

BMJ Open LIFE-UP Day audit to monitor implementation of post-intensive care syndrome prevention practices: a multicentre cross-sectional study in Belgian intensive care units

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ABSTRACT

Objective To evaluate the feasibility and relevance of the LIFE-UP Day audit, a simple, 1-day benchmarking tool based on the multidisciplinary LIFE-UP bundle (Limit sedation, optimise nutritional Intakes, engage Families, promote Exercise and follow-UP the patients after discharge) and assessing the implementation of postintensive care syndrome (PICS) prevention strategies in daily practice.

Design Exploratory multicentre cross-sectional audit study.

Setting Eight Belgian adult intensive care units (ICUs), between April and July 2024.

Participants All patients present at 08:00 on the audit day and hospitalised for ≥24 hours.

Main outcome measures An independent nurse collected data on sedation, analgesia, nutrition, family empowerment, physical exercise and post-ICU follow-up. A multidimensional LIFE-UP composite score (raw 0–10 points), normalised to a 5-point scale, was created to quantify adherence to PICS prevention practices based on current recommendations. Feasibility was evaluated through data accessibility, resource needs, cooperation of ICU teams and the ability to complete the audit within 1 day. Relevance was evaluated through adherence to the bundle, assessed by comparing LIFE-UP scores between ICUs. Quantitative results were expressed as median and IQR.

Results The audit was tested in 87 patients aged 68 (59–74) years, 9 (5–15.5) days after their admission. The audit was feasible across all ICUs: necessary data were available, resources required were minimal and cooperation was excellent. The LIFE-UP score highlighted significant variability between ICUs (2.5 (1.75–2.75), $p<0.001$). The lowest-performing domains were nutritional adequacy, family engagement and structured post-ICU follow-up.

Conclusions The LIFE-UP Day audit proved feasible and provides a first structured framework for benchmarking. Broader implementation will be essential to validate the LIFE-UP score, refine the model and ultimately determine whether it can translate into improved patient and family outcomes.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ This study used a multicentre design including both academic and non-academic intensive care units (ICUs), improving the representativeness of different ICU settings.
- ⇒ Data were collected by a single external investigator using a standardised approach, ensuring consistency across participating centres.
- ⇒ The 1-day audit design enabled a pragmatic evaluation of clinical practices without interfering with routine care delivery.
- ⇒ The assessment relied on local documentation and team reporting, which may have introduced measurement bias.
- ⇒ The LIFE-UP (Limit sedation, optimise nutritional Intakes, engage Families, promote Exercise and follow-UP the patients after discharge) score has not yet undergone formal validation or refinement of its weighting.

BACKGROUND

The long-term physical, cognitive and psychological disorders observed in patients who survive a critical illness and an intensive care unit (ICU) stay have been labelled 'post-intensive care syndrome' (PICS).¹ Up to 80% of ICU survivors may experience one or more symptoms of PICS in the years following discharge, regardless of the initial reason for ICU admission.² With advances in critical care leading to declining mortality rates, the population of ICU survivors continues to grow. PICS has thus become a significant public health concern, as it impacts survivors' functional recovery and is subsequently associated with a financial burden for both the individuals and society.³

Critical care clinicians can play a pivotal role in preventing and managing PICS.⁴ However,

