Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Improving ease of communication for conscious mechanically ventilated patients using a native-language visual communication board: a quasi-experimental study in a tertiary care hospital in southern India

Rudrani Mukherjee
Manipal Academy of Higher Education
Akshay H M
JSS Medical College, JSS Academy of Higher Education and Research
Sunil Kumar D
sunilkumard@jssuni.edu.in

JSS Medical College, JSS Academy of Higher Education and Research

Research Article

Keywords: Visual communication board, Mechanical ventilation, Intensive care units, Nurse–patient communication, Augmentative and alternative communication, Quasi-experimental study

Posted Date: July 16th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-10211307/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Abstract

Background

Conscious patients receiving mechanical ventilation are unable to speak, and the resulting communication breakdown contributes to frustration, anxiety, unmet needs and avoidable adverse events. As sedation-sparing practices keep more ventilated patients awake, low-cost augmentative communication aids have become increasingly relevant; however, evidence from Indian intensive care units (ICUs) and from the nursing perspective remains limited. We evaluated whether a native-language visual communication board (VCB) improves ease of communication for conscious, mechanically ventilated patients compared with usual ICU communication practice, and assessed nurses' perceptions of the board.

Methods

In a two-group, non-randomised quasi-experimental study conducted over two months across five ICUs of a tertiary care hospital in Mysuru, India, 82 conscious intubated adults (Glasgow Coma Scale ≥8ET) were allocated by consecutive sampling to usual care (n = 41) or usual care plus a Kannada-language VCB, a modified VIDATAK EZ board (n = 41). Ease of communication was measured with the 10-item Ease of Communication Scale (ECS; range 0–40, higher scores indicating greater difficulty) before the intervention and again after extubation. Twenty nurses rated the board using a 10-item opinionnaire (0–4). Groups were compared using paired and independent-samples t-tests, with non-parametric confirmation and effect-size estimation; reporting followed the TREND statement.

Results

The groups were comparable at baseline (pre-intervention ECS 26.0 vs 25.8; $p = 0.89$). Post-intervention difficulty decreased in both arms but substantially more with the VCB (9.1 ± 2.9) than with usual care (18.4 ± 7.1). The between-group difference was 9.4 points (95% confidence interval 6.97–11.77; $p < 0.001$), representing a large effect (Cohen's $d = 1.73$) and confirmed non-parametrically ($p < 0.001$). Post-intervention scores were not associated with age ($r = 0.14$; $p = 0.39$) or sex ($p > 0.40$). All ten nurse-rated items scored above the scale midpoint (means 2.8–3.6 of 4), most favourably for improved care of ventilated patients.

Conclusions

A low-cost, native-language visual communication board substantially improved ease of communication for conscious mechanically ventilated patients and was viewed favourably by nurses. These findings

support wider use of visual communication boards in ICU nursing practice, although the single-centre, non-randomised design warrants confirmation in larger controlled studies.

Trial registration:

This study was not prospectively registered in a clinical trials registry.

Background

Communication is a fundamental human need and a core instrument of safe clinical care. In the intensive care unit (ICU), however, the very interventions that sustain life routinely silence the patient. Endotracheal intubation and mechanical ventilation make speech impossible, and conscious patients who cannot make themselves understood describe their experience in terms of fear, panic, helplessness and loss of control [1]. This breakdown is not merely distressing; it is clinically consequential. Patients with communication difficulty are among those at highest risk of preventable adverse events in acute care [2], and impaired interaction undermines the assessment of pain, the recognition of need, and the therapeutic relationship on which recovery depends [3].

For the bedside nurse, who initiates the large majority of communication exchanges in the ICU, these barriers are a daily reality. In a landmark observational study, most communication attempts with ventilated patients were nurse-initiated, yet more than a third of attempts to interpret patient need using conventional means were unsuccessful [4]. Usual practice relies on head nods, yes/no gestures, mouthing of words and improvised signs—methods that are tiring, frequently misread, and a recognised source of frustration for patients and nurses alike [4, 5]. The clinical cost of this misinterpretation is greatest for symptoms that depend on patient report, most notably pain, which is systematically under-recognised when the patient cannot speak [6].

The problem is becoming more visible rather than less. Contemporary critical care favours lighter sedation and daily sedation interruption, which shorten ventilation and improve outcomes but leave a larger population of patients awake, alert and unable to speak for longer periods [7, 8]. Conscious ventilated patients experience heightened anxiety and agitation that interfere with comfort and stability [9, 10], and nurses consistently identify the inability to communicate as one of the most challenging aspects of caring for them [11]. A substantial proportion of mechanically ventilated ICU patients are cognitively and physically capable of using an assistive communication tool, yet such tools are seldom available at the bedside [12].

