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Standardizing communication and documentation of intensive care unit discharge decisions: a before-and-after quality improvement study

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Abstract

Objective

To evaluate whether a standardized communication and documentation process improved the completeness of the interval between the intensive care unit discharge decision and actual unit exit, enabling reliable measurement of avoidable unit days.

Methods

This before-and-after quality improvement study compared aggregated electronic registry reports from two 10-bed adult intensive care units in January-June 2025 and January-June 2026. The primary outcome was the proportion of survivors with a classifiable decision-to-exit interval. Secondary outcomes were exit within four hours, avoidable unit days, and balancing measures.

Results

There were 1,105 admissions at baseline and 1,132 after implementation. At baseline, the interval was not calculable in the cardiac unit and only 0.27% of records were classifiable in the general unit. After implementation, completeness reached 95.83% and 94.07%, respectively (95.2% combined). Exit within four hours occurred in 93.24% of survivors in the cardiac unit and 86.34% in the general unit. The registry identified 17.9 avoidable unit days (rate, 1.4%) and 26.1 days (1.8%), respectively. Seventy-two-hour readmission did not increase.

Conclusion

Standardized communication and documentation were associated with recovery of a reliable discharge-flow measure and made previously unquantifiable delays visible. Critical baseline missingness precludes a direct conclusion that avoidable unit days decreased.

INTRODUCTION

Discharge from an intensive care unit (ICU) is both a clinical transition and an operational handoff. Once intensive care is no longer required, actual exit depends on an explicit discharge decision, communication across teams, destination-bed availability, and coordinated transfer. Prolonged decision-to-exit intervals consume high-complexity capacity without additional intensive-care benefit and may delay new admissions or internal transfers. Potentially avoidable time has represented a material share of ICU bed use and cost in previous studies, and delayed transfer has been associated with longer hospital stay.[1–3]

Efforts to accelerate ICU discharge require safeguards. High occupancy and transfer pressure may influence discharge timing and have been associated with early death or readmission after ICU transfer.[4,5] Communication tools that make daily goals explicit can improve team alignment,[6] but their effect cannot be evaluated if the underlying process is not documented reliably.

The Epimed Monitor registry supports benchmarking and quality management in Brazilian ICUs.[7] Structured assessment has also been used in a Brazilian hospital to strengthen quality governance and data-informed decision-making.[8] However, any registry-derived measure remains dependent on data completeness, validity, and auditability.[9] In the participating hospital, calculation of avoidable unit days required both the time of the discharge decision and the time of actual exit. During the first half of 2025, those data were unavailable in one unit and missing in 99.73% of survivors in the other. Thus, an apparent value of zero could indicate failure to measure rather than absence of delay.

This study evaluated whether implementing a standardized communication and documentation process was associated with improved completeness of the decision-to-exit interval in two adult ICUs. Secondary aims were to describe post-implementation avoidable unit days and examine operational and clinical balancing measures.

METHODS

Study design and setting

We conducted a retrospective, quasi-experimental before-and-after quality improvement study, reported according to SQUIRE 2.0.[10,11] The study took place in a specialty hospital in central Brazil and included two adult ICUs: a 10-bed cardiac ICU and a 10-bed general ICU. The units shared hospital transfer infrastructure but served different clinical profiles. January-June 2025 was the baseline period and January-June 2026 was the implementation period. Matching calendar semesters reduced, but did not eliminate, seasonal bias.

Intervention

Beginning in January 2026, the hospital standardized four connected elements of the ICU discharge workflow. First, discharge readiness and the decision to leave the unit were made explicit within the routine interdisciplinary process. Second, the time of the discharge decision and the time of actual unit exit were documented in Epimed Monitor. Third, barriers to transfer were communicated and escalated through existing clinical and bed-flow workflows. Fourth, unit-specific indicator feedback was used to identify gaps and guide subsequent corrective actions. The immediate theory of change was that shared decisions, reliable timestamps, communication of barriers, and feedback would make the process observable. Reduction of avoidable time was considered a later effect, contingent on removal of the barriers detected.

