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Research Article

Defining effective communication for critically ill patients with an artificial airway: An international multi-professional consensus

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ABSTRACT

Objectives: To define effective communication and identify its key elements specific to critically ill patients with an artificial airway.
Design: A modified Consensus Development Panel methodology.
Setting: International video-conferences.
Main outcome measures: Definition of effective communication and it's key elements.
Results: Eight experts across four international regions and three professions agreed to form the Consensus Development Panel together with a Chair and one person with lived experience who reviewed the outputs prior to finalisation. "Communication for critically ill adult patients with an artificial airway (endotracheal or

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tracheostomy tube) is defined as the degree in which a patient can initiate, impart, receive, and understand information, and can range from an ineffective to effective exchange of basic to complex information between the patient and the communication partner(s). Effective communication encompasses seven key elements including: comprehension, quantity, rate, effort, duration, independence, and satisfaction. In critically ill adults, communication is impacted by factors including medical, physical and cognitive status, delirium, fatigue, emotional status, the communication partner and the nature of the ICU environment (e.g., staff wearing personal protective equipment, noisy equipment, bright lights)." The panel agreed that communication occurs on a continuum from ineffective to effective for basic and complex communication.

Conclusion: We developed a definition and list of key elements which constitute effective communication for critically ill patients with an artificial airway. These can be used as the basis of standard terminology to support future research on the development of communication-related outcome measurement tools in this population.

Implications for clinical practice: This study provides international multi-professional consensus terminology and a definition of effective communication which can be used in clinical practice. This standard definition and key elements of effective communication can be included in our clinical impressions of patient communication, and be used in discussion with the patient themselves, their families and the multi-professional team, to guide care, goal development and intervention.

Introduction

Critically ill patients are a highly complex and heterogenous group. A commonality within this group is that many need mechanical ventilation (Wunsch et al., 2010; Zilberberg et al., 2020; Cheung and Napolitano, 2014; Casamento et al., 2018). Communication, including both verbal and non-verbal modalities is often impaired or impossible due to many factors, including the nature of the patient's illness, weakness, cognitive impairment, fatigue, and sedation (Vincent, 1997). Mechanical ventilation necessitates placement of a tube within the airway (orally, nasally or via a tracheostomy). The presence of the tube obstructs normal airflow through the upper airway, larynx and vocal folds and prevents vocalization (Kazandijian and Dikeman, 2022). This creates a communication impairment attributable to the presence of an artificial airway. In addition, some patients present with a communication impairment(s) secondary to a co-occurring medical condition such as stroke, with concomitant dysarthria or dyspraxia (motor speech disorders), aphasia (disordered language), the presence of delirium and/or because of intubation trauma to laryngeal structures and function (Wallace and McGrath, 2021), a surgical complication resulting in dysphonia (disordered voice). Thus, an artificial airway combined with these disease specific conditions creates barriers to communicating effectively. Other factors which can negative impact a patient's capability to engage in communication include impaired vision and hearing (Cruice et al., 2009), and cultural and linguistic diversity (Li et al., 2017; Yu et al., 2020). In the case of an unplanned Intensive Care Unit (ICU) admission, it is not uncommon for glasses or hearing aids to be left at home.

The communication difficulty of a patient with an artificial airway is unique compared with that of patients with an acquired, progressive degenerative, congenital communication or cognitive-linguistic impairment. Importantly, the clinical environment of the ICU (Backes et al., 2015) is known to significantly impact wellbeing, experience, and recovery (Halvorsen et al., 2022; Wenham and Pittard, 2009; Tronstad et al., 2021; Topcu et al., 2017). The experience of critically ill patients in the ICU highlights the negative relationship between mechanical ventilation and significant distress, frustration, helplessness and anxiety due to their inability to communicate (Ashkenazy et al., 2021; Guttormson et al., 2015; Khalaila et al., 2011; Carroll, 2007) which mirrors their nurses' report of frustration and stress which arises from difficulty communicating with their patients (Yoo et al., 2020; Magnus, 2006; Bergbom-Engberg and Haljamae, 1993). This patient group can be described as "communication vulnerable" (Blackstone et al., 2015).

