

Assessing Compliance with the FASTHUGBID Care Bundle in a Resource-Limited ICU: Evidence from a Clinical Audit in Ethiopia

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Abstract

Background: Critically ill patients admitted to the Intensive Care Unit (ICU) are at high risk of preventable complications such as ventilator-associated pneumonia, deep vein thrombosis, gastrointestinal bleeding, and malnutrition. These complications significantly increase morbidity, mortality, and healthcare costs. Care bundles are structured sets of evidence-based practices designed to improve the quality and consistency of patient care. The FASTHUGBID mnemonic representing Feeding, Analgesia, Sedation, Thromboembolism prophylaxis, Head-of-bed elevation, Ulcer prophylaxis, Glycemic control, bowel care, indwelling catheter, and de-escalation of drugs is widely used as a daily checklist to ensure comprehensive ICU patient management. However, adherence to this care bundle has not been evaluated in the Intensive Care Unit of Injibara General Hospital, Ethiopia.

Objective: To determine adherence to each component of the FASTHUGBID care bundle among patients admitted to the ICU of Injibara General Hospital, Northwest Ethiopia.

Methods: A retrospective clinical audit was conducted. Medical records of consecutively admitted adult patients in the ICU were reviewed. Data were collected for the first full ICU day of admission using a standardized, piloted audit data-extraction form. Information was obtained from electronic and/or paper-based patient records. Adherence was assessed based on documentation of each FASTHUG component in the daily ICU management records. The predefined audit standard will be 100% daily documentation for each FASTHUGBID component. Descriptive statistics will be used to summarize patient characteristics and calculate overall and component-specific adherence rates.

Results: The audit quantifies adherence rates for each FASTHUG component, identifies areas of optimal practice, and gaps in documentation and clinical implementation.

Conclusion: The findings provide evidence on the level of adherence to the FASTHUG BID care bundle and help to identify opportunities to improve the quality of ICU care through strengthened clinical documentation and implementation of standardized care protocols.

Keywords: FASTHUGBID, Intensive care unit, Clinical audit, Care bundle adherence, Critical care quality improvement, Ethiopia

Introduction

Background

The Intensive Care Unit (ICU) is a specialized hospital unit designed to provide advanced care for patients with life-threatening illnesses or injuries requiring continuous monitoring, life-support technologies, and multidisciplinary management. Patients admitted to ICUs often present with severe physiological instability and multi-organ

dysfunction, necessitating complex interventions such as mechanical ventilation, vasopressor support, invasive monitoring, and specialized nursing care. Consequently, the quality and safety of care delivered in ICUs play a critical role in determining patient survival, length of hospital stay, and healthcare resource utilization [1,2].

Critically ill patients are particularly vulnerable to a wide range of preventable complications due to prolonged immobilization, invasive procedures, immune suppression,

and metabolic disturbances. Common complications observed in ICU settings include ventilator-associated pneumonia (VAP), deep vein thrombosis (DVT), pressure injuries, stress-related mucosal disease, malnutrition, and uncontrolled hyperglycemia [3–5]. These complications significantly increase patient morbidity and mortality, prolong hospital stay, and place substantial financial burdens on healthcare systems worldwide.

The burden of critical illness is particularly pronounced in low- and middle-income countries (LMICs), where ICU mortality rates remain significantly higher than in high-income countries due to limited resources, shortages of trained personnel, and inconsistent implementation of evidence-based clinical practices [6,7]. Studies from several LMICs report ICU mortality rates ranging from 30% to 50%, highlighting the urgent need to strengthen quality improvement initiatives in critical care services.

In Ethiopia, outcomes of critically ill patients remain a significant challenge. A recent systematic review and meta-analysis reported that the pooled ICU mortality rate in Ethiopia is approximately 41.3%, reflecting the high burden of severe illness and the limitations of critical care infrastructure in the country [8]. Additionally, studies assessing outcomes among mechanically ventilated patients in Ethiopian ICUs have reported mortality rates exceeding 50%, underscoring the need to improve adherence to evidence-based clinical practices in critical care settings.