recent data indicate that the overall level of knowledge regarding PICS is still low.⁵ Still, inadequate or delayed management strategies during and after the ICU stay may contribute to adverse long-term outcomes.^{6–8} Therefore, PICS should be addressed as early as ICU admission.⁹ Several bundles of care have been described, aiming at reducing ICU-related PICS risk factors: the ABCDEF (A: Assess, prevent and manage pain in ICU patients; B: Conduct daily Spontaneous Awakening and Breathing Trials (SAT-SBT trials) in mechanically ventilated ICU patients; C: Use non-benzodiazepine sedatives and minimise sedative use in ICU patients; D: Assess, prevent and manage delirium in ICU patients; E: mobilise and exercise ICU patients early and often; F: engage and empower patients and families in care processes),¹⁰ LIFE-UP (Limit sedation, optimise nutritional Intakes, engage Families, promote Exercise and follow-UP the patients after discharge)¹¹ or e-CASH (early Comfort using Analgesia, minimal Sedatives and maximal Humane care)¹² bundles are examples of holistic approaches targeting sedation, analgesia, nutrition, physical exercise and humanisation practices. Notwithstanding, despite the numerous published studies evaluating the effectiveness of various interventions to prevent PICS, many approaches, particularly those that are multimodal and individualised, are still in the early stages of implementation.¹³

One way to improve PICS prevention is to enhance the quality of care, which can be facilitated by dedicated audits and subsequent feedback reports, as well as benchmarking.¹⁴ In this process, one or more aspects of clinical care are selected and systematically evaluated against explicit criteria based on established best practices.¹⁵

To the best of our knowledge, no widely adopted standardised tool currently provides a specific metric to benchmark adherence to PICS prevention strategies in intensive care. The LIFE-UP Day audit was developed to address this gap, drawing inspiration from large-scale international audit models such as *nutritionDay*. The latter has shown how a simple, annual 1-day audit can effectively raise awareness, promote interest in clinical nutrition and—though to a lesser extent—encourage changes in practice.¹¹ Building on this concept, the LIFE-UP Day audit applies the multidisciplinary LIFE-UP bundle as its reference framework. It was designed as a structured, pragmatic and scalable instrument to assess current PICS prevention practices across ICUs. The present study aimed to evaluate the feasibility and relevance of this novel audit model.

METHODS

This study followed the SQUIRE V.2.0 (Standards for Quality Improvement Reporting Excellence) guidelines for reporting quality improvement and audit studies.¹⁶

Study design and setting

This exploratory study is a multicentre, cross-sectional audit assessing the feasibility and relevance of the

LIFE-UP Day audit model for PICS prevention. The audit was conducted as a 1 day assessment of PICS prevention practices during the ICU stay. Participating ICUs were recruited in Wallonia (the French-speaking part of Belgium), in both academic and non-academic hospitals. Units were eligible if caring exclusively for adult patients, regardless of the type of sectorisation (medical, surgical or mixed), number of ICU beds or ownership status (public or private). This broad recruitment strategy aimed to ensure representativeness of the diversity of ICU settings in Belgium. The principal investigator (A-FR) distributed an invitation to 24 adult ICUs across Wallonia. Each centre corresponded to one ICU, sometimes organised into several subunits under the responsibility of the same head of department, and all were invited to participate voluntarily.

Audit implementation and logistics

The audit was conducted on a single day between 25 April and 19 July 2024, with each centre selecting the date based on local logistics.

Although the variables to be collected were described in the ethics submission and approved prior to study initiation, the detailed operational scoring grid and weighting structure of the LIFE-UP score (see below) were not shared with participating ICUs before the audit day. This was done to minimise preparation bias and to ensure that feasibility was assessed under real-life conditions. On the morning of the audit, the external nurse conducted a briefing session with the designated local contact person (head nurse or physician) to outline the scope of the audit, clarify the variables to be collected and explain the principles of the LIFE-UP score. This short on-site orientation ensured consistent understanding of the procedures. However, there was no prior educational intervention provided to participating ICUs regarding the LIFE-UP framework or specific guideline components.

If a participating ICU had a bed occupancy below 25% on the planned audit day, a second visit was scheduled on another date selected by the local team. This procedure prevented audits performed during unusually low-activity periods from biasing feasibility assessment or reducing the accuracy of practice benchmarking.

Following data collection and analysis, each ICU received an individualised feedback report summarising its results.

Patient and public involvement

Patients and/or the public were not involved in the design, conduct, reporting or dissemination plans of this research.

