REVIEW

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Ensuring Effective Communication with Patients Receiving Mechanical Ventilation Support in Intensive Care Units: Current Communication Materials

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Abstract

In recent years, with the reduction in sedation use among mechanically ventilated patients, research indicates that a considerable number of patients stay conscious yet are incapable of verbal communication. The presence of an endotracheal tube or tracheostomy cannula, necessary for mechanical ventilation, disrupts or even prevents communication in these patients. As a result, communication challenges pose a major problem for patients receiving mechanical ventilation in intensive care units (ICUs), as well as their families and healthcare providers. These patients face considerable challenges in communication, as they are unable to convey verbal messages or respond to communication attempts. Only a small percentage of the messages conveyed by mechanically ventilated patients are received and understood by healthcare providers, indicating communication difficulties compounded by comprehension challenges. Effective communication with awake and responsive patients during mechanical ventilation facilitates early extubation and reduces ICU stay durations. Nurses must be well-versed in and must apply appropriate communication methods. Additionally, the use of various communication tools, such as low-tech communication boards, high-tech tablet computers, and communication cards, with great awareness is crucial for effective communication with this patient group. The aim of this review is to examine the effects of communication tools used with patients undergoing mechanical ventilation in ICUs on the communication between patients and health workers.

Keywords: Communication, communication tools, mechanical ventilators, intensive care units

INTRODUCTION

When examining sedation strategies applied to patients in intensive care during the last three decades, a transition has occurred from deep sedation practices to lighter sedation in terms of duration and intensity.[1-3] It is an established fact that a significant number of patients remain conscious and responsive during mechanical ventilation, yet are unable to speak due to the use of artificial airways.[2,4,5] Approximately 40% of intensive care unit (ICU) patients require endotracheal intubation or tracheostomy, which can impair their verbal communication.[5] During this process, the inability to speak among a considerable number of patients is frequently coupled with physical weakness, resulting in the incapacity to use gestures.[6] Consequently, there are challenges in receiving and understanding the messages conveyed by mechanically ventilated patients. Only about 5% of the messages patients attempt to convey are correctly perceived and understood by healthcare providers. This indicates that communication difficulties reported by 50% of mechanically ventilated patients are compounded by comprehension and perception challenges.[5,7]

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Communication difficulties pose significant challenges for mechanically ventilated patients in ICUs, their families, and healthcare providers.[8] Literature reviews reveal that various communication methods have been created and implemented in clinical settings to address communication issues with mechanically ventilated patients.[1,2,5,9-14] There are limited comprehensive studies in the current literature that cover all communication tools used in intubated patients. Considering the clinical impacts and benefits, along with the current gaps in the literature, this study seeks to elucidate the barriers to communication with mechanically ventilated ICU patients. Additionally, it seeks to evaluate and improve the effectiveness of communication, and develop new communication strategies by discussing the benefits of different communication tools and offering a perspective on existing deficiencies. In this context, addressing communication with conscious mechanically ventilated patients; the challenges of communication; the techniques used; and the materials employed for communication, along with their benefits, is believed to significantly enhance and facilitate nurse-patient communication.

Communication Methods and Tools Used in Patients Who Cannot Communicate Verbally

In ICUs, both verbal and non-verbal communication methods are used with mechanically ventilated patients, considering their health status and communication abilities. Different communication techniques can be employed simultaneously with the same patient.[15]

Common non-verbal communication methods used in ICUs include hand, eye, and head movements, gestures, eye-letter coding, writing yes-no questions, and lip reading.[7,9,14,16,17] However, the lack of lip-reading skills among healthcare providers often leads to misunderstandings. Additionally, these time-consuming methods can drain patients' energy, leaving them unable to communicate effectively.[2,7,18]

To overcome these challenges, various communication tools have been developed for non-verbal patients.[14] These tools typically include expressions related to physical needs (e.g., thirst, toilet needs), emotional states (e.g., anger, anxiety), requests (e.g., massage, turning lights on/off), hygiene needs (e.g., oral care), titles of healthcare providers (e.g., doctor, nurse), and pain assessment scales.[7,14]