Population and data source

All admissions and exits recorded in both ICUs during the two study periods were included. The analysis used aggregated Epimed Monitor reports for each unit and period. For decision-to-exit measures, the denominator was the number of ICU survivors shown in the reports. No patient-level identifiers, timestamps, or linkage keys were accessed. Reports produced for routine management before ethics approval were the data source; the scientific analysis was finalized after ethics approval.

Measures

The primary outcome was completeness of the decision-to-exit interval, defined as 100% minus the proportion classified as not informed. When the source report displayed no data, the outcome was classified as not calculable rather than zero.

Secondary outcomes were the proportion exiting within four hours of the discharge decision; the proportions in the 4–12, 12–24, and 24-48-hour categories; avoidable unit days; and the avoidable-unit-day rate. According to the institutional Epimed definition, intervals longer than four hours were considered avoidable. The rate was the sum of avoidable delay converted to days divided by the sum of patient-days in the unit during the period; higher values indicated worse flow. Values were transcribed from the source reports and were not independently recalculated because unit-level patient-day denominators were unavailable.

Admissions, exits, occupancy, and mean length of stay described service use. Readmission within 72 hours, ICU mortality, and hospital mortality were balancing measures. Simplified Acute Physiology Score 3 (SAPS 3), predicted mortality, and standardized mortality ratio (SMR) described severity and outcome context.

Analysis

We used descriptive statistics, absolute changes in percentage points, and monthly trajectories. Combined post-implementation completeness was estimated by weighting unit-specific completeness by the number of survivors. We did not perform hypothesis tests, adjusted models, imputation, or causal effect estimation because the data were aggregated, there were only two comparison periods, and the baseline primary measure was critically missing. This approach was selected to avoid causal attribution beyond that supported by the design.[12]

Ethics

The study was approved by the institutional Research Ethics Committee (Brazilian Certificate of Presentation for Ethical Appraisal: CAAE 00330426.7.0000.5075; approval number 8,619,016; July 31, 2026). The requirement for informed consent was waived because the study exclusively used

retrospective, aggregated, and anonymized secondary data, with no individually identifiable information and no patient contact.

RESULTS

Volume, use, and balancing measures

The two ICUs recorded 1,105 admissions and 1,093 exits during January-June 2025 and 1,132 admissions and 1,122 exits during January-June 2026. Cardiac ICU admissions increased by 5.7%, while occupancy rose from 68.9% to 89.3% (+ 20.4 percentage points). General ICU admissions decreased by 2.5%, and occupancy was similar (83.1% versus 82.4%).

Readmission within 72 hours remained 2.6% in the cardiac ICU and decreased from 4.3% to 3.6% in the general ICU. ICU and hospital mortality were lower in both units in 2026; however, these differences were not attributed to the intervention because severity differed between periods, particularly in the general ICU.

Table 1
Operational characteristics and balancing measures by unit and period.

Indicator	Cardiac 2025	Cardiac 2026	General 2025	General 2026
Admissions, n	669	707	436	425
ICU exits, n	661	701	432	421
ICU survivors, n	652	695	371	388
Occupancy, %	68.9	89.3	83.1	82.4
Mean length of stay, days	1.9	2.3	3.5	3.5
ICU readmission within 72 hours, %	2.6	2.6	4.3	3.6
ICU mortality, %	1.4	0.9	14.1	7.8
Hospital mortality, %	3.3	1.8	16.3	11.8
SAPS 3, mean	36.1	37.1	48.8	45.8
Predicted mortality, %	7.2	7.6	21.7	17.3
SMR (95% CI)	0.44 (0.27–0.68)	0.23 (0.12–0.41)	0.75 (0.58–0.95)	0.68 (0.50–0.91)

Source: aggregated Epimed Monitor reports, January-June. CI: confidence interval; ICU: intensive care unit; SAPS 3: Simplified Acute Physiology Score 3; SMR: standardized mortality ratio.

Completeness of discharge documentation

The primary finding was conversion of a non-interpretable indicator into a usable measure. At baseline, the cardiac ICU report had no decision-to-exit data available for calculation, and the general ICU had only 0.27% classifiable records. After implementation, completeness reached 95.83% in the cardiac ICU and 94.07% in the general ICU. Weighted by survivors, approximately 1,031 of 1,083 records were classifiable (95.2%).

The absence of a baseline bar for the cardiac unit indicates that the value was not calculable; it does not represent zero.

