Improving Patient Safety During Intra-Hospital Transport of ICU Patients

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1 Background

Intra-hospital transport of critically ill patients is associated with potentially severe adverse events. Because physicians do not usually accompany their patients during transport, they may not often be aware of the technical or medical issues that arise during this process.

Step one (pre-intervention) sought to determine the chief causes of adverse events during transport out of the Medical Intensive Care Unit (MICU). A total of 52 transport events with 16 adverse events were recorded. Based on this data, a "Transport Tool" consisting of a "Risk Score" and "Safety Checklist" was devised with the goal of reducing adverse events

Step two (intervention) sought to use this Transport Tool to evaluate the risk of individual transports and, based on that score, either continue with the transport, complete a safety checklist and/or confer with MD regarding the necessity of the transport. Our goal was to reduce transport-related adverse events with implementation of this tool

2 Objectives

Step One → ***Step Two***

30.8% of transport encounters have reported adverse events

Our goal was to ultimately **reduce transport related adverse events** by 10% by the end of the study

3 Methods

In this prospective pre- and post- intervention study "**Adverse Events"** were defined as "any unexpected event that harmed or had the potential to harm the patient". Examples provided to nursing included "significant pain, anxiety, inadequate sedation, tangled lines, increasing dose of medication, increased oxygen demands, etc…"

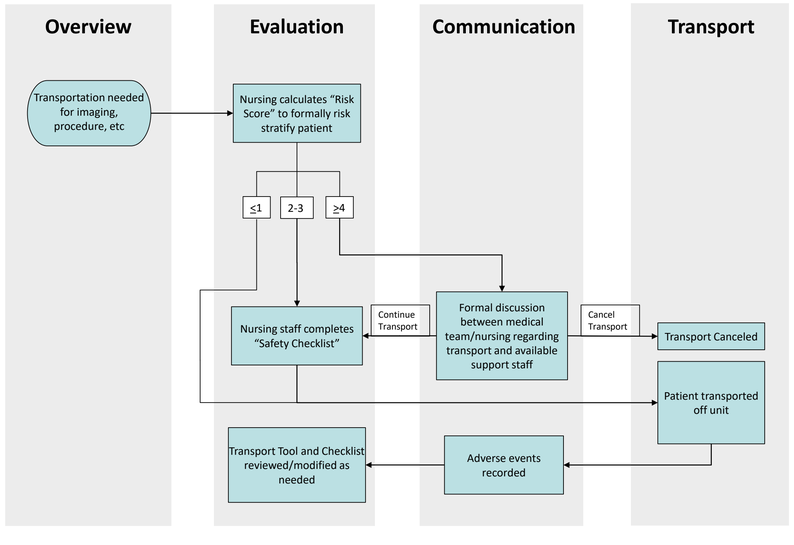
Step One (Pre-Intervention, Nov 2020-Mar 2021): Nursing was instructed to complete a survey recording various data regarding patients pre-, during, and immediately after transport from the MICU. Based on data from the pre-intervention arm, six risk factors were identified as being highly associated with adverse events and several common causes of adverse events were identified. These contributed to the Risk Score and Safety Checklist in the final Transport Tool.

Retrospectively, the Risk Score successfully flagged 12 of 16 transports that resulted in adverse events, and overall flagged 50% of all transports (26 of 52) with a risk score of ≥ 2, the threshold for triggering the Safety Checklist. (Sensitivity 75.0%; Specificity 61.1%)

Step Two (Intervention Nov 2021-Apr 2022): Nursing was given the transport tool described in the Intervention Process Map section and trained on its use. Patients were evaluated with the Risk Score. For scores ≥ 2, nursing was instructed to complete a safety checklist. For scores ≥4 nursing was advised to discuss transport with the Senior Resident. All transports were flagged by nursing as either having an adverse event or not.

The primary endpoint of this survey was reduction in adverse events

4 Intervention Process Map

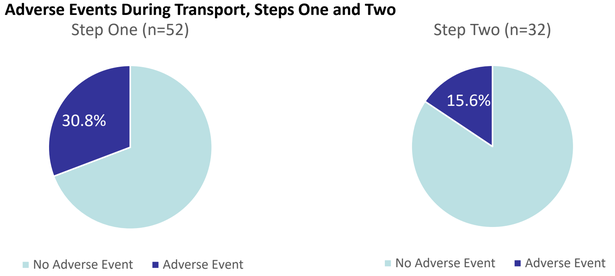


5 Results

Overall, **52 transport events** were recorded in Step One; **32 transport events** were recorded in Step Two, each over a period of five-six months in two separate time periods in 2020-2021 and 2021-2022

Of these**, 16 adverse events** were recorded for Step One; **5 adverse events** were recorded for Step Two (Figure 1)

Figure 1: Adverse Events During Transport, Steps One and Two



Step two saw a **50% reduction in adverse events** following the implementation of the Transport Tool (χ2 value: 2.42; p-value 0.12)

In Step two, **18 out of 32 events triggered checklist review** (56.25%).

10 events underwent MD review. Of these 10 reviewed events:

- Two resulted in canceled transport
- One resulted in additional medication orders; transport resulted in adverse event
- One resulted in extra personnel assigned to the transport; transport resulted in adverse event

6 Analysis and Discussion

Reduction in Adverse Events:

- Reduction is certainly remarkable, but difficult to comment on statistical significance given that the sample in Step Two is so low
- The reduction of 50% is far beyond our goal of 10% and very encouraging for future interventions
- Data was collected over similar times of year (Nov-Mar), in the same hospital setting, using similar methodologies

Effects of the Intervention:

- If we assume the reduction in adverse events is due to our intervention (the Transport Tool) we see in the results some anecdotal evidence that this might be the case
- At least two transports were canceled after completing the safety checklist and conferring with the MD
- Two events that triggered MD consultation resulted in interventions. In one case, a patient seized during transport, but the MD had ordered additional Ativan. This was counted as an adverse event, but conceivably prevented a more serious outcome

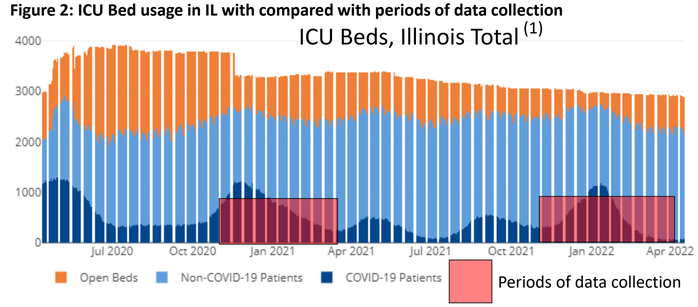
Limitations:

- Small sample size
- Staff may have retroactively submitted transport data for patients with adverse transport related events—or preferentially submitted data retroactively for uneventful transports
- Perception of lack of support staff may drive higher rates of reported adverse events
- Reporting is likely biased, and without knowing the true level of adverse events in the MICU, it is difficult to say whether the reduction represents a true drop or a natural variation

COVID 19:

- COVID 19 inevitably confounds our data collection, but both steps took place during similar surges in COVID 19 numbers (see Figure 2)

Figure 2: ICU Bed usage in IL with compared with periods of data collection



7 Future Steps

Continued Data Collection could potentially result in a statistically significant drop in adverse events if current trends continue—as well as further insight into events where the Transport Tool changed behavior

Refinement of the Transport Tool to include more qualitative input regarding the effect of the safety checklist and risk score on transports

8 References

1. Illinois Department of Public Health. COVID-19 Hospital Resource Utilization. https://dph.illinois.gov/covid19/data/hospitalization-utilization.html. Accessed April 15 2022