There are a range of alternative and augmentative communication (AAC) or non-verbal interventions and verbal communication interventions which have been examined in the ICU setting (Carruthers et al., 2017; Ten Hoorn et al., 2016; Zaga et al., 2019). Non-verbal interventions or AAC such as a communication board (Hosseini et al., 2018; El-Soussi et al., 2015), electrolarynx (Tuinman et al., 2015; Rose et al., 2018; Sato et al., 2016), speech-generating device (Happ et al., 2005, 2004; Koszalinski et al., 2015; Rodriguez et al., 2016) or eye-gaze or eye-blink technology (Garry et al., 2016; Miglietta et al., 2004; Maringelli et al., 2013)can be utilised by patients with either an endotracheal or tracheostomy tube dependent on their level and duration of alertness, cognitive status and the degree of ICU acquired weakness. Verbal communication interventions with a tracheostomy tube include above cuff vocalization (McGrath et al., 2019, 2016; Mills et al., 2021) talking tracheostomy tubes (Pandian et al., 2014), ventilator-adjusted leak speech (Hoit et al., 2003; Hoit and Banzett, 1997; Garguilo et al., 2013) and one-way speaking valve in-line with the ventilator (Prigent et al., 2010; Sutt et al., 2015; Freeman-Sanderson et al., 2016). Interventions targeting communication in the critically ill have demonstrated feasibility, utility and safety (Zaga et al., 2019). While these findings are positive, without a patient-specific definition of the outcome, clinicians are unable to determine which interventions and therapies are most beneficial to improve communication (Zaga et al., 2020).

Effective communication most often refers to the effectiveness of communication between healthcare professionals' or between staff and patients or their significant others (Bramhall, 2014; Ratna, 2019; Grover, 2005). Effective communication is fundamental to humanizing care and enabling patients to participate in their healthcare (Blackstone et al., 2015; Nin Vaeza et al., 2020).

While general definitions of communication and functional communication exist (Blackstone et al., 2015; Beukelman and Light, 2020; Doedens and Meteyard, 2022), there is no internationally agreed upon definition of effective communication that pertains specifically to critically ill patients with an artificial airway, nor consensus on the key elements that determine the effectiveness of communication for this patient population. As such, a population-specific definition of effective communication is needed to standardise the evaluation of these patients' communication abilities, enabling appropriate therapeutic recommendations. Furthermore, such a definition may promote outcome measurement consistency in future research. The aim of this study was to define elements of effective communication specific to critically ill patients with an artificial airway, to underpin the future development of quantitative outcome measurement tools.

Methods

Ethical approval for this study was granted by The University of Melbourne Office of Research Ethics and Integrity (Ref 2021-22766-23342-6). A Consensus Development Panel (CDP) methodology (Black et al., 1999; Nair et al., 2011; Waggoner et al., 2016) was used to bring selected experts in the field together to develop a definition and list of key elements of communication specific to critically ill patients with an

artificial airway.

Participants

A multi-professional, international panel was assembled to reflect diversity of clinical practice and across disciplines and different regions (Black et al., 1999; Nair et al., 2011). Participants were invited if they had expertise in working clinically and conducting research with patients who communicate with an artificial airway; specifically, they had to have evidenced expertise and authored or co-authored at least two peer-reviewed publications that related to communication in mechanically ventilated participants. This list of experts was generated by two systematic reviews (Zaga et al., 2019, 2020) and a grey literature search updated in June 2021. In accordance with the CDP methodology, twelve experts were invited to participate together with the primary investigator who acted as the panel chair. Two people with recent lived experience of having an artificial airway in the ICU (one female from Australia and another from the United Kingdom (UK)), were invited via email, by the chair of the panel (CJZ) and panel member (BAM) to review and contribute to the consensus-outputs. The email invitation outlined the background and aims of the present study and invited their participation.