Augmentative and alternative communication (AAC) methods, which include both aided and unaided techniques, have been developed to address communication deficits. Unaided techniques involve non-verbal communication methods (e.g., facial expressions, body posture, gestures), while aided techniques include low-tech and high-tech interfaces.[1,5] Low-tech AAC materials include writing tools, communication boards, and pain charts, whereas high-tech AAC materials encompass computer-based communication applications, tablet computers, eye-tracking devices, and speech-generating devices.[2,5,12,13] High-tech communication methods and communication boards are considered more user-friendly than other methods.[5,10,11,19] However, a consensus has yet to be reached regarding the most appropriate communication tool for ICUs, and more comparative research is needed.[20]

A Look at Studies Examining the Effectiveness of Communication Tools in Mechanically Ventilated Patients

It is evident that effective communication is of paramount importance in determining the course and outcome of patient treatment. Therefore, addressing communication problems in mechanically ventilated patients is of utmost importance.[21] In healthcare settings where services are meticulously provided, patient-centered communication enhances patient satisfaction, improves health outcomes, and increases care quality. However, patients who cannot communicate verbally due to illness or treatment processes often struggle to convey their needs to nurses or other healthcare providers.[22] In this context, examining the communication tools used with mechanically ventilated patients is crucial (Table 1).

An examination of studies conducted over the last ten years (2014-2023) reveals that low-tech communication tools developed for conscious patients in ICUs in our country include "pictorial communication materials"[7], "pictorial communication cards"[9], and "visual communication guides"[16]. High-tech communication tools include "computer-based communication tools" and "AAC systems (AACS) prototypes"[14]. Studies indicate that communication boards, a low-tech communication tool, are highly beneficial and effective in facilitating communication among patients, their families, and nurses.[2,10,11,21,23-26] Examples of communication boards are provided in Figures 1,2.[23]

Additionally, studies have utilized tablet computers[6,27], eye-tracking communication devices[28,29], voice-activated systems[30,31], and advanced support systems such as speech-generating devices[32,33] among the high-tech communication tools in the literature. Studies examining the effectiveness of communication tools used with mechanically ventilated patients are summarized in Table 2.

CONCLUSION

Communication difficulties between healthcare providers and mechanically ventilated patients in ICUs are common. The findings of the studies reviewed in this article suggest that both low-tech and high-tech communication tools used in ICUs can be effective in improving communication between ICU patients and healthcare providers. The use of low-tech and high-tech communication tools can enhance communication and improve patient-centered outcomes. A combination of methods is recommended. However, the implementation of advanced eye-tracking-based communication devices in ICU practices can significantly contribute to patient-centered care by improving communication in mechanically ventilated patients. Furthermore, integrating technological advancements into care will enhance the satisfaction of both patients and healthcare providers in this group, as well as improve nursing care outcomes.

Table 1. Communication tools used in mechanically ventilated patients

Communication tools used	
Low-tech communication tools	Pictorial communication materials
	Pictorial communication cards
	Visual communication guides
	Communication boards
High-tech communication tools	Computer-based communication tools
	Augmentative and alternative communication system (AACS) prototype
	Tablet computers
	Eye-tracking communication devices
	Voice-activated and speech-generating devices

Figure 1. Sample communication board.[23]

Figure 2. Sample communication board.[23]

Table 2. Studies investigating the effectiveness of communication materials used in patients receiving mechanical ventilator support