Avoidable unit days after implementation

After implementation, 93.24% of cardiac ICU survivors and 86.34% of general ICU survivors exited within four hours of the discharge decision. Intervals longer than four hours occurred in 2.59% and 7.73%, respectively; the remainder were not informed. The reports identified 17.9 avoidable unit days in the cardiac ICU (displayed rate, 1.4%) and 26.1 days in the general ICU (1.8%), totaling 44.0 detected days. A combined rate was not calculated because the patient-day denominators required for valid pooling were unavailable.

Table 2
Decision-to-exit documentation and avoidable-unit-day indicators.

Indicator	Cardiac 2025	Cardiac 2026	General 2025	General 2026
Classifiable records, %	Not calculable	95.83	0.27	94.07
Not informed, %	Not calculable	4.17	99.73	5.93
Exit within 4 hours, %	Not calculable	93.24	0.27	86.34
Exit after 4 hours, %	Not calculable	2.59	0.00*	7.73
Avoidable unit days	Not calculable	17.9	0.0*	26.1
Avoidable-unit-day rate, %	Not calculable	1.4	0.0*	1.8

*The displayed zero values in the general unit at baseline are not interpretable as absence of delay because 99.73% of records were not informed. Exit after 4 hours is the sum of the 4–12, 12–24, and 24-48-hour categories.

Monthly trajectories differed between units. Cardiac ICU avoidable unit days decreased from 3.29 in January to 1.96 in June (-40.4%), although the pattern was not monotonic. In the general ICU, the lowest value occurred in March (2.08 days), followed by increases in April, May, and June, reaching 6.42 days. With only six post-implementation points, these patterns were treated as descriptive signals rather than statistical trends.

Values were transcribed from aggregated Epimed Monitor reports. Control limits were not estimated because only six post-implementation observations were available.

DISCUSSION

Principal findings

A standardized ICU discharge communication and documentation process was associated with a substantial recovery of measurement reliability. The combined completeness of the decision-to-exit interval reached 95.2%, compared with a baseline in which one unit had no calculable data and the other had only 0.27% classifiable records. The improved documentation made 44.0 avoidable unit days visible during the first half of 2026 and revealed heterogeneous post-implementation trajectories between the two ICUs.

Interpretation

The main outcome is improvement in the measurement infrastructure, not proof of shorter discharge delay. A timestamp-dependent indicator cannot distinguish efficient flow from missing data unless completeness is reported alongside performance. In this setting, documentation quality became an operational outcome because it determined whether teams could locate delays, quantify potential capacity, and evaluate subsequent improvement cycles. This interpretation is consistent with clinical-registry audit frameworks that treat completeness and accuracy as prerequisites for reliable indicator use.[9]

The post-implementation avoidable-unit-day values are consistent with literature identifying delayed ICU transfer as a source of potentially avoidable capacity use and cost.[1–3] They do not demonstrate deterioration in 2026; instead, they represent delays that became measurable. Similarly, the displayed baseline zero in the general ICU cannot be interpreted as good performance because almost all relevant records were missing.

The contrasting unit trajectories are operationally informative. The cardiac ICU ended the semester with fewer monthly avoidable unit days despite a marked increase in occupancy, while 72-hour readmission remained unchanged. In the general ICU, the rise from April through June suggests unresolved barriers that should be classified by destination-bed availability, transport, authorization, communication, clinical preparation, or other locally relevant causes. Previous studies indicate that discharge timing, occupancy, and post-transfer safety must be managed together.[4,5]

The findings also reinforce a governance lesson: a structured indicator is useful only when the processes that generate it are reliable and connected to action. Evidence from longitudinal hospital maturity assessment suggests that structured measurement can support quality governance and data-informed decision-making.[8] The four-component intervention created that foundation here, but sustained improvement in avoidable time will require targeted responses to the barriers revealed.

Implications for practice

Future monitoring should separate two goals: maintaining documentation completeness at or above 90% and reducing avoidable time. Monthly review should combine completeness, exit within four hours, avoidable unit days, causes of delay, destination, and balancing measures. Case review is particularly important for prolonged delays and for units whose trajectories worsen. A longer series with stable definitions and auditable patient-day denominators would permit statistical process control or interrupted time-series analysis. Patient-level data, if approved in a future ethics amendment, could support analyses by shift, day of week, destination, and severity.