Augmentative and alternative communication (AAC) offers a practical response [13]. Among AAC options, the visual communication board—a low-cost chart of pictures, symbols and words that the patient indicates by pointing—is the most readily implemented in resource-limited settings, requiring no electronics and minimal training. Evidence from high-income settings is encouraging: communication boards have improved the speed and efficiency of exchanges and patient satisfaction after cardiac

surgery [14, 15], reduced anxiety and eased communication in conscious ventilated patients [16], and improved perceived communication among intubated cardiac surgical patients using colour-coded cards [17]. Where examined, such aids increase satisfaction and reduce distress without altering mortality [18], positioning them as a comfort- and quality-of-care intervention rather than a survival one.

Despite this, the evidence base relevant to Indian ICUs is thin and methodologically constrained. Electronic AAC systems remain too costly for routine Indian use [19], and the available Indian studies of pictorial boards have been small, often confined to single surgical populations, and focused narrowly on patient satisfaction [20–22]. Three considerations compound the gap: prior samples have rarely exceeded 30–60 participants; boards have seldom been adapted to the patient's first language; and the perspective of nurses—who deliver the intervention and bear the communication burden—has largely been omitted. Whether a native-language visual communication board improves ease of communication across a broad ICU case-mix, and whether nurses find it useful in practice, has not been adequately addressed in this context.

We therefore conducted a quasi-experimental evaluation of a Kannada-language visual communication board in conscious, mechanically ventilated adults across five ICUs of a tertiary care hospital in southern India. The primary objective was to determine whether the board improves ease of communication compared with usual ICU communication practice; the secondary objectives were to examine whether ease of communication was associated with patient age or sex, and to assess nurses' perceptions of the board's usefulness in daily care.

Methods

Study design and reporting

This was a two-group, non-randomised quasi-experimental study with a before-and-after (pre/post) assessment in each group. Because allocation was not randomised, the study is reported in accordance with the Transparent Reporting of Evaluations with Nonrandomized Designs (TREND) statement [23].

Setting and duration

The study was conducted over two months (1 March–30 April 2021) in five ICUs of a tertiary care teaching hospital in Mysuru, Karnataka, southern India: the Surgical ICU (SICU, 10 beds), Respiratory ICU (RICU, 9 beds), Neurosurgery ICU (NSICU, 8 beds), Medical ICU (MICU, 18 beds) and Cardiac Care Unit (CCU, 11 beds).

Participants and eligibility

Conscious, mechanically ventilated adults were identified with the assistance of the attending intensivist. Inclusion criteria were: age ≥ 18 years; intubation and mechanical ventilation for more than 24

hours (rendering the patient communication-compromised); orientation to time, place and person with a Glasgow Coma Scale (GCS) of ≥8ET while intubated; and education to at least primary level. Patients were excluded if a family member reported a diagnosed vision, hearing, speech or language disability likely to interfere materially with communication, if they were unconscious, or if they declined consent.

Allocation and sampling

Consecutive sampling was used. Eligible patients were enrolled first into the control group; once recruitment to the control group was complete, consecutive eligible patients were enrolled into the intervention group. Neither randomisation nor allocation concealment was employed, which is acknowledged as a limitation.

Sample size

Assuming a between-group difference of 9.07 points in the communication score derived from a previous study [16], with a two-sided α of 0.05 and 95% confidence, 37 participants per group were required. Allowing for 10% attrition, this was inflated to 41 per group, giving a total sample of 82.

Intervention

The visual communication board was a modified VIDATAK EZ Board, adapted in consultation with the institution's intensivists and nurses and printed with pictures, universal icons and words in Kannada, the regional first language. It comprised a pain chart (severity and type of pain), the common needs of an intubated patient, and a range of emotions the patient might wish to express; the patient communicated by pointing to the relevant cell. Head nurses and bedside nurses in all five ICUs were briefed on the board and encouraged to use it during all communication with intervention-group patients whenever they were conscious, for the duration of mechanical ventilation. Usual communication practices continued alongside the board.

Comparator (usual care)

Patients in the control group received conventional ICU communication only: gestures, head nods, yes/no signs, mouthing of words and other non-verbal cues.

Outcomes and instruments

The primary outcome was ease of communication, measured with the 10-item Ease of Communication Scale (ECS) [24]. Each item is scored 0–4 on a five-point Likert scale (0 = not hard at all; 1 = a little hard; 2 = somewhat hard; 3 = very hard; 4 = too hard), giving a total of 0–40, where higher scores indicate greater difficulty. Patients responded by pointing to the chosen option. The ECS was administered at two

time points: a pre-intervention (baseline) assessment before the board was introduced, and a post-intervention assessment after extubation, the latter reflecting the patient's rating of communication during the period of ventilation. Secondary outcomes were the association of the post-intervention ECS with patient age and sex, and nurses' perceptions of the board, captured with the 10-item Nurse Opinionnaire: Visual Communication Board [25] (each item scored 0–4, higher indicating stronger agreement that the board was helpful), completed by nurses caring for the study patients.