Author/year	Country	Type of research/sample	Measurement tool	Research findings
Kuruppu et al.[2]	Sri Lanka	Qualitative research n=17 (nurses: 9, patients: 8)	Communication board	It was determined that communication practices in the ICUs where the research took place included head nodding, gestures, lip reading, eye blinking, and the use of paper and pen, but communication boards had not been used previously. After the implementation, both patients and nurses participating in the research expressed that the use of communication boards was acceptable and appropriate for effective communication. However, nurses indicated that during busy times, they might use communication boards less. The study concluded that communication boards are highly important for identifying patient needs, improving nurse-patient communication, and ensuring patient-centered care in intensive care units.
Szymkowicz et al.[5]	Belgium	Randomized crossover comparison n=44 (patients)	Communication card eye-tracking system (ET)	This study compared the use of low-tech communication cards and high-tech eye-tracking devices to enhance the effectiveness of interactions with mechanically ventilated patients in ICUs. The results revealed that the eye-tracking device quantitatively and qualitatively improved communication effectiveness compared to conventional communication cards. Additionally, the study concluded that the use of advanced eye-tracking-based communication devices in ICU practices can improve communication in mechanically ventilated patients, thereby contributing to patient-centered care.
Bhardwaj and George[10]	India	Quantitative research n=50 (patients)	Post-test communication board	This research sought to evaluate the efficacy of communication boards in terms of satisfaction among patients receiving mechanical ventilation in ICUs. The communication board was implemented in the experimental group throughout the weaning process. The results showed a significant difference in communication satisfaction scores between the experimental and control groups, suggesting that the implementation of communication boards effectively increased satisfaction among mechanically ventilated patients.
Ull et al.[29]	Germany	Experimental research n=11 (patients)	Richmond Agitation-Sedation Scale Eye-tracking system (ET)	In this study, the ET system was observed over a 4-week period in patients undergoing mechanical ventilation through oral intubation or tracheostomy. The results showed that all patients preferred the gaze fixation technique over blink control to operate the eye-tracking system. The study concluded that eye-tracking systems can be easily used to express patients' basic needs and fears, monitor complications during rehabilitation, and respond to assessment scales related to pain, quality of life, and self-esteem.
Yırtık et al.[14]	Türkiye	Qualitative research n=7 (healthcare workers: 5, patients: 2)	High-tech augmentative and alternative communication system (AACS) prototype	In this study, a high-tech prototype was created to address the communication requirements of non-verbal individuals in intensive care, based on data obtained from qualitative research interviews. The prototype was designed to facilitate communication among patients by dividing it into submenus. In addition to the existing touchscreen, the prototype's pointing feature further simplified communication. Along with the development of pre-defined cards as the primary communication tool, the prototype included modules such as "pain modüle", "drawing module", "writing module, and text-to-speech module" to address patients' communication needs. It was noted that the prototype could be preferred in situations where other communication methods are insufficient for non-verbal patients.
Divani et al.[11]	Iran	Randomized controlled trial n=60 (patients)	Communication board	In this study, after nurses were trained on the use of communication boards, notable differences were observed in serum cortisol levels among patients, who communicated using the boards and those who used routine communication methods. Additionally, significant reductions in hemodynamic parameters, including heart rate and blood pressure, were noted following the use of communication boards. At the beginning of the study, patients with high cortisol levels were found to be anxious. However, the use of communication boards effectively reduced both cortisol levels and anxiety.

