

# BMJ Open Quality Turn that frown upside down: implementation of a visual cue improves communication during emergency department to inpatient hand-offs

Beech Burns, James Heilman, Shana Kusin, Laura Chess, Mary Elizabeth Tanski 

**To cite:** Burns B, Heilman J, Kusin S, *et al*. Turn that frown upside down: implementation of a visual cue improves communication during emergency department to inpatient hand-offs. *BMJ Open Quality* 2022;11:e002078. doi:10.1136/bmjopen-2022-002078

Received 9 August 2022  
Accepted 7 December 2022

## ABSTRACT

When a patient is admitted to the hospital from the emergency department (ED), the ED clinician passes on relevant clinical information to the admitting team to transition care, a process known as patient hand-off and commonly referred to as 'calling report'. This information exchange between clinical teams is not only important for care continuity but also signifies a transition of care. However, there are unique challenges in this hand-off process given the unpredictability of the busy ED environment, ED boarding and discontinuity in physician, nursing and transportation workflows. These challenges create the potential for gaps in communication and can create patient safety concerns, particularly if a patient is transported to an inpatient bed before hand-off takes place.

We set out to determine whether introducing a visual cue on the electronic health record (EHR) ED trackboard to communicate that report had been given would improve hand-off compliance. We sought to improve the utility of the visual cue and compliance of calling report prior to patient transport through a series of several Plan Do Study Act (PDSA) cycles.

Baseline compliance using the 'Report Called' button prior to implementation of our visual intervention was 9.8%. With staff education alone, compliance rose to 41.3%. However, with an easily recognisable visual cue highlighted on the trackboard and an improved workflow compliance immediately rose to >97% and has been sustained for 84 months. Additionally, we have had zero reported incidents of patients being transported to a hospital bed before physician report was called since implementation.

Our study demonstrates that simple visual cues and incorporation of a user-friendly process in the workflow can improve compliance with ensuring report is called prior to patient transfer from the ED. This may have a positive impact on physician communication and patient safety during the admission process.

## PROBLEM

Patient care hand-offs between providers are imperative as patients transition between emergency department (ED) and inpatient care.<sup>1</sup> Busy hospital environments combined

### WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ It is critical to patient safety that hand-offs occur between the emergency department (ED) and inpatient teams during patient care transitions. Despite this, there are few systems in place in the electronic health record to visibly show that hand-off has occurred.

### WHAT THIS STUDY ADDS

⇒ Implementing a visual cue on the electronic health record trackboard to signal that report has been called can improve communication among care teams during patient transitions between the ED and inpatient environment.

### HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Simple visual cues may be used in the electronic health record to improve physician communications and patient safety during patient care transitions.

with discontinuity between physician, nursing and transportation workflows create the potential for hand-offs to occur at the wrong time or not at all. This may result in patient transfer to an inpatient bed prior to ED clinician report and can result in patient safety adverse events. The goal of our project was to use a visual cue easily embedded in the ED provider workflow to improve communication around hand offs and compliance with calling report prior to patient transfer from 10% to 90% within 6 months.

## BACKGROUND

The Academic Medical Centre (AMC) ED where our study was conducted has 42 acute care ED beds (31 adult and 11 paediatric) and an annual volume of 48 000 patients per year. The physician staff is made up of 40 faculty members, 10 fellows, as well as 33 emergency medicine (EM) residents. As the only AMC in



© Author(s) (or their employer(s)) 2022. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

Emergency Medicine, Oregon Health & Science University School of Medicine, Portland, Oregon, USA

### Correspondence to

Dr Mary Elizabeth Tanski; [tanski@ohsu.edu](mailto:tanski@ohsu.edu)

the state, the ED is a level 1 trauma centre, and serves as a tertiary and quaternary care centre for the region. The hospital has 576 patient beds, which are often at capacity, and the ED experiences a significant amount of patient boarding as a result. Because of these challenges, the project team recognised safe patient care transitions as one of the most important steps to maintain patient safety and continuity of care.