Patients

All patients present at 08:00 on the audit day and hospitalised for ≥24 hours were eligible for inclusion. Patients with limited short-term autonomy prospects (ie, those receiving palliative care or admitted for severe stroke or traumatic brain injury with anticipated long-term

Table 1 Recorded data on the LIFE-UP Day audit and LIFE-UP score

Domain of the LIFE-UP bundle	Recorded data	Recommendation	Items of the LIFE-UP score	Raw score	Final score
L—sedation limitation	▶ RASS score. ▶ Indication for sedation. ▶ Sedative use. ▶ Last VAS for pain. ▶ Non-pharmacological adjuvants for pain treatment.	27	▶ Limitation of sedation when not strictly indicated. ▶ Avoidance of midazolam or other benzodiazepines. ▶ Absence of pain. ▶ Use of both pharmacological and non-pharmacological pain management strategies.	0 or 1 0 or 1 0 or 1 0 or 1	L=0–1
I—nutritional intakes adequation	▶ Nutrition route. ▶ Indirect calorimetry measurement. ▶ Energy and protein targets. ▶ Energy and protein actual intakes during the last 24 hours.	28 29	▶ Provision of at least 80% of prescribed energy target. ▶ Provision of at least 80% of prescribed protein target.	0 or 1 0 or 1	I=0–1
F—family engagement	▶ Visiting hours. ▶ Use of ICU diary.	30 31	▶ Flexible or open family visitation policy. ▶ Use or availability of an ICU diary.	0 or 1 0 or 1	F=0–1
E—physical exercise	▶ Anticipated level on the 'Start To Move' protocol. ▶ Actual reached level on the 'Start To Move' protocol during the last 24 hours.	18 32	Achievement of the expected level of early mobilisation according to the Start to Move protocol.	0 or 1	E=0–1
UP—follow-up	Anticipated follow-up for survivors.	31 33	Access to a formalised post-ICU follow-up programme.	0 or 1	UP=0–1
Total final LIFE-UP score.					0–5

The LIFE-UP score is a multidimensional composite score (raw 0–10 points), normalised to a 5-point scale.
ICU, intensive care unit; RASS, Richmond Agitation–Sedation Scale; VAS, Visual Analogue Scale.

conscious changes) were excluded, as they were unlikely to benefit from post-ICU follow-up.

Collected data

Data were collected by a single independent nurse who visited all participating sites, supported by the local ICU team (head nurse or physician). Using a standardised paper-based form, information was extracted from patients' medical and nursing charts under the supervision of the local head nurse or responsible physician. In accordance with the pragmatic audit design, no double-check or source verification procedure was performed. Because the study protocol included a planned remote assessment of PICS (see online supplemental material), patient identifiers were recorded on the paper forms to allow later recontact. These identifiers were accessible only to the coordinating centre. After centralisation, the clinical data were entered into an electronic database by the coordinating team. Missing data were not imputed: blank fields on the paper forms were treated as missing and excluded from item-level analyses, while patients remained included in all analyses for which data were available.

Collected variables included ICU characteristics, patient demographics, illness severity and current organ support therapies. PICS prevention practices delivered in the 24 hours preceding the audit were also recorded. Data collection was guided by the LIFE-UP bundle (table 1), which integrates key domains of PICS prevention: sedation and analgesia management, nutritional

adequacy, early mobilisation, family engagement and post-ICU follow-up.¹¹ Observed practices were systematically compared against relevant clinical guidelines, published protocols and evidence-based recommendations (table 1). Local protocols, when present, were not used as the reference comparator.