Table 2. Continued

Author/year	Country	Type of research/sample	Measurement tool	Research findings
Ull et al.[28]	Germany	Prospective descriptive study n=64 (patients)	Survey form Behavioral Pain Scale (BPS) Eye-tracking system (ET)	At the beginning of the research, calibration was performed by having each patient follow a cursor on a monitor with their gaze, reaching a total of 9 consecutive points. Subsequently, all patients were introduced to the eye-tracking system by playing simple games for 10 minutes. After completing the training phase, a yes-no questionnaire was projected onto the monitor and was designed to be read aloud using the eye-tracking system. Patients read the question on the monitor and selected "yes" or "no" by fixing their gaze on the corresponding answer. The study concluded that the use of these devices, which can convert text and symbols into clear speech and provide access to computers, phones, and control of Windows or home environments, led to improvements in family support and quality of life for patients.
Kuyler and Johnson[25]	South Africa	Qualitative research n=40 (nurses: 30, patients: 10)	Vidatak EZ board	In the study conducted to identify the content of the communication board, patients and nurses suggested 111 common words that should be included on the board. Of these, 104 words were included in the communication board employed in the research, and the final selection of words was based on patient preferences. While evaluating the words, the patient and nurse participants recommended that certain phrases be adapted for South African use. For example, "I love you" should be changed to "I appreciate you," "light-headed" to "dizzy," "physical therapist" to "physiotherapist," and "respiratory therapist" to "respiratory care practitioner." They also suggested removing some phrases from the board as they were not linguistically or culturally appropriate for South Africa. Additionally, they proposed adding words such as "catheter," "place, date, month, and time," "please," "okay/good," "good morning or hello," "move, get up, or walk," "speech therapist," "psychologist," "bed up or down," and "head up or down. The study concluded that the Vidatak EZ Board communication board is valuable for patient communication in intensive care units and that a portion of its content is applicable in South Africa. However, the study emphasized that word selection, linguistic, spiritual, and cultural diversity should be thoroughly evaluated when designing such boards.
Al-Yahyai et al.[22]	Oman	Descriptive-cross-sectional study n=194 (nurses)	Survey form	This study found that very few nurses used alphabet, picture, writing or drawing boards, or modern electronic assistive devices, while the majority relied on traditional methods such as lip reading and using gestures/body language. It was observed that nurses did not adopt assistive communication tools and lacked standardized, evidence-based communication methods. Therefore, the study concluded that policies should improve patient outcomes in intensive care units, and healthcare workers urgently require training in this area.
Vignesh et al.[34]	India	Quantitative research n=60 (patients)	Post-test Patient Satisfaction Scale High-tech Communication board	This research was carried out to assess the effects of implementing a high-tech communication board on patients' responses and satisfaction levels. In contrast to the group of patients who did not utilize the communication board, the group using the high-tech communication board showed significant improvements and increased satisfaction in their responses.
Albayram and Yava[9]	Türkiye	Descriptive study n=47 (patients)	Survey form pictorial communication cards	This research sought to examine the effects of pictorial communication cards, developed for communicating with intubated patients who had undergone open-heart surgery, on patient communication and satisfaction. The majority of patients reported that the pictorial communication cards assisted their communication. Additionally, it was observed that visual communication cards could be used for patients of all age groups, regardless of education level or gender, facilitating communication. However, it was concluded that these cards could not completely eliminate communication challenges.
Pandian et al.[33]	United States of America	Randomized controlled trial n=44 (patients)	Quality of life (QOL-MV) Voice-related quality of life (V-RQOL) Speech ıntelligibility test (SIT) Blue line ultra suctionaid (BLUSA) Speaking tracheostomy tube	This study, conducted with awake, mechanically ventilated patients attempting to communicate who could not endure a one-way speaking valve, assessed the quality of life through the use of the BLUSA speaking tracheostomy tube. The results showed that the BLUSA speaking tracheostomy tube significantly improved the quality of life for mechanically ventilated patients with tracheostomies who were unable to tolerate cuff deflation.