Data collection

Data were collected in three phases. In Phase I, sociodemographic and clinical data (age, sex, marital status, diagnosis and indication for ventilation, ICU, GCS and number of ventilation days) were obtained from each patient's critical-care chart. In Phase II, the baseline ECS was administered to all 82 patients and the board was introduced in the intervention group. In Phase III, the post-intervention ECS was administered to all 82 patients after extubation, and the Nurse Opinionnaire was distributed on the final day of data collection. Twenty nurses (four from each of the five ICUs) completed the opinionnaire.

Bias reduction and rigour

Several measures were taken to limit bias. A GCS threshold of ≥8ET ensured that participants could comprehend and use the board; a single trained investigator administered all ECS assessments using a uniform pointing protocol; the identical instrument and scoring were used at both time points; and baseline equivalence between groups was examined statistically. Blinding of participants or staff was not feasible given the overt nature of the intervention, which is acknowledged.

Statistical analysis

Data were entered in Microsoft Excel and analysed in IBM SPSS Statistics v23. Continuous variables are summarised as mean ± standard deviation (and median [interquartile range] where appropriate) and categorical variables as n (%). Within-group pre/post change was tested with the paired-samples t-test, and the between-group post-intervention comparison with the independent-samples t-test, reporting the mean difference with its 95% confidence interval (CI). Because the ECS total is a sum of ordinal items, all comparisons were re-examined with non-parametric tests (Wilcoxon signed-rank and Mann–Whitney U) to confirm robustness, and distributional normality was assessed with the Shapiro–Wilk test. Effect sizes were calculated (Cohen's d for the between-group comparison; dz for paired comparisons). The association of the post-intervention ECS with age was assessed using the Pearson correlation coefficient (with the Spearman coefficient as a non-parametric check) and with sex using the independent-samples t-test. A two-sided p-value < 0.05 was considered statistically significant. Nurse Opinionnaire responses were summarised descriptively as item means.

Ethics

The study was approved by the Institutional Ethics Committee of JSS Medical College, JSS Academy of Higher Education and Research (approval no. JSSMC/IEC/220121/05STS/2020-21, dated 25 January

2021; IEC registration ECR/387/Inst/KA/2013/RR-19), and written informed consent was obtained from every participant. The study was conducted in accordance with the Declaration of Helsinki. It was not prospectively registered in a clinical trials registry.

Results

Participants and baseline characteristics

Eighty-two patients were enrolled, 41 in each group, and none were lost to follow-up (Fig. 1). The two groups were well matched at baseline (Table 1). Mean age was 50.1 ± 19.4 years in the control group and 49.5 ± 16.3 years in the intervention group ($p = 0.88$), with a male predominance in both (control 32/41 [78%]; intervention 31/41 [76%]). Marital status, indication for ventilation, ICU distribution, GCS and ventilation duration (mean 5.5 days in both groups; $p = 0.98$) were comparable. Neurosurgical and neurological conditions were the commonest indication for ventilation (47/82 [57%]), most often head injury (30/82 [37%]), followed by respiratory illness (16/82 [20%]). Critically, baseline (pre-intervention) ECS scores were near-identical (26.0 ± 7.6 vs 25.8 ± 7.3; $p = 0.89$), confirming that the groups began from an equivalent level of communication difficulty.

Table 1
Baseline sociodemographic and clinical characteristics of participants by group.

Characteristic	Control (n = 41)	Intervention (n = 41)	Total (N = 82)
Age, years — mean ± SD	50.1 ± 19.4	49.5 ± 16.3	49.8 ± 17.8
Age group, n (%)			
18–37	13 (32)	9 (22)	22 (27)
38–57	9 (22)	16 (39)	25 (30)
58–77	16 (39)	16 (39)	32 (39)
≥78	3 (7)	0 (0)	3 (4)
Sex, n (%)			
Male	32 (78)	31 (76)	63 (77)
Female	9 (22)	10 (24)	19 (23)
Marital status, n (%)			
Married	33 (80)	30 (73)	63 (77)
Unmarried	7 (17)	8 (20)	15 (18)
Divorced	0 (0)	1 (2)	1 (1)
Widowed	1 (2)	2 (5)	3 (4)
Indication for ventilation, n (%)			
Neurosurgical/neurological	26 (63)	21 (51)	47 (57)
Head injury	18 (44)	12 (29)	30 (37)
Intracranial haemorrhage	4 (10)	4 (10)	8 (10)
Stroke	2 (5)	4 (10)	6 (7)
Other neurological	2 (5)	1 (2)	3 (4)
Respiratory	7 (17)	9 (22)	16 (20)
Poisoning / snake bite	1 (2)	3 (7)	4 (5)
Cardiology	2 (5)	3 (7)	5 (6)
Gastroenterology	1 (2)	2 (5)	3 (4)

ECS, Ease of Communication Scale; GCS, Glasgow Coma Scale; ICUs as defined in Methods. Percentages are of the column n. Groups were comparable at baseline (age p = 0.88; pre-intervention ECS p = 0.89; ventilation duration p = 0.98).