Furthermore, ICU-related complications remain highly prevalent in Ethiopian hospitals. A retrospective study conducted in public hospitals in Addis Ababa reported that ventilator-associated pneumonia occurred in 31.3% of mechanically ventilated patients, demonstrating the substantial burden of healthcare-associated infections in ICU settings [3,9]. Similarly, another study conducted in Northwest Ethiopia reported a VAP prevalence of 19.6% among ICU patients, with mortality exceeding 76% among affected patients, highlighting the severe consequences of preventable ICU complications [10]. These findings emphasize the need for systematic strategies to improve adherence to preventive care practices in ICU settings.

To improve patient safety and standardize clinical practice, healthcare systems increasingly rely on evidence-based care bundles and clinical audit mechanisms. Clinical audit is a systematic process that evaluates healthcare practices against established standards, identifies gaps in care, and facilitates targeted improvements in healthcare delivery. Through continuous monitoring and feedback, clinical audits promote adherence to best practice guidelines, enhance professional accountability, and support continuous quality improvement.

Care bundles have emerged as an effective strategy for improving patient outcomes in critical care settings. A care bundle consists of a small set of evidence-based interventions that, when implemented together and consistently, have been shown to improve patient outcomes more effectively than when applied individually [11]. Care bundles help standardize care delivery, reduce clinical variability, and ensure that essential components of patient care are not overlooked.

One widely recognized care bundle used in ICU practice is the FAST HUGBID mnemonic, introduced by Vincent as a practical bedside checklist to guide daily patient assessment during ICU rounds [12]. FAST HUG represents ten key elements of essential ICU care: Feeding, Analgesia, Sedation, Thromboembolism prophylaxis, Head-of-bed elevation, Ulcer prophylaxis, and Glucose control, bowel care, indwelling catheter, and de-escalation of drugs. Each component addresses a critical aspect of patient management to prevent common ICU complications and optimize patient outcomes.

Evidence suggests that the use of structured checklists such as FAST HUGBID improves adherence to essential care practices and enhances communication among healthcare professionals during patient management [13,14]. Implementation of such checklists has been associated with improved documentation, better compliance with evidence-based interventions, and a reduction in preventable complications among critically ill patients.

Statement of the problem

Despite the recognized benefits of care bundles and clinical checklists in improving patient outcomes, consistent implementation of these practices remains a challenge in many healthcare settings. Variations in adherence to recommended ICU care practices may occur due to factors such as heavy workload, inadequate staffing, limited training, and inconsistent documentation systems.

In resource-limited settings, including many hospitals in sub-Saharan Africa, ICU services often face additional challenges such as limited infrastructure, shortages of specialized critical care personnel, and insufficient monitoring systems. These constraints may hinder the consistent application of standardized care protocols and increase the risk of preventable complications among critically ill patients.

Although the FAST HUGBID checklist is widely recommended for daily ICU patient management, studies from different countries have reported variable compliance with its components, indicating gaps between recommended clinical practices and actual bedside care. In Ethiopia, evidence regarding adherence to ICU care

bundles remains limited, and few studies have systematically evaluated compliance with standardized critical care practices.

Within the Intensive Care Unit of Injibara General Hospital, anecdotal observations and informal staff feedback suggest possible inconsistencies in the daily application and documentation of FAST HUG components during patient management. However, there is currently no systematic evidence quantifying adherence to the FAST HUGBID care bundle in this ICU. The absence of such information limits the ability of healthcare providers and hospital administrators to identify gaps in clinical practice and implement targeted quality improvement interventions.

Justification of the study

Assessing adherence to the FAST HUGBID care bundle is essential for improving the quality and safety of care provided to critically ill patients. Each component of the FAST HUGBID checklist targets preventable complications commonly encountered in ICU settings, including ventilator-associated pneumonia, thromboembolic events, stress ulcers, malnutrition, and uncontrolled hyperglycemia.