Table 2. Continued

Author/year	Country	Type of research/sample	Measurement tool	Research findings
Erturk Yavuz and Gursoy[16]	Türkiye	Mixed-methods research n=34 (healthcare workers: 20, patients: 14)	Visual communication guide	In this study, the implementation of a visual communication guide developed for patients who underwent partial laryngectomy in Türkiye showed that patients found the guide helpful and practical for expressing themselves. It was reported that the guide could be effective in preventing misunderstandings in communication and providing faster solutions to patient problems and requests. However, while 50% of the patients deemed the images insufficient, healthcare workers and other patients considered the images in the guide to be clear, comprehensible, and suitable in terms of color, size, and font. Healthcare workers stated that the guide was practical and efficient in saving time during communication but fell short in addressing patients' psychological concerns.
Hosseini et al.[21]	Iran	Quasi-experimental study n=30 (patients)	Hospital Anxiety and Depression Scale (HADS) Ease of Communication Scale (ECS) Communication board	This research sought to evaluate the impact of communication boards on communication and anxiety levels in conscious, mechanically ventilated patients in ICUs. The findings revealed that the implementation of communication boards facilitated communication and reduced anxiety. Additionally, it was noted that communication with conscious, mechanically ventilated patients is challenging. In the control group, where no assistive communication tools were used, difficulties persisted for a while but decreased over time. Traditional means such as body language and eye contact were identified as effective factors in communication.
Ertürk Yavuz and Gürsoy[35]	Türkiye	Experimental study n=90 (patients)	Survey form Glasgow Coma Scale Perianesthesia Comfort Scale State Anxiety Scale Computer-based communication tool (CBCT)	In this study conducted with mechanically ventilated patients in ICUs, after open-heart surgery, a CBCT which vocalizes patients' requests, needs, and problems in Turkish was used. The results revealed that 82.2% of patients in the control group and 20.0% of those in the experimental group experienced difficulties in communication. The experimental group had higher perianesthesia comfort scores and lower state anxiety scores compared with the control group. Although 93.3% of the experimental group patients, who were studied alongside CBCT, 43.3% of the control group patients reported that hand-arm movements were the best communication method, all patients in the experimental group found the communication tool easy and learnable. It was concluded that the developed CBCT assisted patients in communication, increased their comfort levels, and reduced their anxiety. It was emphasized that this tool is the first voice-enabled, pictorial, and easily applicable application developed in Türkiye for non-verbal patients to communicate with their surroundings.
El-Soussi et al.[23]	Egypt	Randomized controlled trial n=60 (patients)	Communication board	In this research, most patients in the intervention group found communication boards easier and more beneficial compared to using paper and pen for communication. Additionally, their mechanical ventilation and ICU stay duration decreased. On the other hand, most patients in the control group expressed dissatisfaction. The results showed that communication boards increased patient satisfaction levels and were an effective intervention in reducing patient distress.
Rathi and Baskaran[26]	India	Quasi-experimental study n=30 (patients)	Survey form Communication board	This study evaluated the impact of communication boards on the satisfaction levels of mechanically ventilated patients. The results revealed that the satisfaction levels of the experimental group, using the communication board, were notably higher compared with the control group, which used a routine whiteboard for communication. The study concluded that communication boards improved interpersonal relationships between nurses and patients, reduced communication errors, increased the time allocated for care, and enhanced patient comfort. It was emphasized that communication boards can be used to improve communication satisfaction in mechanically ventilated patients.

ICU: Intensive care unit

MAIN POINTS

- **Shift in sedation strategies and communication challenges**: Over the past thirty years, there has been a transition from deep sedation to lighter sedation practices in intensive care units (ICUs). This has resulted in some mechanically ventilated patients remaining conscious but unable to speak, leading to communication difficulties. Only about 5% of patients' messages are correctly understood, exacerbating communication challenges.
- **Non-verbal communication methods and tools**: In ICUs, non-verbal methods such as hand, eye, and head movements, writing, and yes-no questions are used to communicate with mechanically ventilated patients. However, these methods can be time-consuming and exhausting for patients. As a result, low-tech (communication boards, pictorial cards) and high-tech (eye-tracking systems, tablet computers, speech-generating devices) communication tools have been developed.
- **Effectiveness of communication tools**: Studies have shown that tools such as communication boards and eye-tracking systems are effective in helping patients express their needs, reducing anxiety, and facilitating nurse-patient communication. High-tech tools, in particular, provide more effective communication compared to traditional methods.
- **Cultural and linguistic adaptation**: The design of communication tools must take into account cultural, linguistic, and individual differences. For example, adapting the expressions on communication boards to local culture enhances patients' ability to use these tools effectively.
- **Role of technological advancements**: High-tech solutions such as eye-tracking systems, speech-generating devices, and computer-based communication tools have significant potential in meeting the communication needs of mechanically ventilated patients. These technologies support patient-centered care and improve satisfaction for both patients and healthcare providers. However, further research is needed to standardize and widely implement these tools.

Footnotes

Authorship Contributions

Concept: C.Ç., K.ÖY., Design: C.Ç., K.ÖY., Data Collection and/or Processing: C.Ç., K.ÖY., Analysis and/or Interpretation: C.Ç., K.ÖY., Literature Search: C.Ç., K.ÖY., Writing: C.Ç., K.ÖY.