Characteristic	Control (n = 41)	Intervention (n = 41)	Total (N = 82)
Orthopaedics	2 (5)	1 (2)	3 (4)
General surgery	2 (5)	1 (2)	3 (4)
Psychiatry	0 (0)	1 (2)	1 (1)
Intensive care unit, n (%)			
SICU	21 (51)	12 (29)	33 (40)
NSICU	7 (17)	11 (27)	18 (22)
RICU	1 (2)	2 (5)	3 (4)
MICU	9 (22)	12 (29)	21 (26)
CCU	3 (7)	4 (10)	7 (9)
GCS while intubated, n (%)			
8ET	8 (20)	13 (32)	21 (26)
9ET	14 (34)	12 (29)	26 (32)
10ET	19 (46)	16 (39)	35 (43)
Ventilation duration, days — mean ± SD	5.5 ± 5.0	5.5 ± 4.5	5.5 ± 4.7
Pre-intervention ECS — mean ± SD	26.0 ± 7.6	25.8 ± 7.3	25.9 ± 7.4

ECS, Ease of Communication Scale; GCS, Glasgow Coma Scale; ICUs as defined in Methods. Percentages are of the column n. Groups were comparable at baseline (age p = 0.88; pre-intervention ECS p = 0.89; ventilation duration p = 0.98).

Primary outcome: ease of communication

Within each group, communication difficulty fell from baseline to the post-extubation assessment (Table 2; Fig. 2). In the control group the ECS decreased from 26.0 ± 7.6 to 18.4 ± 7.1 (mean reduction 7.6 points, 95% CI 6.1–9.1; $p < 0.001$; $dz = 1.61$). In the intervention group it decreased from 25.8 ± 7.3 to 9.1 ± 2.9 (mean reduction 16.7 points, 95% CI 14.7–18.8; $p < 0.001$; $dz = 2.61$). The key comparison—the post-intervention ECS between groups—strongly favoured the board: 9.1 ± 2.9 versus 18.4 ± 7.1, a mean difference of 9.4 points (95% CI 6.97–11.77; $p < 0.001$), corresponding to a large effect (Cohen's $d = 1.73$). Non-parametric testing confirmed every comparison (Wilcoxon and Mann–Whitney, all $p < 0.001$), and the Shapiro–Wilk test indicated approximate normality ($p > 0.05$), supporting the parametric analyses.

Table 2
Ease of Communication Scale scores: within-group change and between-group post-intervention comparison.

Comparison	Pre / Group A	Post / Group B	Mean difference (95% CI)	p; effect size
Control: pre vs post	26.0 ± 7.6	18.4 ± 7.1	7.6 (6.1–9.1)	< 0.001; dz = 1.61
Intervention: pre vs post	25.8 ± 7.3	9.1 ± 2.9	16.7 (14.7–18.8)	< 0.001; dz = 2.61
Post-intervention: control vs intervention	**18.4 ± 7.1**	**9.1 ± 2.9**	**9.4 (6.97–11.77)**	**< 0.001; d = 1.73**

Values are mean ± SD unless stated. CI, confidence interval; dz, paired effect size; d, Cohen's d. Within-group comparisons by paired-samples t-test; between-group comparison by independent-samples t-test. All comparisons remained significant ($p < 0.001$) on non-parametric testing (Wilcoxon signed-rank; Mann–Whitney U).

Secondary outcomes: associations with age and sex

The post-intervention ECS was not significantly associated with age in either group (intervention: Pearson $r = 0.14$, $p = 0.39$; Spearman $\rho = 0.20$, $p = 0.20$; control: $r \approx 0.00$, $p = 0.99$) (Table 3). Likewise, there was no significant association with sex (intervention: male 8.9 ± 2.7 vs female 9.5 ± 3.5, $p = 0.57$; control: male 18.8 ± 7.4 vs female 16.9 ± 6.1, $p = 0.47$).

Table 3
Association of post-intervention Ease of Communication Scale scores with age and sex.

Variable	Control	Intervention	Test / p
Age vs post-intervention ECS	r = 0.00	r = 0.14 (ρ = 0.20)	p = 0.99 / p = 0.39
Sex (male vs female), post-intervention ECS	18.8 vs 16.9	8.9 vs 9.5	p = 0.47 / p = 0.57

Age associations by Pearson correlation (r) with Spearman (ρ) as a non-parametric check; sex associations by independent-samples t-test. No association reached statistical significance.

Nurses' perceptions of the board

All 20 nurses completed the opinionnaire. Every one of the 10 items scored above the scale midpoint, with means ranging from 2.8 to 3.6 of 4 (Table 4). The highest agreement was for the statements that the board "helped improve care of mechanically ventilated patients" (3.6) and "helped the health team understand patients' needs" (3.5); the lowest, though still above midpoint, was for "helped patients avoid repetition of their needs" (2.8).

Table 4
Nurse Opinionnaire: mean ratings of the visual communication board (n = 20 nurses), ordered from highest to lowest agreement.