Conducting a clinical audit provides an evidence-based approach to evaluating current clinical practices against recommended standards. The findings of such an audit can help identify deficiencies in care delivery, guide targeted quality improvement interventions, and strengthen adherence to evidence-based guidelines.

In resource-limited healthcare settings such as Ethiopia, optimizing existing clinical practices is particularly important to maximize patient outcomes despite limited infrastructure and resources. By generating local evidence on the level of adherence to the FAST HUG BID care bundle, this study will contribute to improving ICU care practices and support ongoing quality improvement initiatives in critical care services.

Objective of the study

General objective

To assess adherence to the FAST HUG BID daily care bundle among critically ill patients admitted to the Intensive Care Unit of Injibara General Hospital, Northwest Ethiopia.

Specific objectives

- To determine the compliance rate of each component of the FAST HUGBID care bundle among ICU patients.
- To identify variations in the documentation and implementation of FAST HUGBID components in daily ICU patient management.

Methods

Audit area

The clinical audit will be carried out in the Intensive Care Unit of Injibara General Hospital, located in Injibara town, Awi Zone, Northwest Ethiopia. The ICU is situated on the first floor of the hospital and consists of two rooms with a total of six beds. The unit is staffed by 12 healthcare professionals providing critical care services to adult patients.

Audit population

The population for this audit comprises all adult patients who received care in the ICU of Injibara General Hospital between August and December 2025. Medical records of these patients will be reviewed to evaluate adherence to the FAST HUGBID care bundle during their ICU stay.

Audit sample

A total of 40 patient records will be selected for review. These records represent adult ICU admissions within the specified audit period and are considered sufficient to provide a practical snapshot of clinical practice and adherence patterns.

Sampling method

A consecutive sampling technique will be used to identify eligible patient records. All adult patients admitted to the ICU during the audit period who meet the inclusion criteria will be considered until the target sample size of 40 records is reached. This approach minimizes selection bias and reflects routine clinical practice.

Study design

A retrospective clinical audit was conducted through review of the medical records of adult patients admitted to the ICU between August and December 2025. The audit assessed compliance with predefined FASTHUG care bundle standards using routinely documented clinical information.

Inclusion criteria

Records of patients meeting the following criteria will be included:

- Adult patients admitted to the ICU.
- ICU stay of 48 hours or more, ensuring sufficient opportunity for daily application of FAST HUGBID components.

- Availability of complete or retrievable medical documentation.

Exclusion criteria

Records will be excluded if:

- The ICU stay was less than 48 hours.
- Medical records are incomplete or missing critical documentation required for assessment.

Sample size

The audit reviewed 40 consecutive patient records meeting the eligibility criteria during the study period. The sample size was selected pragmatically based on the number of eligible ICU admissions and available records. Similar clinical audits conducted in resource-limited settings have utilized comparable sample sizes to evaluate compliance with quality indicators. The objective of the audit was to identify gaps in adherence rather than estimate population parameters with statistical precision.

Operational Definitions

F-Feeding

Documentation of initiation of enteral feeding within 24 hours of ICU admission, or explicit documentation of a contraindication or reason for delay (e.g., bowel obstruction, severe hemodynamic instability, or NPO status for procedures).

A – Analgesia

- For awake and communicative patients: documented pain assessment using a validated numerical scale (e.g., Numeric Rating Scale 0–10).
- For non-verbal or sedated patients: documented pain assessment using a behavioral scale (e.g., Critical-Care Pain Observation Tool [CPOT] or Behavioral Pain Scale [BPS]).

S-Sedation

Documentation of sedation level using a validated scale such as the Richmond Agitation-Sedation Scale (RASS) or Sedation-Agitation Scale (SAS).

T-Thromboembolism prophylaxis

Documentation of venous thromboembolism (VTE) risk assessment using a validated tool (e.g., Caprini or Padua score) within 24 hours of ICU admission and evidence of prophylactic measures where indicated.

