanding of key stakeholder perspectives and contextual issues relevant to the utilization of patient communication strategies in the ICU. Furthermore, previous reviews exploring barriers to patient communication in the adult ICU have not applied a theoretical framework to understand communication strategy utilization barriers and facilitators. The use of an implementation theory that includes behavioral and contextual determinants, such as the Theoretical Domains Framework (TDF), may help to better understand and identify potentially modifiable barriers to and facilitators for communication strategy utilization in the ICU [24, 25].

Methods and design

Aim and objectives

The primary aim of this scoping review is to answer the question: What are stakeholder reported barriers to and facilitators for patient communication strategy utilization for adults with an advanced airway in the ICU? To answer this question, we will conduct a scoping review with the primary aim of mapping of the current evidence on barriers to and facilitators for patient communication strategy (including AAC and voice restorative device) utilization for adults with an advanced airway in the ICU. The secondary aim of this review is to use the TDF to better understand barriers to and facilitators for communication strategy utilization, highlight key trends and gaps, and to inform evidence-based patient-centered practice, policy, and research. To our knowledge, this will be the first
scoping review to map and synthesize reported barriers to and facilitators for to communication strategy utilization in the adult ICU using a theoretical framework.

**Methods**

Our scoping framework will be informed by the scoping review methods suggested by Arskey and O’Malley, and advanced by Levac and Colquhoun [26–28]. We will follow the scoping review reporting methods outlined by the Preferred Reporting for Items for Systematic reviews and Meta-Analysis Protocols (PRISMA-P) (Additional file 1) [29]. We will also use rapid review methods to expedite the review process. A rapid review is a type of knowledge synthesis in which components of the systematic review process are simplified or omitted to produce information in a shorter period of time [30]. The rapid review components we will use include omission of gray literature and a single-reviewer system to perform the first screen of all titles and abstracts.

**Information sources**

The research team developed a comprehensive search strategy (Additional file 2) in consultation with a health sciences information specialist. Our search strategy will be used in Ovid Medline Epub Ahead of Print, In-Process and Other Non-Indexed Citations, Ovid Medline Daily and Ovid Medline, Ovid Embase, and translated to Ovid PsycINFO, EBSCO Cumulative Index to Nursing and Allied Health Literature (CINAHL), and the Cochrane Library.

Including a complete gray literature search can be time consuming with very minimal relevant results and questionable replicability [31]. Omitting the gray literature as part of a rapid evidence assessment introduces the risk of selection bias [30, 31]. To mitigate the risk of missing relevant studies, we will hand search reference lists of included studies and recent systematic reviews and include those meeting inclusion criteria [18, 19, 30].

**Eligibility criteria**

We will combine and deduplicate all electronic database searches in Endnote™ X9 [32]. One reviewer (LI) will perform an initial screen of titles and abstracts removing studies not meeting the eligibility criteria. The eligibility criteria are listed in Table 1. The remaining studies will be imported into Covidence™. Two independent reviewers (LI/FG) will screen study titles and abstracts against the eligibility criteria and subsequently screen full-text articles to aid in decision making about inclusion. Discrepancies will be resolved by discussion and a third reviewer (CD) as arbiter if necessary. Reference lists of included studies and recent systematic reviews will be screened by title and then full text by the process described above to decide about inclusion [18, 19].

We will include published studies from 1990 to present reporting quantitative, qualitative, mixed or multi-method designs, including both comparative (e.g., randomized, controlled, cohort, quasi-experimental) and non-comparative (e.g., survey, narrative, audit) methods. We will include all study designs to keep our search broad enough to capture diverse stakeholder reported barriers or facilitators of patient communication strategy utilization in the ICU. We will, however, exclude reviews, protocols, and opinion pieces including editorials and letters since these designs will likely not report our outcome of interest. For practical reasons, our search will be limited to English language studies. The 1990-year limit aligns with the paradigm shift to minimal ICU sedation practices. We also consider studies published more than 25 years ago may not be relevant to current barriers and facilitators to patient communication strategy utilization in the ICU.