LIFE-UP score development

To quantify PICS prevention efforts, a novel composite LIFE-UP score was developed for this study. One point was initially awarded for each of the following 10 observed practices: limitation of sedation when not strictly indicated; avoidance of midazolam or other benzodiazepines; absence of pain; use of both pharmacological and non-pharmacological pain management strategies; provision of at least 80% of prescribed energy targets; provision of at least 80% of prescribed protein targets; flexible or open family visitation policy; use or availability of an ICU diary; achievement of the expected level of early mobilisation according to the Start to Move protocol; and access to a formalised post-ICU follow-up programme. The ten evaluated items were derived from the LIFE-UP bundle framework and selected based on evidence-informed elements from the literature addressing key domains of PICS prevention and management (table 1). Each of the five LIFE-UP domains—L, I, F, E and UP—was thus assigned a maximum value of 4, 2, 2, 1 and 1 points, respectively, resulting in a raw score ranging from 0 to 10 (table 1). In the absence of robust evidence quantifying the relative contribution of each domain to long-term

PICS outcomes (and acknowledging that this contribution may vary between patients), and to preserve the conceptual balance of the bundle, the domain scores were subsequently rescaled so that each domain contributed a maximum of one point. This produced a final composite score ranging from 0 to 5 (table 1). One score was attributed per patient, allowing straightforward benchmarking of PICS prevention practices across ICUs.

Outcomes

The primary outcome of this exploratory audit was to assess the feasibility of the model in routine practice. Feasibility was evaluated using a qualitative descriptive approach across key dimensions: scope definition (alignment with audit objectives, clarity and absence of ambiguity in variable interpretation during data collection), resources (availability of the resources including personnel, time, logistics), data availability (whether required variables were routinely documented and accessible within existing medical and nursing records across units with different organisational structures, without requiring additional measurements), cooperation of ICU teams (engagement and support) and timeframe (audit completion within 1 day). The audit was considered feasible if at least 80% of centres completed data collection within 1 day, with <10% missing data and no major protocol deviations.

The secondary outcome was to evaluate the relevance of the audit by measuring adherence to PICS prevention practices via the LIFE-UP score.

Additional exploratory outcome analysis

In addition to the main feasibility and relevance assessment, an exploratory secondary analysis was conducted to evaluate post-ICU outcomes. 3 months after ICU discharge, patients who had provided consent on the audit day were contacted by an independent investigator to complete the validated French hybrid version of the Healthy Aging Brain Care-Monitor (HABC-M).¹⁷ This assessment aimed to explore whether the degree of PICS prevention during the ICU stay, expressed through the LIFE-UP score, correlated with the occurrence of PICS-related symptoms at follow-up. A detailed methodology is provided in the online supplemental material.

Statistics

As this was an exploratory audit, no formal sample size calculation was conducted. The aim was to assess feasibility rather than to test predefined hypotheses.

Statistical analysis was performed using GraphPad Prism (V.10.4.0 for Mac OSX, GraphPad, San Diego, California, USA). Qualitative parameters were expressed as counts and percentages. Normality of quantitative parameters was assessed using the Shapiro-Wilk test. As quantitative parameters were not normally distributed, results were expressed as median (P50) and interquartile range (P25–P75). Missing values were not imputed. Data were compared using the Kruskal-Wallis test. Correlations

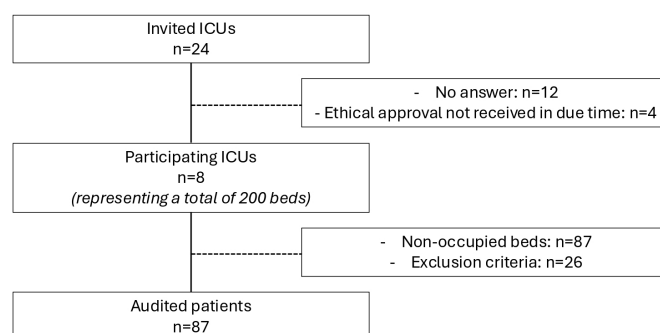


Figure 1 Flow chart of the participating ICUs and included patients. ICUs, intensive care units.

between data were tested using the Spearman test. A *p* value <0.05 was considered statistically significant.