Nurse Opinionnaire item (n = 20 nurses)	Mean score (0–4)
Helped improve care of mechanically ventilated patients	3.6
Helped the health team understand patients' needs	3.5
Helped patients respond well	3.45
Helped restore staff confidence	3.4
Helped save time	3.3
Made it easier to interact with mechanically ventilated patients	3.3
Helped promote patient comfort	3.25
Helped understand the patient's medical need	3.2
Helped form rapport with patients	3.05
Helped patients avoid repetition of their needs	2.8
Each item scored 0–4 (higher = stronger agreement that the board was helpful). All items scored above the scale midpoint of 2.	

Discussion

Principal findings

In conscious, mechanically ventilated adults managed across five ICUs, a low-cost native-language visual communication board was associated with substantially greater ease of communication than usual care. The between-group difference in post-intervention difficulty was large (9.4 points; Cohen's d = 1.73) and robust to non-parametric testing, and nurses rated the board favourably across every domain assessed. Ease of communication was independent of patient age and sex.

Interpretation

Communication difficulty fell in both groups between the baseline and post-extubation assessments, so interpretation must centre on the between-group comparison rather than the within-group change. Some improvement in the control group is expected: as patients recover and approach extubation their difficulty declines regardless of any intervention, and the post-intervention ECS partly reflects this trajectory. The meaningful signal is therefore the additional benefit in the board group, which roughly halved the residual difficulty score relative to usual care. The near-identical baseline ECS and the broad comparability of the groups support attributing this difference to the intervention rather than to baseline imbalance.

Comparison with previous studies

Our findings are consistent with international evidence. Hosseini et al. reported eased communication and reduced anxiety with communication boards in conscious ventilated patients [16], while studies of boards or colour-coded cards after cardiac surgery reported improved patient-rated communication [15, 17], and El-Soussi et al. found that augmentative methods improved communication and reduced distress—without affecting mortality—in intubated patients with chronic obstructive pulmonary disease [18]. Within India, smaller studies of pictorial boards from Pondicherry [20], Bhopal [21] and elsewhere [22] reported higher communication-related satisfaction with boards but were limited by small samples and narrow case-mix. The present study extends this literature with a larger, mixed-ICU sample, a first-language board, and a complementary assessment from nurses; the favourable nurse appraisal accords with Bhardwaj et al., who reported that a validated board reduced nurses' communication difficulty [25].

Clinical and practice rationale

A plausible mechanism is that a shared pictorial–linguistic referent converts ambiguous non-verbal exchange into discrete, verifiable choices, reducing misinterpretation of needs and of pain [4, 6]. As lighter sedation keeps a growing number of patients conscious during ventilation [7, 8], such aids address an expanding clinical need at negligible cost.

Implications for nursing practice

Nurses initiate most communication in the ICU [4] and carry much of the burden of misunderstanding. A board that nurses themselves judge to improve patient care and team understanding is readily embedded into routine nursing workflows, requires minimal training, and—by being available in the patient's first language—is well suited to India's multilingual critical-care settings. Incorporating a validated visual communication board into nursing communication bundles is a practical, low-cost quality-improvement measure that places a simple tool in the hands of the clinicians best positioned to use it.

Strengths

The study was larger than prior regional reports and used a concurrent comparator with excellent baseline balance and complete follow-up. The effect was large and was corroborated by effect-size estimation and non-parametric tests. The broad ICU case-mix, the dual patient–nurse perspective, and the native-language adaptation of the board enhance the relevance of the findings to everyday Indian practice.

Limitations

Several limitations temper these conclusions. The study was conducted at a single centre. Allocation was non-randomised and sequential, which risks temporal confounding (for example, seasonal variation in case-mix or progressive staff familiarity with the board) and precludes firm causal inference, although

the close baseline equivalence mitigates this concern. Blinding was not feasible, so social-desirability and observer effects cannot be excluded. The post-intervention ECS was obtained after extubation and is therefore partly recall-based. The Nurse Opinionnaire had no usual-care comparator and may be subject to social-desirability bias. The study did not measure patient-centred clinical endpoints such as ventilator days, anxiety, satisfaction or adverse events, and it was not prospectively registered. Finally, generalisability beyond Kannada-speaking patients with a GCS ≥8ET is uncertain.

Future research

Future work should include multicentre randomised or stepped-wedge designs, the measurement of patient-reported and clinical endpoints (anxiety, satisfaction, quality of pain control and duration of ventilation), and formal cost-effectiveness and implementation evaluation. Adaptations for patients with sensory impairment (for example, tactile or Braille boards) and tools to support communication between patients and their families also merit study.

Conclusions

A low-cost, native-language visual communication board substantially improved ease of communication for conscious mechanically ventilated patients and was valued by the nurses who used it. Although the single-centre, non-randomised design limits causal inference, the large and robust effect together with the favourable nurse appraisal support the adoption of visual communication boards within ICU nursing practice and justify larger, controlled, multicentre evaluations.