| Population/setting | Inclusion | Exclusion |
|--------------------|-----------|-----------|
| • Adult (age 18+) ICU patients and their communication partners (i.e., nurses, physicians, interdisciplinary clinicians, family members) | | • Emergency department, postoperative recovery units, hospital floors/wards, psychiatry, long-term care, and home settings |
| • ICU, specialized weaning centers, and high-dependency in patient settings | | |
| • Patients with an advanced airway (oral endotracheal tube, tracheostomy) | | |

| Intervention | Inclusion | Exclusion |
|-------------|-----------|-----------|
| • Patient communication strategies including AAC (unaided strategies, aided strategies low- and high- tech; voice restorative devices | | |

| Comparator | Inclusion | Exclusion |
|-----------|-----------|-----------|
| • Studies with comparison or no-comparison group will be included | | |

| Outcomes | Inclusion | Exclusion |
|----------|-----------|-----------|
| • Stakeholder (patients and communication partners including nurses, physicians, interdisciplinary clinicians, family members)—reported barriers and facilitators to patient communication strategies | | • Studies without stakeholder reported barriers or facilitators to patient communication strategies |

| Type of study | Inclusion | Exclusion |
|---------------|-----------|-----------|
| • All study designs | | • Editorials, letters, protocols, reviews, education pieces, reports, working papers, government documents, white papers, and evaluations |

AAC, augmentative and alternative communication
Data extraction
Two reviewers (LI/FG) will independently extract data using an iteratively developed data extraction form. Study identifiers and data to be extracted are listed in Table 2.

Stakeholder-reported outcomes will be extracted if they are reported as barriers or facilitators to patient communication strategy utilization. Stakeholders include patients and their communication partners (e.g., nurses, physicians, interdisciplinary clinicians, family members). We will define barriers as any physiological, psychological, cognitive, or contextual conditions reported to reduce or negatively affect patient communication strategy utilization in the adult ICU [33]. We will define facilitators as physiological, psychological, cognitive, or contextual conditions reported to enhance or positively affect patient communication strategy utilization in the adult ICU [33].

We anticipate the extraction of the data will be an iterative process that depends on the evidence found in our search [27]. We also anticipate that data extracted will vary based on the type of study and data presented [27]. For example, for qualitative studies, descriptions of individual barriers and facilitators will be extracted verbatim unless only reported in a synthesized format. For quantitative studies, reported outcomes will be extracted and categorized as barriers or facilitators according to the approach described by Weatherson et al. (2017) (i.e., if 50% or more participants identify ease of use of a communication device/strategy, “ease of use” will be categorized as a facilitator) [34]. We will note the reporting stakeholder source of each extracted barrier and facilitator.

To ensure reliability, two reviewers (LI/FG) will pilot the barrier and facilitator extraction process then meet to compare findings. They will repeat this process for 3–5 articles, or until reliability is reached and the extraction tool is adapted. Upon completing the extraction, the two reviewers will meet to determine agreement on the presence or absence of barriers and facilitators within each paper. The authors will solve discrepancies through discussion, rereading source material and collaboration. In the event that agreement cannot be reached, the opinion of a third reviewer (CD) will determine the final result.

Presentation of findings
Following the PRISMA-ScR scoping review extension guide, we will present study screening and inclusion in a PRISMA chart [35]. We will also present a summary table of the studies meeting eligibility criteria including the stated aims of the study, study design, study setting, participant characteristics, and patient communication strategy. We will present extracted and coded barriers and facilitators both quantitatively and qualitatively.

Synthesis of barriers and facilitators
Barriers and facilitators will be coded and categorized into the 14 domains of the TDF using a recommended coding approach [25, 36, 37]. A coding book will be developed by the research team prior to the coding process and iteratively modified to ensure accuracy, consistency, and transparency of the interpretive process of categorizing barriers and facilitators to the TDF domains [37].

Two reviewers will independently and deductively code the barriers and facilitators and will meet to discuss coding discrepancies until a final TDF categorization is accomplished. The resulting TDF categorization will be reviewed by the entire authorship team to determine if any alternative categorizations are plausible. We will then review the full list of extracted barriers and facilitators categorized each domain and determine the number of unique barriers and facilitators in each. Three criteria will be used to judge relevance of a TDF domain: (1) relatively high frequency of barriers or facilitators, (2) presence of conflicting barriers or facilitators, and (3) evidence of stakeholder beliefs that impact utilization of a communication strategy [25]. The authors will solve discrepancies through discussion, rereading source material, and collaboration.

We will present a quantitative summary of the barriers and facilitators to patient communication strategy utilization in the adult ICU including the frequency of reported barriers and facilitators in included studies (as counts within each TDF domain and proportions overall). We will also present the frequency (proportion) of barriers and facilitators in each TDF domain according to study design, communication strategy, and the stakeholder reporting the barrier or facilitator.