RESULTS

Characteristics of the participating ICUs and the included patients

Half of the invited centres (n=12) responded to the email invitation. Four centres did not complete the ethical agreement process in due time. An ethical agreement was received from eight centres (figure 1): six non-academic hospitals (75%), including two private centres and two academic ICUs. Most participating ICUs (7/8, 87.5%) were mixed medical-surgical units, with one dedicated surgical ICU. Together, the participating ICUs represented 200 adult critical care beds, with unit sizes ranging from 6 to 48 beds. Multidisciplinary teams were partially implemented, with nursing assistants present in five out of eight ICUs (62.5%), dedicated physiotherapists in all ICUs (1–5 per unit), dietitians in six out of eight ICUs (75%) and psychologists in five out of eight ICUs (62.5%). Access to occupational therapists and speech therapists was available on demand in most ICUs (7/8, 87.5%).

The audit was successfully conducted in each ICU within a single day, except for two centres where a 2nd day was necessary due to low occupancy rates during the initial audit. The audits were performed across 10 different days. Of the 113 occupied beds on audit days, 87 patients were included (77% inclusion rate). This corresponded to 4–27 included patients per participating ICU, reflecting the heterogeneity in unit size and occupancy on the audit days. The median age of audited patients was 68 years (59–75), and their median Sequential Organ Failure Assessment (SOFA) score on admission was 6 (3–9). Additional patient characteristics are detailed in table 2.

Feasibility of the audit model

The scope of the audit was well defined and realistic. The necessary data were available in all participating ICUs with no significant barriers to access. The audit required minimal resources: a single external nurse conducted the audit with the support of local staff. ICU teams demonstrated strong engagement and collaboration, facilitating

Table 2 Characteristics of the included patients

Characteristic	n=87
Age, years	68 (59–75)
Sex (female), n (%)	25 (28.7)
BMI at admission, kg/m ²	27.6 (23–32)
Admission category, n (%)	
Medical	64 (73.6)
Surgical	23 (26.4)
Primary failure at admission, n (%)	
Cardiovascular	27 (31.1)
Pulmonary	25 (28.7)
Neurological	10 (11.5)
Polytrauma	5 (5.7)
Other	20 (23)
SOFA at admission	6 (3–9)
Time between admission and audit day, days	9 (5–15.5)
SOFA on the audit day	5 (3–8)
Organ supports on the audit day, n (%)	
Invasive ventilation support	41 (47.1)
Tracheostomy	5 (5.7)
Non-invasive ventilation support	43 (49.4)
Catecholamines	20 (23)
Continuous venovenous haemofiltration	2 (2.3)
Intermittent haemodialysis	5 (5.7)
Extracorporeal membrane oxygenation	0

Data are expressed as n (%) or median (P25–P50).

BMI, body mass index; SOFA, Sequential Organ Failure Assessment.

smooth data collection. The 1-day format was achievable in all centres. Up to 16 patients in a participating ICU could have their data recorded in a single day. No protocol deviations were reported during data collection, and all audits were conducted according to the predefined procedures.

No unintended consequences or audit-related disruptions to clinical workflow were reported.

Compliance in LIFE-UP score implementation

The LIFE-UP score is detailed in table 3. The median score across all participating ICUs was 2.5 (IQR 1.75–2.75), with significant variation between the eight included centres ($p<0.001$) (figure 2).

Table 3 LIFE-UP score for the included patients

	n=87
L —sedation limitation (4 points)	3 (2–3)
I —nutritional intakes adequation (2 points)	0 (0–2)
F —family engagement (2 points)	0 (0–0)
E —physical exercise (1 point)	1 (1–1)
UP —follow-up (1 point)	1 (0–1)
Total (10 points)	5 (4–6)
LIFE-UP score (5 points)	2.5 (1.75–2.75)

Data are expressed as median (P25–P50).