## MEASUREMENT

When a patient is admitted from the ED to the hospital, the responsibility for their care is transitioned from the ED team to the inpatient team. When communication between the EM and inpatient providers occurs, it is termed a patient 'hand-off', 'hand-over' or 'calling report' and marks the shift in responsibility for the patient's subsequent medical care.<sup>2 3</sup> This communication is vital for patient safety, ensuring that the patient's current clinical condition, completed diagnostic studies, and diagnostic impressions are relayed to the admitting team. The hand-off also functions to notify the admitting team of outstanding diagnostic studies and current or anticipated treatments. Busy ED and hospital environments, high patient volumes, ED boarding and other demands on the provider's attention can contribute to poor communication and inconsistent transitions in care. Failure to consistently perform patient hand-offs from the ED to the inpatient unit creates a lapse in continuity of patient care and can have negative impact on patient safety.<sup>3</sup> In one study, 29% of physicians reported an adverse event or near miss due to inadequate communication between the ED and inpatient team.<sup>4</sup>

Several approaches have been evaluated in attempting to improve communication and safety during patient hand-offs. One example is the use of a standardised checklist focusing on patient-specific information exchange between the ED and inpatient teams, with the goal of clearly communicating follow-up and plans.<sup>5</sup> Another example is a tool to enhance two-way communication between sending and accepting services, allowing the ED provider to convey information and the accepting provider to ask questions and request clarifications.<sup>6</sup>

While there is considerable literature on the value of hand-offs and specific structures to organise the hand-off report, there is very little data on methods to ensure that ED-to-inpatient hand-off occurs in a consistent, timely and visible fashion.

For this project, we treated an affirmative response within the 'Report Called' trackboard function as an indication that provider hand-off had been performed. If the functionality was not used, we regarded that as an instance in which report had not been called prior to the patient being transported to their inpatient hospital bed. Using this methodology, we found that baseline compliance of using the 'Report Called' trackboard function. We evaluated compliance data monthly, and found that compliance with use of the report-called function was

9.78% over the initial 6-month period. We continued to track compliance monthly throughout our PDSA cycles to monitor for trends. Data were extracted monthly from the electronic medical record and reviewed by our project group.

## DESIGN

In light of our baseline data, there was a clear need for improvement in the process of ensuring ED to inpatient hand-off had been completed prior to patient transport to their hospital bed. First, we established a project team with representatives from ED and inpatient physician leadership and ED nursing, designated an ED Quality Improvement champion, recruited EHR support and mapped our desired workflow. Because the EHR is so integral to all aspects of emergency care at our institution, including other elements of the transition of care, we determined that the most effective solution would be one in which a visual cue introduced to the ED trackboard visible to both physician and nursing staff would indicate whether provider hand-off had occurred. We obtained and reviewed monthly reports of usage of tracking board functions for admitted patients.

Our project team met monthly to review data and audit cases where the function was not used. We created and refined abnormality trackers to examine barriers to registered nurse (RN) or ED physician use of the function. The project team also provided RN and MD education in the form of reminder emails, audit feedback and real-time training.

As this was a quality improvement project, patients were not involved in the design, conduct, reporting or dissemination of our quality improvement research.

## STRATEGY

In the preintervention state, when an ED physician determined a patient required admission, they placed a bed request in the electronic health record (EHR). This triggered the communications centre to page the admitting physician, prompting them to call the ED to receive report. While the physician was responsible for ensuring that doctor-to-doctor hand-off had occurred, the nurse was responsible for arranging patient transport to an inpatient bed. Because the processes for calling report and transportation to an inpatient bed were distinct (and executed by different staff members), there was potential for transport to occur prior to physician hand-off. Not infrequently, a bed would become available prior to the ED calling report and a patient would arrive to the inpatient setting without the inpatient provider having any knowledge of the patient or their condition. This created patient safety concerns as it represented an interruption in responsibility for patient care.

To address this issue, we used a PDSA cycle approach to create a system-based improvement to ensure hand-offs were completed prior to patient transfer to the hospital floor. Given that many critical patient communications

Joe Imorten

Male, 60 years, 3/18/1962

MRN: 07647466

---

Time taken:

---

Report Called?

Report Called?

**Figure 1** 'Report Called' button within a patient chart in Epic sandbox.

occur in the EHR, including physician orders, RN and MD documentation, we felt a tool using the electronic patient record would be the most effective intervention.

### PDSA cycle 1

For our first PDSA cycle, we added a 'Report Called' button in the patient chart to explicitly document that report had been called for an admitted patient (figure 1). With the institution of the Report Called button, the ED physician would place an order for a bed request and a page would be generated to the admitting provider as before. However, once the ED physician spoke with the admitting provider and the care transitioned to the inpatient team, they would manually click the Report Called button in the EHR. This communicated to the ED team and RN that report had been called and that the patient was ready for transport to the floor.