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REFERENCES

1. Karlsen MW, Ølnes MA, Heyn LG. Communication with patients in intensive care units: a scoping review. Nurs Crit Care. 2019; 24(3): 115-31.
2. Kuruppu NR, Tobiano G, Ranse K, Abayadeera A, Chaboyer W. Facilitators, barriers and acceptability of implementing a communication board in Sri Lankan intensive care units: A qualitative descriptive study. Intensive Crit Care Nurs. 2024; 83: 103708.
3. Page V, McKenzie C. Sedation in the Intensive Care Unit. Curr Anesthesiol Rep. 2021; 11(2): 92-100.
4. Danielis M, Povoli A, Mattiussi E, Palese A. Understanding patients' experiences of being mechanically ventilated in the intensive care unit: findings from a meta-synthesis and meta-summary. J Clin Nurs. 2020; 29(13-14): 2107-24.
5. Szymkowicz E, Bodet-Contentin L, Marechal Y, Ehrmann S. Comparison of communication interfaces for mechanically ventilated patients in intensive care. Intensive Crit Care Nurs. 2024; 80: 103562.
6. Holm A, Dreyer P. Use of communication tools for mechanically ventilated patients in the ıntensive care unit. Comput Inform Nurs. 2018; 36(8): 398-405.
7. Otuzoğlu M, Karahan A. Determining the effectiveness of illustrated communication material for communication with intubated patients at an intensive care unit. Int J Nurs Pract. 2014; 20(5): 490-8.
8. Ten Hoorn S, Elbers PW, Girbes AR, Tuinman PR. Communicating with conscious and mechanically ventilated critically ill patients: a systematic review. Crit Care. 2016; 20(1): 333.
9. Albayram T, Yava A. The determination of the efficiency of visual communication cards developed for the purpose of communication with the intubated patients in the ıntensive care unit of cardiovascular surgery. Turkiye Klin Cardiovasc Sci. 2020; 32(3): 103-15.
10. Bhardwaj K, George M. Effectiveness of communication board among mechanically ventilated patients in terms of satisfaction in the ICUs. Int J Sci Res. 2023; 56-8.
11. Divani A, Manookian A, Haghani S, Meidani M, Navidhamidi M. Evaluating the use of communication board on cortisol level and physiological parameters in mechanically ventilated patients. Iran J Nurs Midwifery Res. 2022; 27(3): 198-203.
12. Ju XX, Yang J, Liu XX. A systematic review on voiceless patients' willingness to adopt high-technology augmentative and alternative communication in intensive care units. Intensive Crit Care Nurs. 2021; 63: 102948.
13. Rose L, Sutt AL, Amaral AC, Fergusson DA, Smith OM, Dale CM. Interventions to enable communication for adult patients requiring an artificial airway with or without mechanical ventilator support. Cochrane Database Syst Rev. 2021; 10(10): CD013379.
14. Yırtık HN, Yelek EN, Karahan T, Bozkuş İB, Kulak Kayıkçı ME. Development of a prototype and determination of high-tech augmentative and alternative communication system requirements for ındividuals in intensive care units. Hacettepe Univ Fac Heal Sci J. 2023; 10(1): 58-84.
15. Turan Bayraktar D, Kara G. The approach of intensive care nurses toward non-communicative patients. Gümüşhane University Journal of Health Sciences. 2019; 8(2): 27-34.
16. Erturk Yavuz M, Gursoy A. patient communication following laryngectomy: a pilot study using visual communication guide. Journal of Hacettepe University Faculty of Nursing. 2017; 4(3): 74-88.
17. IJssennagger CE, Ten Hoorn S, Van Wijk A, Van den Broek JM, Girbes AR, Tuinman PR. Caregivers' perceptions towards communication with mechanically ventilated patients: the results of a multicenter survey. J Crit Care. 2018; 48: 263-8.
18. Honorato JCS, Cruz I. Nursing evidence-based interprofissional practice guidelines for impaired gas exchange in ICU - systematic literature review. Journal of Specialized Nursing Care. 2019; 11(1).
19. Zaga CJ, Freeman-Sanderson A, Happ MB, Hoit JD, McGrath BA, Pandian V, et al. Defining effective communication for critically ill patients with an artificial airway: an international multi-professional consensus. Intensive Crit Care Nurs. 2023; 76: 103393.