Procedure

A Consensus Development Panel is typically conducted as a face-to-face conference (Diamond et al., 2014). This CDP was modified to conduct meetings via videoconference and email exchange which enabled international participation during the COVID-19 pandemic. Three videoconference meetings were scheduled, with two or three meetings predicted to be required. The meetings were moderated by a Chair, a clinician-researcher with a clinical background in Speech Pathology, who was undertaking a postdoctoral degree at the time of the study. In the first meeting, the Chair presented relevant evidence including systematic reviews which reported on communication interventions with critically ill patients requiring an artificial airway and outcome measurement tools (Zaga et al., 2020, 2019). A preliminary definition and proposed list of key elements of effective communication developed by the Chair in conjunction with their academic supervisory panel, which formed the basis of the discussion during in the first meeting. The material circulated subsequent to the first meeting included minutes of the previous meeting and content for the panel's consideration. The subsequent meeting sought to refine and clarify both the definition and the key elements. The Chair gave equal opportunity for each participant to express their opinions and thoughts, and all panel members were active during the meetings. The consensus target was determined a priori as $\geq$75 % overall agreement for the proposed definition and key elements respectively (Diamond et al., 2014). Anonymous voting occurred after the second meeting. Participants had a week to review the circulated material and provide feedback electronically prior to the vote. Voting via the online platform (https://www.pollev.com) was activated for a 24-hour period. Two polls were activated, one for the definition and one for the list of key elements via a binary response of either agree or disagree. The Chair did not partake in the voting.

Outcomes

The primary outcomes of the study were 1) to develop a definition of effective communication for critically ill patients with an artificial airway and 2) a list of the key elements that define effective communication in this population.

Data analysis

The meetings were recorded and transcribed, with transcription content reviewed for accuracy by the Chair. The Chair synthesised the data content, analysing the results thematically with the generation of codes which were thematized accordingly (Tuckett, 2005; Maguire and Delahunt, 2017). The themes were then incorporated into the revised definition and list of key elements for further discussion with the panellists. The Chair distributed the revised definition and list of key elements of effective communication following the outcome of the second videoconference via email prior to anonymous voting.

Results

Participants: Panel

Eight out of twelve invited experts agreed to participate in the CDP together with one Chair, across four international regions and three professions (speech pathology, nursing and medicine) (See Supplementary Material). The panel met on two occasions, 22nd/23rd November 2021, and 30th November/1st December 2021 (dependent on time zone) for one hour. Live polling was planned during the second meeting; however, the discussion took up the entire hour. The live polling was enabled for a specified 24-hour period on 9th/10th December 2021. Two polls were activated: the first for the definition of effective communication and the second for the list of key elements. All eight participants engaged in and completed voting in full to generate the consensus rating. Seven out of eight (87.5 %) participants voted in agreement of the CDP generated definition and list of key elements of effective communication respectively.

Participants: People with lived experience

One of the two invited people with lived experience (TQA) agreed to participate in the study.

The definition and key elements of effective communication

The panel acknowledged that no definition of effective communication specific to both the target population and clinical setting currently exists, confirming the gap in the evidence and indication for this CPD. Over the course of the two online meetings, the CDP generated the following definition: "Communication for critically ill adult patients with an artificial airway (endotracheal or tracheostomy tube): is defined as the degree in which a patient can initiate, impart, receive, and understand information, and can range from an ineffective to effective exchange of basic to complex information between the patient and the communication partner(s). Effective communication encompasses seven key elements including: comprehension, quantity, rate, effort, duration, independence, and satisfaction. In critically ill adults, communication is impacted by factors including medical, physical and cognitive status, delirium, fatigue, emotional status, the communication partner and the nature of the ICU environment (e.g., staff wearing personal protective equipment, noisy equipment, bright lights)."

The preliminary list of key elements included descriptors (i.e., explanation). The panel agreed that descriptors of the key elements were necessary to enhance the definition to guide objective communication assessment and provision of therapy. The preliminary list contained five key elements; however, the descriptors of two of the key elements contained terms (*rate and effort*) which the CDP agreed were significant enough to form discreet elements. As such, the consensus list contained a total of seven key elements. Table 1 displays the list of key elements and their descriptors.

Continuum of effective communication

While not a primary aim, during the panel discussions, the panel agreed unanimously that effective communication of patients with an artificial airway presented on a continuum from ineffective to effective

Table 1
Preliminarily proposed and consensus list of key elements of effective communication and their descriptors.