After instituting this process, the average compliance rate for admitted patients over a period of 24 months was 9.8%. Though EPs may have in fact been calling report and simply not adhering to the new system, communications from the inpatient team indicated that patients were continuing to be transported to the floor without awareness of the accepting team with some frequency. We identified several barriers to success with this first iteration. First, accessing the Report Called button did not fit neatly with the physician workflow. Due to EHR limitations, the Report Called button could only be accessed once the patient's chart had been fully opened; prior to this intervention, however, providers had not been required to 're-enter' a patient's chart to indicate that hand-off had been completed. From the ED's perspective, entering the chart to toggle the Report Called button was seen as an extra step and the benefit to an already busy clinician was not obvious. Second, though it was intended to serve as a communication from physician to nurse signalling that a patient was ready for admission, it was not readily visible on the trackboard (and therefore to the nursing staff). In fact, nurses were required to enter the patient chart and

access a specific screen outside of their regular workflow in order to see whether or not report was called.

### PDSA cycle 2

Given poor adherence with the new process, we implemented a more rigorous training programme as our second PDSA cycle to reinforce the mechanics of the procedure. We educated our ED faculty, fellows and residents through monthly email reminders and through in-person demonstrations of the workflow. Additionally, we performed audits and issued emails to individuals who failed to use the new process. With initiation and iteration of this educational intervention, our compliance with 'Report Called' utilisation improved to an average of 41.3% of all inpatient admissions. While this was certainly a step in the right direction, compliance plateaued despite general follow-up reminders and audits, and through this time we continued to have patients transported to the floor without report being called. Though RNs and MDs were increasingly aware of the new system through education and feedback, perceived incongruity with existing workflows and additional burden remained major obstacles.

### PDSA cycle 3

We undertook a third PDSA cycle where we sought to make our process more visible and better aligned with physician and nursing workflows. Our goals in this cycle were to make our intervention easily visible, concordant with existing workflows, and transform it into a 'hard stop' to prevent patients from leaving the department prior to report being called. To achieve these aims, we developed a simple visual tool that was linked to the placement of a bed request. In the newly created workflow, when a bed was requested the EHR automatically produced a red icon on the trackboard (figure 2). The icon alerted the ED physician and the RN that a bed had been requested but that communication between the ED physician and accepting team had not yet occurred; therefore, transport of the patient to an inpatient bed could not yet proceed.

ED Track Board (OHSU Emergency Department) - Last Refresh Time: 12/10/2014 3:21:00 PM

Refresh Identify Patient ED Narrator Code Discharge Tx Team Open Chart ED Manager ED Map Sign Out Quick Vitals My Note

All Pts (Charge) RN Unassigned My Patients (4) RME and Re

Needs Triage ED Acute and Reception ED Obs Care Area ED Peds and Reception Expected EMS/EDTX

Be	Patient	CC	A	TID	Fac	Res	Rpt Called	EDIE	Obs ...	L...	Una..	Lab Stat
06	Farhad, T (33 y.o. ...)			184...								
12	Omnicell, E (31 y.o....)	Stroke Sx		1315...								
802	Himtest, O (63 y.o....)	Acute append...		1229...		Sapp, R						

**Figure 2** Emergency department trackboard demonstrating a visual cue that report has been called through the use of a green smiley face. Also pictured is the red frowning face signifying that report has not yet been called.

When physician report had been called, the ED physician was to simply click on the icon (a red frown face) displayed on the trackboard and toggle that report had been called, thereby changing the icon to a green smiley face. This visibly signalled to the entire treatment team that report had been completed and the patient had been accepted, indicating that transport could then occur. Because this icon was displayed on the track board it was readily visible to the RN, who could then arrange the logistics of patient transport.