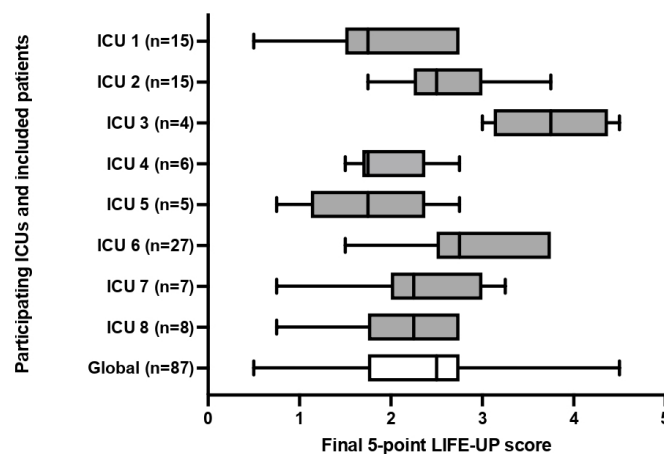


Figure 2 Distribution of the final 5-point LIFE-UP score across the eight different participating ICUs. The figure illustrates the distribution of individual patient LIFE-UP scores in each of the eight participating ICUs and overall (global cohort). Scores range from 0 to 5, with higher values indicating greater adherence to the LIFE-UP bundle (Limit sedation, optimise nutritional Intakes, engage Families, promote Exercise and follow-UP the patients after discharge). Data are presented as median, IQR, minimum and maximum. ICUs, intensive care units.

Sedation and analgesia management

Sedation management was the most consistently implemented domain. On the audit day, 36 of 87 patients (41.4%) were sedated, with a documented medical indication (neurological or respiratory dysfunction) in 8 patients (22.2%). All these patients had a Richmond Agitation–Sedation Scale (RASS) score between –3 and –5. However, 17 patients remained unnecessarily deeply sedated (median RASS –4 (–5 to –1.5)). Midazolam was administered in 7 of 36 sedated patients (19.4%), while benzodiazepines for sleep promotion were used in 8 of 87 patients (9.2%), and melatonin in 1 patient (2.8%).

Pain assessment was recorded in 83 of 87 patients (95.4%). According to the most recent pain score, 13 of 83 patients (15.7%) still reported pain. Non-pharmacological pain management strategies (eg, heat/cold application, positioning) were available in only one of eight ICUs.

Nutritional adequacy

Nutritional support showed marked variability across centres. Among all patients, 42 of 87 (48.4%) received enteral nutrition, 5 (5.7%) received parenteral nutrition and 25 (28.7%) were fed orally, of whom 4 (16%) also received oral nutritional supplements.

No nutritional intake was provided to 16 of 87 patients (18.4%), primarily due to a medical fasting order (14 of 16 patients, 87.5%) for a median duration of 14 hours (IQR 23–24 hours).

Energy targets were determined using indirect calorimetry in only seven patients (8%). During the preceding 24 hours, 39 patients (44.8%) received $\geq 80\%$ of prescribed



Table 4 Mobilisation and physical exercises in the included patients

n=87		
Type of physical exercise delivered during the last 24 hours, n (%)	Passive mobilisation	43 (49.4)
	Passive leg cycling	12 (13.8)
	Active leg cycling	9 (10.3)
	Sitting on the edge of the bed	18 (20.7)
	Sitting out of bed (passive or active transfer)	33 (37.9)
	Walking (with or without assistance)	18 (20.7)
	Resistance training, arms and legs	23 (26.4)
Predicted level on the 'Start To Move' protocol, n (%)	Level 0	0
	Level 1	40 (46)
	Level 2	20 (23)
	Level 3	10 (11.5)
	Level 4	7 (8)
	Level 5	10 (11.5)

Data are expressed as n (%).

energy targets, and 41 (47.3%) reached $\geq 80\%$ of protein targets.