Proposed		Agreed	
Element	Descriptor	Element	Descriptor
Quantity	• The amount of communication expressed • The mean length of utterance	Quantity	• The amount expressed (e.g., single words, full sentences) • The frequency of communication interactions (i.e., how often)
Quality	• The rate of communication, the naturalness • The intelligibility (how easily understood)	Comprehension	• The degree in which the overall message was understood
		Rate	• The rate of communication (e.g., slow, fast, variable) • The degree in which the rate interrupts flow of conversational exchange
		Effort	• The degree of effort expended using communication method
Duration	• The amount of time taken to communicate or the amount of time communicating • If the use of the mode(s) and method(s) of communication was restricted, by the patient, the clinician or both	Duration	• The amount of time communicating • The degree in which the use of the communication method was time-restricted, either by patient or communication partner
Independence	• The degree of independence the patient has regarding initiating communication • The degree of independence the patients has in setting up via the specific mode(s) and method(s)	Independence	• The degree of independence for initiation of communication • The degree of independence for setting up and using the communication method
Satisfaction	• The degree of satisfaction with communication mode(s) and method(s) utilised • The degree of effort, overall satisfaction and/or specific to the subsequent elements	Satisfaction	• The patient's and communication partner's perceived satisfaction with their communication • The patient's and communication partner's perceived satisfaction with the communication method

and devised a conceptual matrix to visually illustrate the continuum of effective communication at a basic or complex level (See Fig. 1). Effective communication can be achieved via verbal or non-verbal communication (also known as AAC).

The panel debated what constituted basic and complex communication, with length of the communication (how long was the utterance, e.g., two-word phrase or complete sentence) considered to be a key factor. The panel discussed that variation and nuance often existed in a communication exchange, making definitive descriptors challenging. For example, a patient could respond using single words only but communicate effectively about complex topics. Conversely, a patient could respond in multiple word phrases and sentences but be nonsensical due to the presence of delirium thereby diminishing effective communication. It was therefore agreed that communication length, content, and comprehension were all determinants of whether a communication exchange was basic or complex. Basic communication referred to simplistic, contextual and/or single-message expressions related to wants, needs, emotions and pain. For example, "I need to be suctioned" or "I have pain here". Complex communication referred to non-contextual, abstract and/or multi-component expressions, e.g. "How long will I need this breathing tube for?" or "When will the pain subside?". (See Table 2). Additional selected detail of the CDP discussion can be viewed in Appendix 1.

Feedback from a person with lived experience

The person with lived experience and panel Chair had a phone meeting to further discuss the study and she recalled aspects of her lived experience; specifically, how it related to the study and how she thought she would like to contribute. The person with lived experience reviewed the panel's outputs and provided her reflections via quotations which can be viewed in Table 3. The consumer's feedback regarding the continuum of effective communication prompted change from a unidirectional arrow to a bidirectional arrow as seen in Fig. 1.

Discussion

A multi-professional international panel of experts reached consensus on a definition and list of key elements of effective communication for critically ill patients with an artificial airway. The definition incorporated the traditional themes of the degree to which a patient can initiate, impart, receive, and understand information together with reference to a continuum which ranges from ineffective to effective exchange of basic to complex information. Importantly, the definition highlighted the medical, cognitive, and emotional factors, the physical environment and context, which together with the presence of the breathing tube, creates a unique, population-specific communication exchange. It was agreed that effective communication encompassed seven key elements including comprehension, quantity, rate, effort, duration, independence, and satisfaction.

The experience of patients in the ICU highlights the negative relationship between invasive ventilatory support and emotional distress, feelings of helplessness, fear, and anxiety (Ashkenazy et al., 2021; Guttormson et al., 2015). A common major cause of emotional distress for such patients is reported to be an inability to communicate basic wants and needs to staff and communicate with their family (Khalaila et al., 2011). In this study, the person with lived experience recounted her experience of recovery specific to her communication with staff, where she shared humour in addition to basic wants and needs. The person with lived experienced further described how she progressed along the *continuum of effective communication*, albeit not in a linear fashion, in the context of delirium. Further exploration of what patients want and need to communicate, which extends further than requests for bodily-related actions (e.g., suction or re-positioning), is a priority for future work.

Staff who have difficulty communicating with patients have reported

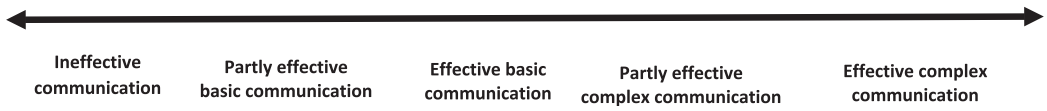

Fig. 1. Continuum of effective communication.

Table 2
Differentiation of Basic versus Complex Communication.