20. Carruthers H, Astin F, Munro W. Which alternative communication methods are effective for voiceless patients in ıntensive care units? A systematic review. Intensive Crit Care Nurs. 2017; 42: 88-96.

21. Hosseini SR, Valizad-Hasanloei MA, Feizi A. The effect of using communication boards on ease of communication and anxiety in mechanically ventilated conscious patients admitted to intensive care units. Iran J Nurs Midwifery Res. 2018; 23(5): 358-62.

22. Al-Yahyai Rn Bsn ANS, Arulappan Rn Rm Bsc N Msc N PhD N DNSc J, Matua GA, Al-Ghafri Rn Bsn SM, Al-Sarakhi Rn Bsn SH, Al-Rahbi Rn Bsn KKS, et al. Communicating to non-speaking critically ıll patients: augmentative and alternative communication technique as an essential strategy. SAGE Open Nurs. 2021; 7: 23779608211015234.

23. El-Soussi AH, Elshafey MM, Othman SY, Abd-Elkader FA. Augmented alternative communication methods in intubated COPD patients: does it make difference. Egypt J Chest Dis Tuberc. 2015; 64(1): 21-8.

24. Gropp M, Johnson E, Bornman J, Koul R. Nurses' perspectives about communication with patients in an intensive care setting using a communication board: a pilot study. Health SA. 2019; 24: 1162.

25. Kuyler A, Johnson E. Patient and nurse content preferences for a communication board to facilitate dialogue in the intensive care unit. Intensive Crit Care Nurs. 2021; 63: 103005.

26. Rathi R, Baskaran M. Communication Board Satisfaction among Clients on Mechanical Ventilator. Int J Nurs Educ. 2015; 7(3): 216.

27. Holm A, Viftrup A, Karlsson V, Nikolajsen L, Dreyer P. Nurses' communication with mechanically ventilated patients in the intensive care unit: umbrella review. J Adv Nurs. 2020; 76(11): 2909-20.

28. Ull C, Hamsen U, Weckwerth C, Schildhauer TA, Gaschler R, Waydhas C, et al. Approach to the basic needs in patients on invasive ventilation using eye-tracking devices for non-verbal communication. Artif Organs. 2022; 46(3): 439-50.

29. Ull C, Weckwerth C, Schildhauer TA, Hamsen U, Gaschler R, Waydhas C, et al. First experiences of communication with mechanically ventilated patients in the intensive care unit using eye-tracking technology. Disabil Rehabil Assist Technol. 2023; 18(1): 44-9.

30. Koszalinski RS, Heidel RE, Hutson SP, Li X, Palmer TG, McCarthy J, et al. The use of communication technology to affect patient outcomes in the intensive care unit. Comput Inform Nurs. 2020; 38(4): 183-9.

31. Rodriguez CS, Rowe M, Koeppel B, Thomas L, Troche MS, Paguio G. Development of a communication intervention to assist hospitalized suddenly speechless patients. Technol Health Care. 2012; 20(6): 489-500.

32. Freeman-Sanderson AL, Togher L, Elkins MR, Phipps PR. Quality of life improves with return of voice in tracheostomy patients in intensive care: an observational study. J Crit Care. 2016; 33: 186-91.

33. Pandian V, Cole T, Kilonsky D, Holden K, Feller-Kopman DJ, Brower R, et al. Voice-related quality of life ıncreases with a talking tracheostomy tube: a randomized controlled trial. Laryngoscope. 2020; 130(5): 1249-55.

34. Effectiveness of high-tech communication board on patients response and level of satisfaction among mechanical ventilated patients. Int J Res Pharm Sci. 2020;11(SPL4):86-90.

35. Ertürk Yavuz M, Gürsoy A. Computer-based communication tool provides effective communication for non-speaking patients: a quasi-experimental study. Clin Nurs Res. 2022; 31(4): 656-65.