H – Head-of-Bed elevation

Documentation in nursing notes or flow sheets confirming head-of-bed elevation to 30–45 degrees unless contraindicated.

U – Ulcer prophylaxis

Documentation of stress ulcer risk assessment within 24 hours of admission, particularly for patients with risk factors such as mechanical ventilation >48 hours, coagulopathy, or a history of gastrointestinal bleeding.

G – Glycemic control

Documentation of blood glucose monitoring at intervals specified by ICU protocols (e.g., every 4–6 hours for patients on insulin infusion or as per unit guidelines).

B-Bowel care

I –Indwelling catheter

D – Descalation of drug

Data Collection Methods

Data collection approach

Data will be collected retrospectively using a standardized audit data abstraction tool (proforma) developed by the audit team. The tool will capture information on adherence to FAST HUG BID components and relevant patient characteristics.

Data sources

Information will be extracted from paper-based and electronic medical records. Access to records will follow hospital governance procedures, and data handling will comply with confidentiality and data protection standards.

Ethical considerations

All data will be anonymized to protect patient confidentiality. Personal identifiers will be removed or coded immediately after extraction. The audit will be registered with the hospital's clinical governance department, and ethical approval will be sought if required according to institutional policies.

Data quality management

To ensure data accuracy and reliability:

- The data abstraction tool will be piloted on a small subset of records before full deployment.

- Data collectors will receive training on the audit protocol and documentation standards.
 - Daily supervision and random checks will be performed during data collection.
 - Double data entry by two independent individuals will minimize errors and discrepancies.
 - Data will be reviewed for completeness and consistency prior to analysis.
- statistical software. Descriptive statistics will summarize patient characteristics and adherence rates. Results will be presented in tables and percentages. Compliance with each FAST HUGBID component will be calculated, and overall adherence patterns will be described to identify strengths and gaps in clinical practice.

Given the audit's quality-improvement purpose and limited sample size, analyses were restricted to descriptive statistics.

Data processing and analysis

Data will be entered, cleaned, and analyzed using

This structured methodology ensures transparency, reproducibility, and alignment with clinical audit principles aimed at improving ICU care quality.

Table 1. Audit proforma (checklist).

Sr. No.	Daily intensive care unit recommended cares	Yes	NO	NA
1	Is enteral or parenteral nutrition at goal?			
2	Does pain assessment and consider analgesia			
3	Is the patient; "calm, comfortable, collaborative" (sedation)			
4	Is the patient given thromboembolism prophylaxis?			
5	Is the patient on head up position?			
6	Is stress ulcer prophylaxis given?			
7	Is blood glucose at goal?			
8	Is the patient given bowel and wound care?			
9	Drugs (de-escalation)			

Table 2. The scoring system based on the Literature review (LRs) Recommendations on the Adherence to the FASTHUGBID care bundle in the intensive care unit.

Sr. No.	Daily Intensive Care Unit Recommended Care Checklist	Target (%)	Evidence	Data source
1	Enteral or parenteral nutrition should at goal	100	LR	Asking and direct observation
2	Pain should be assessed and considered for analgesia	100	LR	Asking and direct observation
3	Patient should be calm, comfortable, and collaborative	100	LR	Direct observation
4	Thromboembolism prophylaxis should be considered	100	LR	Asking and direct observation
5	Head up position (unless contraindications)	100	LR	Direct observation
6	Stress ulcer prophylaxis given unless contraindicated	100	LR	Asking and direct observation
7	Blood glucose should be monitored with range	100	LR	Asking and direct observation
8	Bowel and wound care should be considered	100	LR	Asking and direct observation
9	Drugs de-escalation assessment	100	LR	Direct observation

Key: LR = Literature Review

Action plan

Action plan for audit on current practices of patient care in ICU

SN.	Action to be implemented	By whom	When
1	Conduct baseline audit to assess current practices patient care	Audit performer	Within 2 weeks of audit presentation
2	Announce the result of this audit to anesthetists and other team	Audit performer	Within 1 month of the audit presentation
3	Develop and implement an educational program for healthcare staff	Audit performer	Within 1 month of the audit presentation
4	Conduct a post-intervention audit to assess improvement	Audit performer	Within 2 months of the audit presentation

Results

A total of 40 critically ill adult patients admitted to the ICU during the audit period were included in the analysis. Adherence to each component of the FASTHUG care bundle was evaluated based on documented daily multidisciplinary practice.