Abbreviations

AAC
augmentative and alternative communication
CCU
cardiac care unit
CI
confidence interval
ECS
Ease of Communication Scale
GCS
Glasgow Coma Scale
ICU
intensive care unit
IQR
interquartile range
MICU
medical ICU
NSICU

neurosurgery ICU
RICU
respiratory ICU
SD
standard deviation
SICU
surgical ICU
VCB
visual communication board.

Declarations

Ethics approval and consent to participate:

Approved by the Institutional Ethics Committee, JSS Medical College, JSS Academy of Higher Education and Research (approval no. JSSMC/IEC/220121/05STS/2020-21, dated 25 January 2021; IEC registration ECR/387/Inst/KA/2013/RR-19). Written informed consent was obtained from all participants. The study adhered to the Declaration of Helsinki and was not prospectively registered in a clinical trials registry.

Consent for publication:

Not applicable; the manuscript contains no individual personal or identifying data.

Competing interests:

The authors declare that they have no competing interests.

Funding:

This work was supported by the Indian Council of Medical Research Short-Term Studentship programme (ICMR-STS 2020; reference 2020–04975). The funder had no role in the design of the study; the collection, analysis or interpretation of data; or the writing of the manuscript.

Author Contribution

S.K.D. conceived and designed the study and supervised the statistical analysis and interpretation of the data. R.M. recruited the participants, collected the data, carried out the analysis, prepared the tables and figures, and drafted the manuscript. A.H.M. provided critical-care clinical supervision and supported implementation of the intervention in the intensive care units. All authors interpreted the results, critically

revised the manuscript for important intellectual content, and read and approved the final version. All authors are accountable for the accuracy and integrity of the work.Initials used: R.M. = Rudrani Mukherjee, A.H.M. = Akshay H.M., S.K.D. = Sunil Kumar D.

Acknowledgement

The Indian Council of Medical Research (ICMR), New Delhi, India.

Data Availability

The dataset supporting the conclusions of this article is included within the article and its additional file (Additional file 1: de-identified minimal data set). The data are also available from the corresponding author (S.K.D., sunilkumard@jssuni.edu.in) on reasonable request.

References

1. Karlsson V, Bergbom I, Forsberg A. The lived experiences of adult intensive care patients who were conscious during mechanical ventilation: a phenomenological-hermeneutic study. Intensive Crit Care Nurs. 2012;28(1):6–15.
2. Bartlett G, Blais R, Tamblyn R, Clermont RJ, MacGibbon B. Impact of patient communication problems on the risk of preventable adverse events in acute care settings. CMAJ. 2008;178(12):1555–62.
3. Patak L, Wilson-Stronks A, Costello J, Kleinpell RM, Henneman EA, Person C, et al. Improving patient-provider communication: a call to action. J Nurs Adm. 2009;39(9):372–6.
4. Happ MB, Garrett K, Thomas DD, Tate J, George E, Houze M, et al. Nurse-patient communication interactions in the intensive care unit. Am J Crit Care. 2011;20(2):e28–40.
5. 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.
6. Al Sutari MM, Abdalrahim MS, Hamdan-Mansour AM, Ayasrah SM. Pain among mechanically ventilated patients in critical care units. J Res Med Sci. 2014;19(8):726–32.
7. Kress JP, Pohlman AS, O'Connor MF, Hall JB. Daily interruption of sedative infusions in critically ill patients undergoing mechanical ventilation. N Engl J Med. 2000;342(20):1471–7.
8. Sharma S, Hashmi MF, Valentino DJ III. In: StatPearls, editor. Sedation vacation in the ICU. Treasure Island (FL): StatPearls Publishing; 2021.
9. Tate JA, Devito Dabbs A, Hoffman LA, Milbrandt E, Happ MB. Anxiety and agitation in mechanically ventilated patients. Qual Health Res. 2012;22(2):157–73.
10. Menzel LK. Factors related to the emotional responses of intubated patients to being unable to speak. Heart Lung. 1998;27(4):245–52.