Element	Basic communication	Complex communication
Expression: Length	Short (e.g., yes, no)	Long (e.g., full sentences)
Expression: Content	Simplistic, concrete, contextual and/or single-message expressions (e.g., wants, needs, emotions and pain)	Multi-component, abstract, non-contextual expressions (e.g. basic communication content plus questions, humour, discussion and conversation)
Comprehension	Demonstrates reliable yes/no response for concrete and contextual items and ability to follow single stage commands	Demonstrates basic comprehension plus: • Reliable yes/no response for abstract and non-contextual items and • Understanding of open-ended questions

Table 3
Reflections from a Person with Lived Experience.

Consensus output	*Consumer reflections*
The definition of effective communication	*"The major limitation for my communication even more than the artificial airway was due to weakness and fatigue"*
The continuum of effective communication	*"As a patient who regained consciousness with an unexpected tracheostomy I can relate to the continuum of effective communication whilst I was on critical care. I can recall reaching each stage of the continuum; however my progress wasn't a linear progression along this continuum and therefore I feel it is appropriate for this scale not to be represented as a linear, improving scale (Fig. 1)."*
The differentiation of basic and complex communication	*"Table 2 expresses personal milestones I reached during my time on ICU, for example I distinctly remember sharing humour with my caregivers and this was coupled with my general feeling of gaining strength and clarity within my mind as the delirium wore off."*

negative impact on patient care and reduced job satisfaction (IJessennagger et al., 2018). Interventions targeting communication in the critically ill have demonstrated feasibility, utility, and safety (Zaga et al., 2019). Despite these positive findings, purpose built and validated outcome measurement tools are needed to support clinicians to determine which interventions and therapies are most beneficial to improving patient outcomes related to communication interventions (Zaga et al., 2020). Importantly, this requires a clear definition of the outcome to ensure important domains are measured.

The value of the present study is twofold. Firstly, it provides clinicians with consistent terminology and a definition that can be used to report and discuss the patient's communication abilities and goals, both with the patient, their families, and the multi-disciplinary team. Secondly, it provides researchers with a standard definition of effective communication for critically ill patients with an artificial airway and its core components enabling the development of outcome measurement tools and quantitative evaluation of the efficacy of interventions on communication. To date, clinicians have assessed and treated patients who are trying to communicate with an artificial airway using subjective clinical judgements and/or outcome measurement tools that are not fit for the purpose, not developed with the specific communication barrier of the artificial airway central to the tool and importantly, not validated in the critical care population (Zaga et al., 2020). Researchers have examined communication methods and measured effects, without clearly defined or accepted terms of effective communication. Our consensus-based definition of effective communication was developed to address a gap for critically ill patients with an artificial airway. The assembly of an international multi-professional panel of experts in critical care and/or communication and/or artificial airways who are also experienced clinician-researchers added credibility to the consensus methodology and supported the robust development of the intended goal specifically as it enabled discussion of communicative effectiveness from different professional perspectives (Nair et al., 2011). The modified approach of virtual meetings rather than face-to-face conference enabled international membership and rapid discussion with progression to anonymous voting. This process was also likely facilitated by the development of a novel definition and list of its key elements in the critical care setting.

Study limitations

The notable limitation of this study was the small pool of experts meeting our inclusion criteria, due to the limited evidence base in this topic, and four experts did not respond to the invitation to participate Accordingly, the participants were from a limited number of specialist health services and this may have led to unconscious collective bias (Durkheim, 1982). The fact that panel participants were not blinded to each other may have naturally influenced the process. Feedback from only one person with lived experience with an artificial airway in the critical care setting is a second limitation, though it set an important tone for the immense value-add of patient engagement in clinical research.