Family engagement

Family involvement remained limited. Six of eight ICUs (75%) maintained restricted visiting hours, typically allowing visits of 30 min to 2 hours two times per day. None of the participating ICUs offered open visitation policies or used ICU diaries to facilitate family engagement or patient recollection.

Early mobilisation

All ICUs reported providing some form of physical rehabilitation, though practices were heterogeneous. Only two ICUs (25%) delivered a single physiotherapy session to patients within the previous 24 hours, and three ICUs (37.5%) had a structured mobilisation protocol in place.

Details of the physical exercises performed are presented in table 4. The targeted level of mobilisation, as defined by the Start to Move protocol,¹⁸ was achieved in 66 of 87 patients (75.8%). None of the patients received neuromuscular electrical stimulation.

Post-ICU follow-up

A formalised post-ICU follow-up programme designed to screen for PICS was routinely organised in only two ICUs (25%).

Additional exploratory outcome analysis

Of the patients included in the audit, follow-up status at 3 months is detailed in the online supplemental material. A total of 31 patients (35.6%) completed the HABC-M assessment 104 (84–111) days after the audit day. The median HABC-M score was 18 (10–29), ranging from 2 to 60. No correlation was observed between the individual

LIFE-UP score and the HABC-M total score ($p=0.653$). Further details are available in the online supplemental material.

DISCUSSION

This exploratory study confirmed the practical feasibility of the LIFE-UP Day audit model. The audit was successfully implemented in a multicentre setting, requiring minimal resources and leveraging existing clinical documentation. These results highlight the potential for scalability and reproducibility of the LIFE-UP Day audit in diverse ICU settings. Moreover, the study demonstrated the added value of an audit focused specifically on PICS prevention: the LIFE-UP score effectively captured substantial variability in prevention practices across participating ICUs, underscoring its potential as a quality improvement tool.

Marked differences were observed in the implementation of PICS prevention strategies. While sedation and analgesia management were generally well addressed, nutritional targets were frequently unmet, consistent with previous observations.¹⁹ Family-centred care also remained limited, despite growing evidence supporting its positive impact on patient and family outcomes.²⁰ Similarly, early mobilisation practices were inconsistently applied—findings that echo recent reports from 37 Swiss ICUs²¹—likely reflecting persistent barriers such as resource limitations and the absence of structured protocols. Finally, a small proportion of ICUs organised a post-ICU follow-up for PICS screening, a pattern consistent with international data.²² Insufficient funding and resource allocation appear to be key contributing factors.²³ Overall, these findings align with prior research demonstrating considerable variability in the application of evidence-based ICU care bundles, including the ABCDEF bundle.²⁴

The LIFE-UP Day audit builds on existing quality improvement frameworks by providing a comprehensive, multidisciplinary approach to PICS prevention. Unlike earlier bundles, it explicitly integrates domains often under-represented in ICU care models, such as nutritional support and post-ICU follow-up. Together, these findings emphasise the need for targeted quality improvement initiatives to bridge the gap between best practices and routine clinical care. By offering a quantitative and standardised measure of adherence to PICS prevention strategies, the LIFE-UP score can act as a catalyst for local and international improvement efforts. It enables ICUs to identify priorities, benchmark performance, monitor progress over time and share best practices within and across institutions. The LIFE-UP Day audit also holds promise as an educational and awareness-raising tool, with a potential impact similar to that of the *nutritionDay* initiative.²⁵ Repeated annual LIFE-UP Day audits could promote greater awareness of PICS and, ideally, drive meaningful changes in ICU practice.

Building on insights from this exploratory phase, future developments should focus on expanding the dataset to

encompass additional aspects of PICS prevention (eg, sleep promotion, restraint minimisation); enhance feedback reports with individualised benchmarking, practical recommendations and quality improvement toolkits²⁶ to facilitate behavioural and practice changes within audited centres²⁵; and evaluate clinical impact by linking LIFE-UP scores with patient outcomes in larger, longitudinal studies. Ultimately, the LIFE-UP Day audit could support advocacy efforts to secure resources, funding and institutional support for comprehensive PICS prevention programmes.