11. Yoo HJ, Lim OB, Shim JL. Critical care nurses' communication experiences with patients and families in an intensive care unit: a qualitative study. PLoS ONE. 2020;15(7):e0235694.
12. Happ MB, Seaman JB, Nilsen ML, Sciulli A, Tate JA, Saul M, et al. The number of mechanically ventilated ICU patients meeting communication criteria. Heart Lung. 2015;44(1):45–9.
13. Radtke JV, Baumann BM, Garrett KL, Happ MB. Listening to the voiceless patient: case reports in assisted communication in the intensive care unit. J Palliat Med. 2011;14(6):791–5.
14. Stovsky B, Rudy E, Dragonette P. Comparison of two types of communication methods used after cardiac surgery with patients with endotracheal tubes. Heart Lung. 1988;17(3):281–9.
15. Patak L, Gawlinski A, Fung NI, Doering L, Berg J, Henneman EA. Communication boards in critical care: patients' views. Appl Nurs Res. 2006;19(4):182–90.
16. 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.
17. 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 intensive care unit of cardiovascular surgery. Turkiye Klinikleri Cardiovasc Sci. 2020;32(2):103–15.
18. El-Soussi AH, Elshafey MM, Othman SY, Abd-Elkader FA. Augmented alternative communication methods in intubated COPD patients: does it make a difference. Egypt J Chest Dis Tuberc. 2015;64(1):21–8.
19. Communicating with nonverbal patients in India. inexpensive augmentative communication. https://www.dinf.ne.jp/doc/english/asia/resource/apdrj/z13jo0400/z13jo0405.html. Accessed 23 Nov 2021.
20. D S HA. Effectiveness of communication board on the level of satisfaction of the communication pattern among patients on mechanical ventilation. Pondicherry J Nurs. 2016;9(2):20–3.
21. Pakhide DV. A quasi-experimental study to assess the effect of modified communication board on communication ability of post-operative CABG patients at a selected hospital, Bhopal, Madhya Pradesh, India. Int J Med Res Rev. 2019;7(6):475–81.
22. Metilda JA. Effectiveness of communication board on level of satisfaction over communication among mechanically ventilated patients. Int J Innov Sci Res Technol. 2020;5(9):311–6.
23. Des Jarlais DC, Lyles C, Crepaz N, TREND Group. Improving the reporting quality of nonrandomized evaluations of behavioral and public health interventions: the TREND statement. Am J Public Health. 2004;94(3):361–6.
24. Martinho CIF, Rodrigues ITRM. Communication of mechanically ventilated patients in intensive care units. Rev Bras Ter Intensiva. 2016;28(2):132–40.
25. Bhardwaj K, George M, Mitra L. A validated communication board reduces nurses' communication difficulties in the ICUs. Int J Adv Res. 2019;7(8):83–90.

Figures

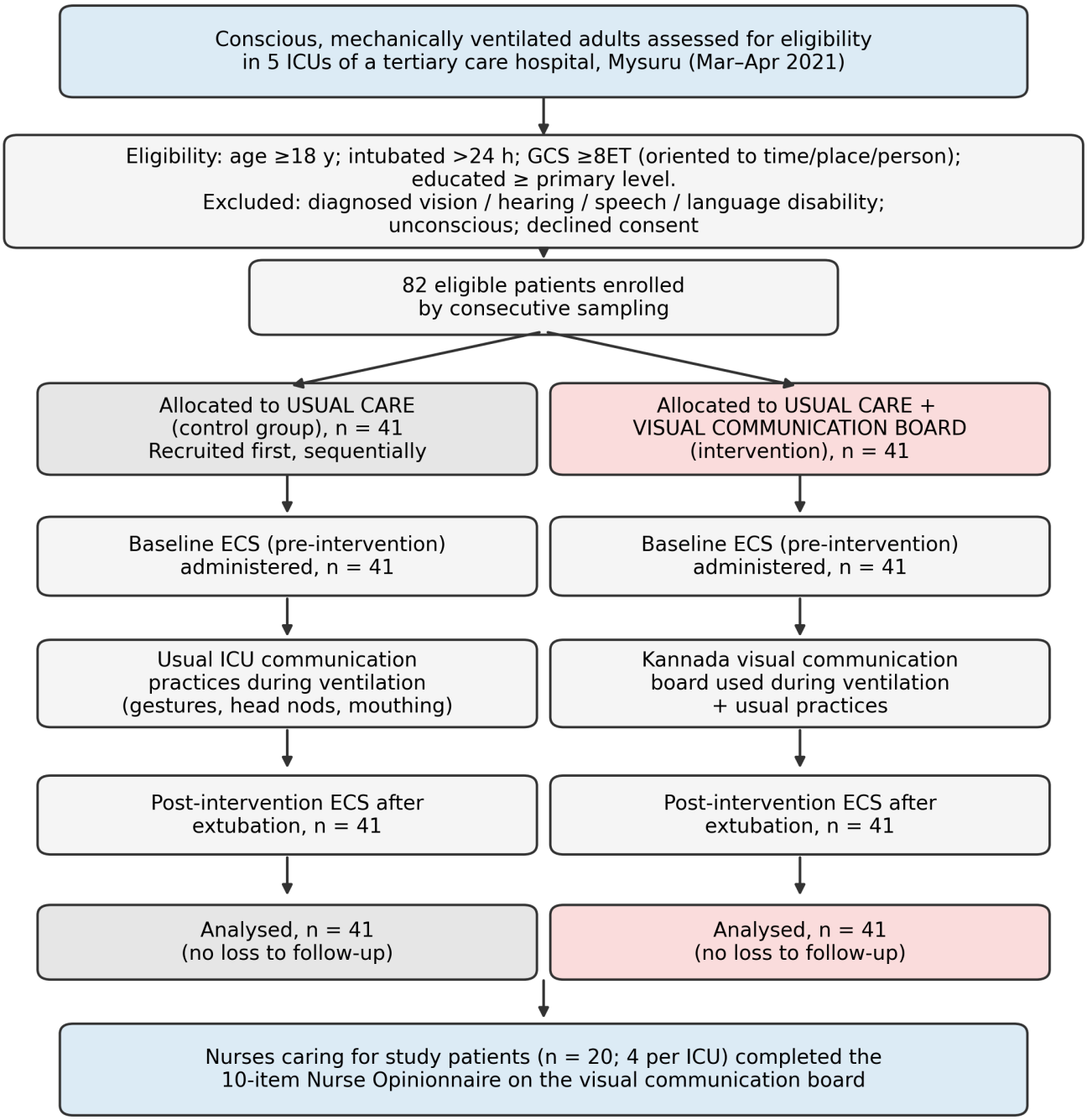


Figure 1

Participant flow through the study. ECS, Ease of Communication Scale; GCS, Glasgow Coma Scale; ICU, intensive care unit.