Overall compliance with FASTHUG components

• Feeding (85%)

Early enteral nutrition was initiated in most eligible patients within 24 hours of ICU admission. However, some patients remained nil per Os (NPO) for extended periods without clear documentation of indication or

a structured re-feeding plan.

• Analgesia and sedation (48%) – lowest adherence

This was the poorest-performing domain. Key gaps identified include:

- Over-sedation in several patients (RASS –4 to –5 despite target –2).
- Absence of documented daily spontaneous awakening trials (sedation holidays) in 28% of eligible intubated patients.
- Inconsistent documentation of structured pain assessment using validated tools.

• Thromboembolic Prophylaxis (95%) – highest adherence

Nearly all patients received appropriate pharmacologic or mechanical VTE prophylaxis according to risk assessment, demonstrating strong protocol adherence.

• Head-of-Bed elevation (75%)

Thirty out of 40 patients were positioned at the recommended 30–45° angle at the time of audit spot-check. Non-compliance was primarily related to:

- Patients sliding down in bed.
- Bed repositioning for procedures (e.g., dressing changes, physiotherapy) without subsequent re-elevation.

This poses a risk for ventilator-associated pneumonia (VAP).

No	Standards	Number of audited Anesthetist based on standard	Number of Anesthetist meet the audit standard	Percentage of Anesthetist who meet the standards (%)
1	Enteral or parenteral nutrition should at goal	40	34	85%
2	Pain should assess and consider analgesia	40	19	48%
3	Patient should; calm, comfortable, collaborative(sedation)	40	19	48%
4	Thromboembolism prophylaxis should be considered	40	38	95%
5	Head up position (unless contraindications)	40	30	75%
6	Stress ulcer prophylaxis given	40	36	90%
7	Blood glucose should be monitored with range	40	35	87.5%
8	Bowel and wound care should be considered.	40	22	55%
9	Removing Foley catheter	40	18	45%
10	Drugs de-escalation assessment.	40	32	80%

- **Ulcer prophylaxis (90%)**

High compliance with stress ulcer prophylaxis was observed among high-risk patients using proton pump inhibitors (PPIs) or H₂ receptor blockers.

Gap identified: A small proportion of low-risk patients were receiving prophylaxis without clear documented indication.

- **Glycemic control (87.5%)**

Most patients maintained blood glucose within the recommended ICU target range (140–180 mg/dL), reflecting satisfactory monitoring and insulin adjustment practices.

Discussion

This clinical audit evaluated adherence to the FASTHUGBID care bundle among 40 critically ill patients in the ICU of Injibara General Hospital. Overall, the findings demonstrate strong compliance in pharmacologic preventive interventions, but reveal clinically meaningful deficiencies in sedation practice and bedside care processes.

Strengths in preventive pharmacology

The ICU showed excellent adherence to Thromboembolic Prophylaxis (95%), reflecting robust implementation of VTE prevention strategies. This is particularly important given the high incidence of immobilization-related thromboembolic events in critically ill patients.

Similarly, Ulcer Prophylaxis (90%) and Glycemic Control (87.5%) demonstrated high compliance. Appropriate stress ulcer prevention and maintenance of moderate glycemic targets are strongly associated with reduced gastrointestinal bleeding, infection risk, and mortality in ICU populations.

These results indicate that protocol-driven pharmacologic interventions are well-integrated into routine practice.

Critical gaps in sedation and analgesia

The observed sedation adherence rate of 48% is lower than rates reported in several ICUs where structured sedation protocols are routinely implemented. Previous studies have demonstrated improved compliance when validated sedation scales and daily sedation targets are incorporated into ICU practice [15].