Establishing a direct association between implementation metrics and long-term patient-centred outcomes represents a central objective in quality improvement research. However, in the context of PICS—a multifactorial and heterogeneous syndrome—such validation is inherently complex. PICS outcomes are influenced not only by ICU-based preventive strategies, but also by baseline vulnerability, comorbidities, illness severity, post-ICU rehabilitation access, psychosocial context and socio-economic determinants. Therefore, the absence of a detectable association in this exploratory cohort should not be interpreted as a lack of clinical relevance of preventive practices. Beyond measurable long-term outcomes, structured prevention efforts may enhance quality of care, humanisation of the ICU environment and patient and family experience. In this perspective, quantifying implementation through a structured audit remains meaningful, as it enables benchmarking, identification of practice gaps and monitoring of progress over time.

Some limitations must be acknowledged. First, the study included a limited number of ICUs and patients, exclusively in ICUs located in Wallonia, Belgium. However, this exploratory phase was designed to test the audit model's feasibility and relevance, rather than to produce representative prevalence data or demonstrate the effectiveness of PICS prevention practices. Although the participating units represented a diversity of settings (academic vs non-academic, public vs private, various sizes), the geographical restriction can limit generalisability to other healthcare systems with different organisational cultures. Second, the audit was conducted during the summer months, when ICU occupancy and staffing may differ from typical conditions. This could have affected both feasibility outcomes and adherence levels. Third, selection bias is inherent in cross-sectional studies, potentially overrepresenting long-stay patients, who may, in fact, be the most relevant population for PICS prevention efforts. Fourth, although data were collected by an independent nurse using a standardised form, reliance on local documentation and team reporting could introduce observer or reporting bias. The absence of an independent validation process for certain variables (eg, nutritional adequacy, mobilisation level) may have affected data accuracy. Fifth, feasibility was assessed qualitatively rather than through predefined quantitative indicators. The absence of standardised feasibility metrics (eg, time per patient or

structured scoring) may limit reproducibility and precision. Future iterations should incorporate more objective measures. Finally, the LIFE-UP score has not yet undergone formal validation or refinement of its weighting. Some domains (eg, nutrition or family engagement) may have disproportionate influence on the total score, and sensitivity analyses were not performed. However, the relative contribution of each LIFE-UP domain to long-term PICS outcomes remains unknown and may vary between patients depending on baseline vulnerability, severity of illness and postdischarge trajectory.

Conclusions

The LIFE-UP Day audit and its associated score are a novel, pragmatic and scalable tool for monitoring PICS prevention in ICUs. This exploratory study confirmed its feasibility and relevance for benchmarking practices and identifying areas of improvement. An annual implementation across diverse ICU settings could drive greater awareness, standardisation and enhancement of PICS prevention practices, ultimately improving outcomes for ICU survivors. Future directions include expanding the audit to an international level, after refining based on the present observations and ultimately determining whether systematic assessment and feedback on PICS prevention can translate into improved patient and family outcomes.

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Contributors AFR: conceptualisation. AFR: methodology. AFR, NK, VDO, VF, CG, GM, EP, SV and DW: investigation. AFR: formal analysis. AFR: visualisation. AFR: writing—original draft. VDO, VF, CG, GM, EP, SV, DW, BL and JBE: writing—review and editing. AFR: guarantor.

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Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Ethics approval The coordinating ICU gained ethical approval for multi-centre data collection (Ethics Committee of the University Hospital of Liège, Belgium, chair Pr Didier Ledoux, local Ref 2023–295, approved on 4 April 4th, 2024), and local approval was additionally necessary. All participating hospitals were instructed to inform patients and relatives with a standardised patient information sheet about their right to refuse participation.

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Data availability statement Data are available upon reasonable request. The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

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