A qualitative analysis will be performed to provide major themes of barriers and facilitators of each TDF domain with reference to stakeholder and communication strategy [38]. Following an immersive reading of the coded TDF domains, we will look for recurring patterns

Table 2 Study identifiers and data to be extracted

| Category | Description |
|----------|-------------|
| First author and year of publication | Full reference |
| Location of publication | Study design |
| Participant (e.g., patient, nurse, physician, interdisciplinary clinician, family) and unit characteristics | Stated aim(s) of study |
| Communication strategy (e.g., AAC unaided or aided, low or high tech, voice restorative device) | Verbatim description of barriers and facilitators to communication strategy utilization with reporting stakeholder noted |
| Stakeholder reported outcomes related to communication strategy utilization (e.g., ease of tool use; acceptability of tool; satisfaction; speech intelligibility) | AAC, augmentative and alternative communication |

AAC, augmentative and alternative communication
in the data. Peer debriefing and reflexive writing will be
used to bring meaning and coherence to barrier and fa-
cilitator concepts linking substantial portions of the data
together. The overarching themes will represent patterns
identified in the data comprising domain concepts most
likely to influence communication behaviors including
those that are potentially modifiable. Verbatim exem-
plars will be provided for the included TDF domains.

Quality assessment
We will appraise the risk of bias of included studies
using the Mixed Methods Appraisal Tool (MMAT)—
Version 2018 [39, 40]. The MMAT is an easy to use tool
demonstrating moderate to perfect interrater reliability
[41]. Two reviewers (LI/FG) will independently appraise
study quality. Though we will not exclude studies of low
quality, we will use the results to describe the rigor of
the included studies.

Discussion
The primary aim of this scoping review is to answer the
question: What are stakeholder reported barriers to and
facilitators for patient communication strategy utilization
for adults with an advanced airway in the ICU? To answer
this question, we will map and synthesize stakeholder re-
ported barriers and facilitators in the current peer-
reviewed evidence-base to the domains of the TDF. We
will build upon existing reviews by incorporating the
qualitative and mixed methods literature, which may offer
new stakeholder perspectives and contextual understand-
ings. Since the TDF is a broad framework about behavior
change that includes individual and environmental/con-
textual domains, it is a suitable framework to categorize
the potential wide range of stakeholder reported barriers
to and facilitators of communication strategy utilization
in the adult ICU.

As physical and psychological harm can result from
communication impairment in adult ICU patients
treated with an advanced airway, it is critical to address
this complex issue. The synthesis of barriers and facilita-
tors using the TDF will allow us to better understand
and highlight potentially modifiable antecedents to be-
behavior change related to communication strategy
utilization in the adult ICU. Furthermore, using the TDF
to categorize barriers and facilitators reported in the
current evidence base provides a theoretical foundation
for future interventions targeting behavior change. The
results of this review will also help to identify trends and
gaps in the current peer-reviewed evidence base and
support recommendations for improving patient-
centered practice and policy related to successfully es-
ablishing and sustaining adult patient communication
in the ICU.

Strengths and limitations
The strengths of this scoping protocol include the use of
a transparent and established scoping review method-
ology and reporting structure; a systematic search of five
electronic databases developed in consultation with a
health sciences information specialist; systematic screen-
ing and data extraction carried out by two independent
reviewers for all steps except the initial screen; the inclu-
sion of qualitative and mixed methods studies; the inclu-
sion of a quality assessment step using the MMAT; and
the use of a theoretical framework to map and synthesize
barriers and facilitators to patient communication
strategy utilization that spans multiple levels of
influence in the adult ICU.

Limitations of our protocol include selection bias by
restricting our search to publications in English after
1990, the use of a rapid review approach including omiss-
on of gray literature, and single reviewer first screen of
titles and abstracts. To mitigate risk of selection bias in-
roduced by our rapid evidence selection processes, we
will follow recommended strategies to ensure replicabil-
ity (methodological transparency), objectivity and accur-
acy (two independent screeners for second review of
titles/abstracts and full text, two independent data ex-
tractors with a detailed process of reaching agreement,
use of a quality assessment tool), and comprehensiveness
(multiple databases and hand-searching of reference
lists) [42, 43].

Supplementary information
Supplementary information accompanies this paper at https://doi.org/10.
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Abbreviations
AAC: Augmentative and alternative communication; ICU: Intensive care unit;
MMAT: Mixed Methods Appraisal Tool; TDF: Theoretical domains framework

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Authors’ contributions
LI conceptualized the study and prepared the draft proposal under the
supervision of CD, LR, and YY. Both LI and CD contributed to the
development of the background and planned output of the research as well
as the design of the study. LI prepared the manuscript, and CD, LR, FG, and
YY reviewed it. All authors contributed to the reviewed draft version of the
manuscript and approved the final version.

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