Head-of-bed elevation and nursing care gaps

Compliance with head-of-bed elevation (75%) was comparable to findings reported in other resource-limited

ICU settings, where staffing constraints and inconsistent monitoring contribute to variation in adherence [16].

Feeding practices

Feeding compliance (85%) was moderate but improvable. Prolonged NPO status without explicit justification or re-initiation plan was observed in some cases. Early enteral nutrition is essential for maintaining gut integrity, preventing bacterial translocation, preserving lean body mass, and supporting immune function. Nutritional delays can exacerbate organ dysfunction and delay recovery [17].

Overall interpretation

The ICU demonstrates strong adherence in protocolized pharmacologic prevention strategies. However, gaps in sedation management, bedside positioning, and dynamic nursing reassessment highlight opportunities for structured quality improvement.

The pattern observed suggests that medication-based protocols are easier to standardize, whereas behavioral and process-based practices require continuous reinforcement, multidisciplinary coordination, and active monitoring.

Limitations

This audit has several limitations. First, data were collected retrospectively from medical records, making the findings dependent on documentation quality. Second, the sample size was relatively small and derived from a single institution, limiting generalizability. Third, direct observation of clinical practice was not performed. Finally, the descriptive nature of the analysis precluded identification of predictors of adherence.

Recommendations

A. Priority area: optimize analgesia and sedation

1. Adopt an analgesia-first (Analgo-sedation) protocol

Implement a formal unit policy prioritizing pain control before sedative escalation. Use validated tools (CPOT or BPS) every 4 hours.

2. Integrate pain as a mandatory vital sign

Modify ICU flow sheets so that sedation scores (RASS) cannot be documented without a corresponding pain score.

3. Mandatory daily sedation interruption

Incorporate spontaneous awakening trials (SATs) and spontaneous breathing trials (SBTs) into daily rounds, with required documentation of justification if deferred.

4. Education and refresher training

Provide structured training emphasizing light sedation targets (RASS –1 to +1) and the risks of over sedation.

5. Sedation pharmacology review

Update protocols to prioritize non-benzodiazepine sedatives (e.g., propofol or dexmedetomidine) when clinically appropriate.

B. Improve head-of-bed elevation compliance

1. Install visible bed-angle markers or inclinometers.
2. Incorporate head-of-bed checks into hourly nursing rounds and post-procedure protocols.
3. Educate patients and families (when feasible) on the importance of elevation in preventing pneumonia.

C. Reduce device-associated infections

1. Daily foley catheter review (“foley holiday”)

During rounds, explicitly question ongoing need for catheterization.

2. Nurse-led removal protocol

Develop criteria-based nurse-initiated catheter removal policies.

D. Enhance nutritional management

1. Develop a standardized NPO and re-feeding policy with maximum allowable NPO duration.
2. Ensure early involvement of a dietician for high-risk or prolonged ICU stays.
3. Make nutritional status a mandatory discussion point during multidisciplinary rounds.

E. Reinforce strengths

Provide structured positive feedback to staff for high compliance in

1. Thromboembolic Prophylaxis
2. Ulcer Prophylaxis
3. Glycemic Control

Recognition reinforces sustainable practice change.

F. Re-audit and sustainability

A follow-up audit should be conducted within 3–6

months to evaluate the impact of interventions and ensure sustained improvements, particularly in sedation management and head-of-bed positioning.

Conclusion

This audit demonstrates that while pharmacologic preventive strategies are well-established in the ICU, critical gaps persist in sedation practice, bedside nursing processes, and dynamic reassessment. Targeted, multidisciplinary quality improvement interventions focusing on analgesia-first sedation, structured documentation, and practical bedside reinforcement measures are likely to yield meaningful improvements in patient safety and outcomes.

With structured implementation and re-evaluation, the ICU can transition from good compliance to consistently high-reliability critical care practice.