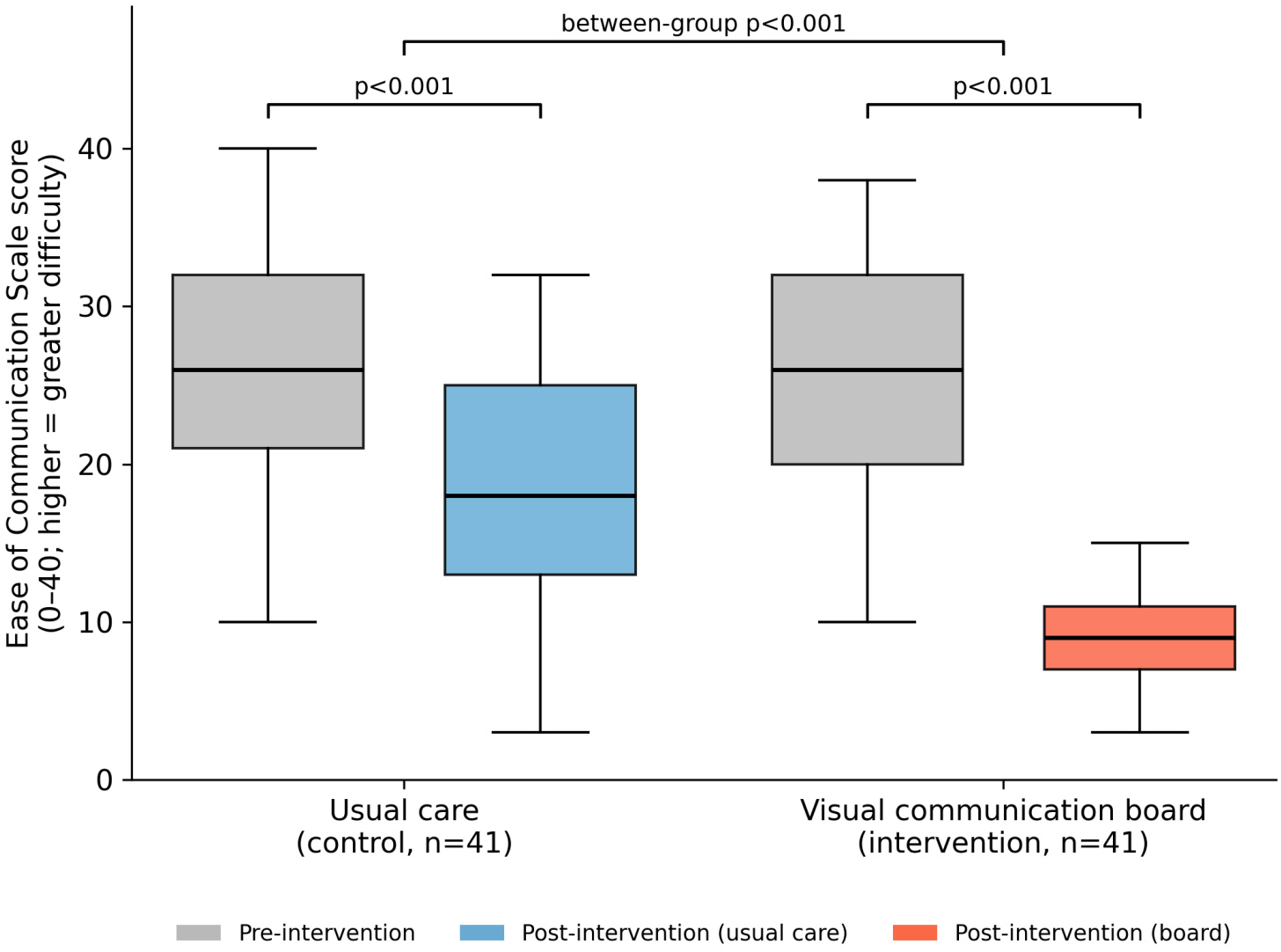


Figure 2

Ease of Communication Scale scores before and after the intervention, by group. Higher scores indicate greater communication difficulty. Boxes show the median and interquartile range and whiskers show the range. Within-group reductions and the between-group post-intervention difference were all significant at p<0.001 (paired and independent-samples t-tests, with non-parametric confirmation).