Areas for future research

Testing the external validity of this definition with ICU staff not specialised in the area of communication is required. The development of an outcome measurement specifically for critically ill patients with an artificial airway who communicate in the ICU setting is needed to measure effectiveness of communication therapies. The authors intend to develop such a tool which could subsequently be used by the patient to rate communication satisfaction with communication and rate the degree of effort required to communicate, in real time, during the ICU admission. This tool would enable evaluation of communication between patients and their communication partners (healthcare professionals and families and/or carers), and would help to identify the optimal communication method(s) for specific patient populations and individual patients with an artificial airway. The advantage of such an outcome measure is that it combines quantitative data and patient preference. Furthermore, the existence of a standardised definition of effective communication and development of a validated outcome measure would harmonise with the ICU Liberation Bundle which promotes minimisation of sedation, minimising risk factors for delirium and maximising family engagement (Morandi et al., 2011; Pun et al., 2019). Following its development, the measurement tool will be validated in

clinical practice. Future work will require direct patient and family partnership, where their involvement will be integral to the development and validation of the tool. Additional patient perceptions and attitudes towards the consensus definition and key elements of effective communication would also add value. This would ensure that future research is meaningful and is focused on what patients and their communication partners deem to be important, not what clinicians assume to be important (Burns et al., 2018). The development of a core outcome set for studies of communication interventions to enable communication in adults requiring an artificial airway with or without mechanical ventilator support is a notable concurrent body of work which will facilitate future research (Development of a core outcome set for studies for interventions to enable communication in adults requiring an artificial airway with or without mechanical ventilator support [Internet], 2020). Lastly, the aim of the study was to define and identify a list of key elements of effective communication which could be applied in any intensive care unit, and not to provide recommendations for clinical practice. Future work is required to provide recommendations for how healthcare professionals can support patients with an artificial airway to communicate and communicate effectively with them.

Conclusion

Using CDP methodology, we produced a consensus definition and list of key elements of effective communication for critically ill patients with an artificial airway. This definition incorporates components of a communication exchange, the concept that effective communication sits on a continuum from ineffective to effective and is influenced by the presence of an artificial airway and the critical care environment in which communication exchanges occur. This work will support the development of future outcome measurement tools and serve as a standard terminology for future research.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Selected detail of CDP discussion

- The panel discussed the elements of communication within an exchange between communication partners; the degree in which one can initiate the communication, impart or transmit the message, receive the partner's message and make sense of it or understand it.
- The panel agreed that communication in the ICU can be conceptualised on a continuum. The initial descriptors presented to the panel included the terms *ineffective* and *effective*, *functional, and non-functional.* Bodies of work in the field of aphasia, differentiate a language and communication impairment from functional 'real world' communication which sits across the activity and participation levels on the International Classification of Functioning (Organization WH, 2001; Doedens and Meteyard, 2020). The term *functional communication* has been used in aphasia literature to describe contextual everyday use of language (Doedens and Meteyard, 2020; Armstrong and Ferguson, 2010).
- During the panel discussions, the term *functional* was dismissed as it was deemed both ambiguous and superfluous, since a patient's communication could be both functional and effective and it was decided that the term functional did not add anything significant or relevant to the description of the communication.
- The panel agreed that effective communication in the ICU is comprised of multiple elements, which reflects the dynamic and processual nature of a communication exchange and/or interaction.
- The preliminary elements which for presented for discussion were satisfaction, quantity, quality, duration, and independence. Each of these presented domains were supported by additional descriptors; Satisfaction – relating to the communication mode(s) and method(s) utilised, degree of effort, overall satisfaction and/or specific to the subsequent elements; Quantity – relating to the amount of communication expressed and the mean length of utterance; Quality – relating to the rate of communication, the naturalness and the intelligibility (how easily understood); Duration – relating to the amount of time communication and if the use of the mode(s) and method(s) of communication was restricted, by the patient, the clinician or both; and Independence – relating to the degree of independence the patient has regarding initiating communication and setting up via the specific mode(s) and method(s). Through the discussions, the panel established that comprehension was a necessary addition to describe the degree in which the communication is understood and makes sense to the communication partner(s), since the other domains reflect expressive communication. Comprehension was deemed to be a more appropriate term to describe the degree in which the overall message was understood than intelligibility as traditionally, intelligibility is a term used in the context of examining speech intelligibility in dysarthria. The degree of effort exerted to communicate was thought to be more fitting as a stand-alone element, rather than a component of satisfaction. The mean length of utterance was thought to be a less feasible measure of quantity of communication and therefore removed as a descriptor of this element. In turn, the frequency of communication interactions was added. The descriptor of naturalness was removed as this is not a component that would likely change through treatment e.g. the use of an electrolarynx or a speech-generating device and would rather be reflected within the satisfaction element with a given mode(s) and method(s).

Appendix B. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.iccn.2023.103393.

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