References

1. Halpern NA, Pastores SM. Critical care medicine in the United States 2000–2005: an analysis of bed numbers, occupancy rates, payer mix, and costs. *Critical care medicine*. 2010;38(1):65–71.
2. Wunsch H, Angus DC, Harrison DA, Collange O, Fowler R, Hoste EA, et al. Variation in critical care services across North America and Western Europe. *Critical care medicine*. 2008 Oct;36(10):2787–93, e1–9.
3. Geerts WH, Bergqvist D, Pineo GF, Heit JA, Samama CM, Lassen MR, et al. Prevention of venous thromboembolism: American College of Chest Physicians evidence-based clinical practice guidelines. *Chest*. 2008;133(6):381S–453S.
4. Van den Berghe G, Wouters P, Weekers F, Verwaest C, Bruyninckx F, Schetz M, et al. Intensive insulin therapy in critically ill patients. *New England journal of medicine*. 2001;345(19):1359–67.
5. Vincent J-L, Rello J, Marshall J, Silva E, Anzueto A, Martin CD, et al. International study of the prevalence and outcomes of infection in intensive care units. *Jama*. 2009;302(21):2323–9.
6. Baker T. Critical care in low-income countries. *Tropical Medicine & International Health*. 2009;14(2):143–8.
7. Riviello ED, Letchford S, Achieng L, Newton MW. Critical care in resource-poor settings: lessons learned and future directions. *Critical care medicine*. 2011;39(4):860–7.
8. Abate SM, Assen S, Yinges M, Basu B. Survival and predictors of mortality among patients admitted to the intensive care units in southern Ethiopia: A multi-center cohort study. *Annals of Medicine and Surgery*. 2021;65:102318.
9. Reynolds D, Burnham JP, Vazquez Guillamet C, McCabe M, Yuenger V, Betthausen K, et al. The threat of multidrug-resistant/extensively drug-resistant Gram-negative respiratory infections: another pandemic. *European Respiratory Review*. 2022;31(166):220068.

11. Debas SA, Zeleke ME, Mersha AT, Melesse DY, Admassie BM, Workie MM, et al. Evaluation of ventilator-associated pneumonia care practice in the intensive care units of a comprehensive specialized hospital in Northwest Ethiopia: a 1.5-year prospective observational study. *BMC anesthesiology.* 2024;24(1):361.
12. Paul N, Ribet Buse E, Knauthe AC, Nothacker M, Weiss B, Spies CD. Effect of ICU care bundles on long-term patient-relevant outcomes: a scoping review. *BMJ Open.* 2023 Feb 17;13(2):e070962.
13. Vincent J-L. Give your patient a fast hug (at least) once a day. *Critical care medicine.* 2005;33(6):1225–9.
14. Haynes AB, Weiser TG, Berry WR, Lipsitz SR, Breizat AH, Dellinger EP, et al. Safe Surgery Saves Lives Study Group. A surgical safety checklist to reduce morbidity and mortality in a global population. *New England journal of medicine.* 2009 Jan 29;360(5):491–9.
15. Klar R, Hoffmann A, Blumer J, Cioccarri L. Implementation of the FAST HUG if WEAK extended ward round checklist in a tertiary interdisciplinary intensive care unit: a before-and-after quality improvement study. *Critical Care Science.* 2026 Mar 13;38:e20260158
16. Degrado JR, Anger KE, Szumita PM, Pierce CD, Massaro AF. Evaluation of a local ICU sedation guideline on goal-directed administration of sedatives and analgesics. *Journal of Pain Research.* 2011;4:127–34.
17. Iken RF, Woodruff RJ, Smith J, Albert RK, Douglas IS. Observational study of head of bed elevation adherence using a continuous monitoring system in a medical intensive care unit. *Respiratory care.* 2012;57(4):537–43.
18. Casaer MP, Mesotten D, Hermans G, Wouters PJ, Schetz M, Meyfroidt G, et al. Early versus late parenteral nutrition in critically ill adults. *New England Journal of Medicine.* 2011;365(6):506–17.