Limitations

This study has several limitations. First, the baseline primary measure was critically missing, so a valid before-and-after estimate of change in avoidable unit days was impossible. Second, aggregated and rounded reports prevented independent audit of individual timestamps, patient-day denominators, and delay causes. Third, the before-and-after design remains vulnerable to secular changes, residual seasonality, and concurrent interventions. Fourth, severity differed between periods, particularly in the general ICU; mortality and length of stay therefore cannot be attributed to the intervention. Fifth, six post-implementation monthly points were insufficient to infer stability or a statistical trend. Finally, the study measured implementation at the unit level and could not quantify fidelity to each intervention component.

CONCLUSION

In two adult ICUs, standardized communication and documentation of discharge decisions were associated with recovery of the decision-to-exit measure to approximately 95% completeness. The intervention converted a previously non-interpretable indicator into actionable operational information and revealed 44.0 avoidable unit days during the first half of 2026. Because the baseline was not valid for this indicator, the study does not establish a reduction in avoidable unit days. The current result should be understood as successful implementation of measurement and as the starting point for unit-specific cycles addressing discharge barriers.

Declarations

Ethics approval and consent to participate. The study was approved by the institutional Research Ethics Committee (CAAE 00330426.7.0000.5075; approval number 8,619,016; July 31, 2026). The requirement for informed consent was waived because only retrospective, aggregated, anonymized secondary data were used.

Consent for publication. Not applicable.

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Conflicts of interest. The authors declare no conflicts of interest.

Data availability. Aggregated reports underlying the findings may be made available by the corresponding author upon reasonable request, subject to institutional authorization and the approved ethical conditions. Patient-level data were neither accessed nor analyzed.

Author contributions. All authors contributed substantially to the conception or implementation of the improvement initiative, interpretation of the findings, and critical revision of the manuscript; all authors must approve the final version and accept accountability for the work before submission.

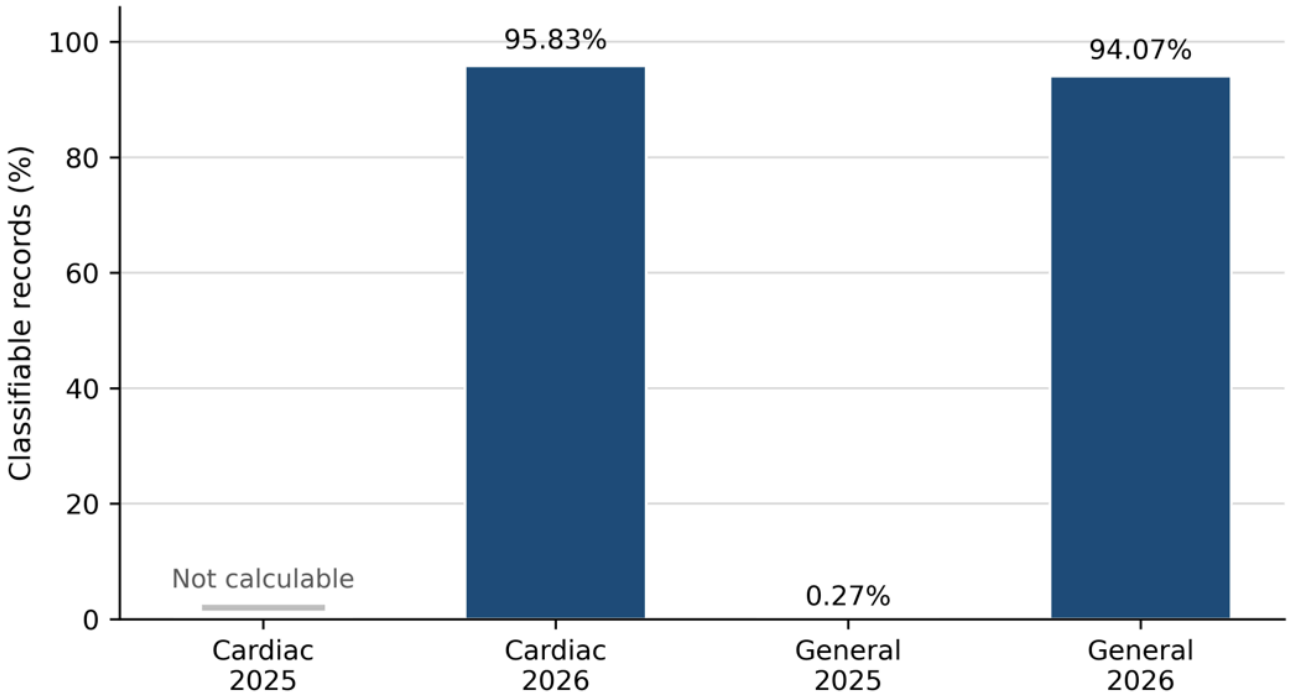
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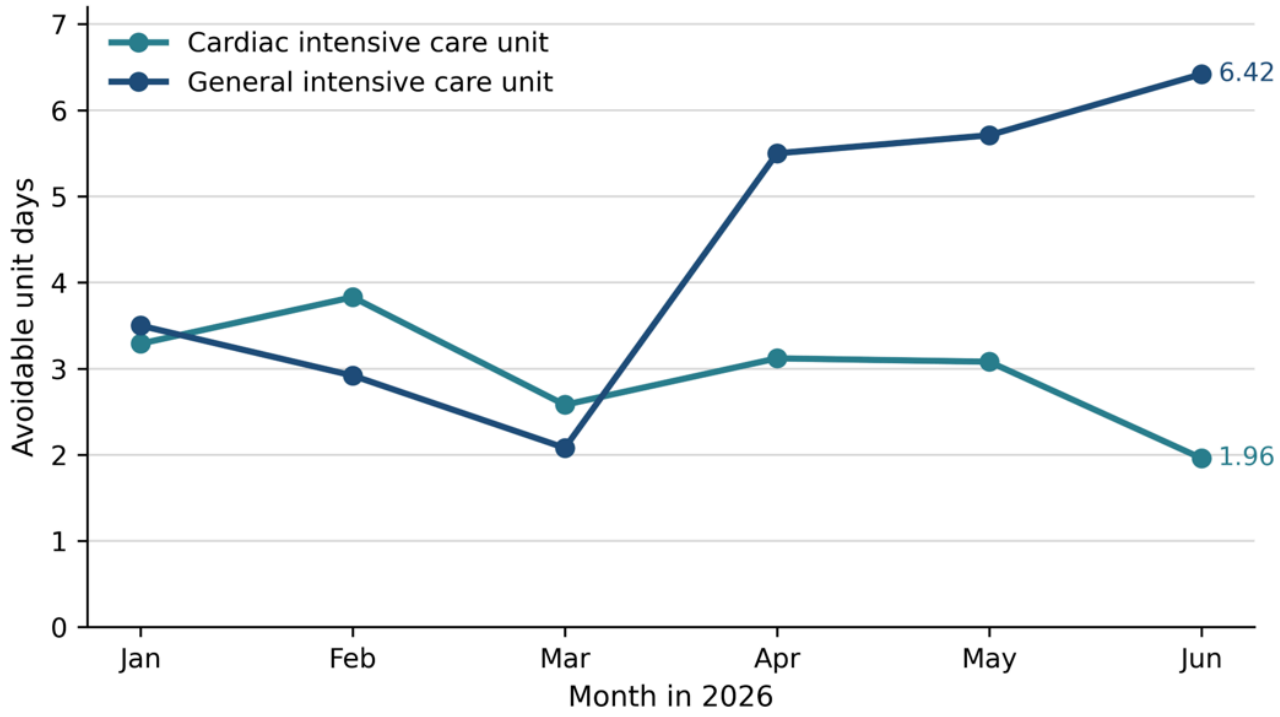
Figures



The absence of a baseline bar for the cardiac unit indicates that the value was not calculable; it does not represent zero.

Figure 1

Completeness of the decision-to-exit interval by unit and study period.



Values were transcribed from aggregated Epimed Monitor reports. Control limits were not estimated because only six post-implementation observations were available.

Figure 2

Monthly avoidable unit days during the implementation period, by unit.