## RESULTS

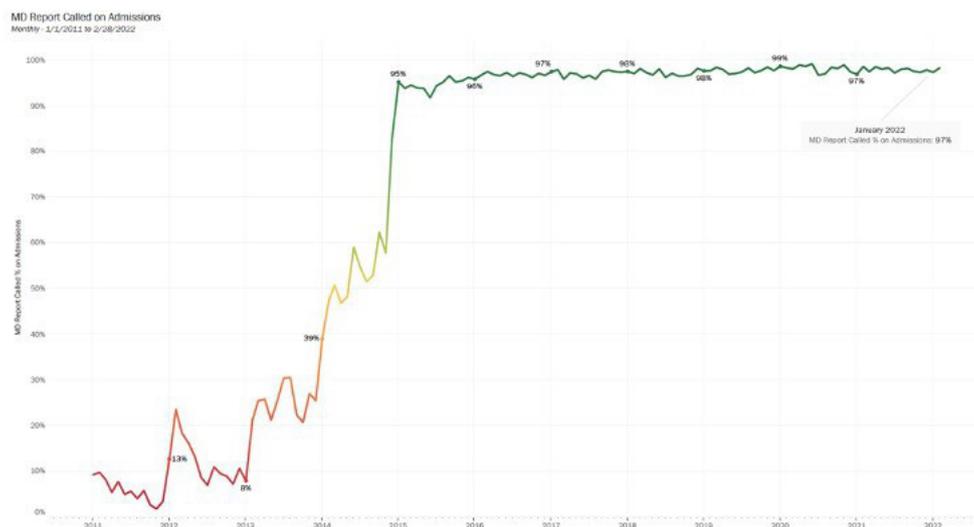
The compliance of the Report Called trackboard use was evaluated over time, and the effectiveness of each PDSA cycle intervention was measured. We found that compliance with use of the trackboard function increased with each intervention, and significantly increased overtime from a baseline of 9.78% to a current state of >97% which has been sustained for 84 months (figure 3). Since implementation of PSDA cycle 3, there have been no patient safety related reports of patients being transported to a bed without report being called.

We reviewed our data to ensure that no eligible patients had been omitted, and confirmed that 100% of admitted

patients were captured. Analysis of our data confirmed a positive impact on compliance with 'Report Called' use after each PDSA cycle intervention.

## LESSONS AND LIMITATIONS

This study has several limitations. First, it used compliance with use of the trackboard process as a surrogate for the hand-off report actually being completed. Though it measured compliance with clicking the 'Report Called' button for admitted patients, we were not able to determine if there were any instances where a button was clicked and a patient was transported to the floor without report actually being given from the ED physician to the admitting physician. Conversely, after the introduction of the first PDSA cycle, we treated failure to use the 'Report Called' function as an indicator that verbal report was not given to the receiving team. It is likely that in many cases report was indeed called and relevant patient information was communicated; thus use of the 'Report Called' functionality in the early stages of this project would underestimate the true percentage of instances in which hand-off had successfully been completed. However, based on feedback from our inpatient partners, we know that patient hand-off was failing to occur in a substantial



**Figure 3** Compliance with the use of the Report Called button in Epic over an 11-year period.

number of cases. A third limitation is that there existed no way to verify the quality of the hand-off or information exchange, only whether or not hand-off occurred and was documented. Finally, we did not measure a direct relationship between use of the Report Called button and whether patient harm as a result of poor communication occurred. Further study could be undertaken to investigate whether or not compliance with calling report has a statistically significant impact on patient safety events owing to communication errors.

## CONCLUSION

This study demonstrates that visual cues incorporated into a user-friendly workflow can improve the reliability of hand-off report being called prior to patient transfer from the ED. ED environments are fast paced, involve complex workflows and depend on several integrated teams. Our intervention decreased the number of patients transferred to the floor without report being called in a simple, easily visible and visually stimulating manner. It is this simplicity and visibility that makes our intervention sustainable, as demonstrated by its continued success after an 84-month period of data collection. This workflow could be integrated into other patient transfer settings (Intensive Care Unit, Operating Room, procedural suites and dialysis units) to aid in patient care transitions and may have a positive impact on physician communication and patient safety during the admission process.

**Acknowledgements** We would like to thank Mike Hildebrand and Jordan Taboda for their administrative support of this study.

**Contributors** All listed authors have substantially contributed to and approved of the manuscript as submitted. Contributions include: study design (MT, BB, JH), analysis and interpretation of data (MT, BB, SK) drafting manuscript (MT, BB, JH, SK), critical manuscript revision (MT, BB, JH, LC).

**Funding** The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

**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 IRB determined that the proposed activity is not research involving human subjects. IRB review and approval is not required. STUDY00024257.

**Provenance and peer review** Not commissioned; externally peer reviewed.

**Data availability statement** Data sharing not applicable as no datasets generated and/or analysed for this study.

**Open access** This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

## ORCID iD

Mary Elizabeth Tanski <http://orcid.org/0000-0002-8179-0678>

## REFERENCES

- 1 Sullivan C, Inboriboon PC, Bridgford S. Transitions in care: when words can save lives. *Mo Med* 2015;112:197–201.
- 2 Cheung DS, Kelly JJ, Beach C. Section of quality improvement and patient safety, American College of emergency physicians. improving handoffs in the emergency department. *Ann Emerg Med* 2010;55:171–80.
- 3 Ong M-S, Coiera E. A systematic review of failures in handoff communication during intrahospital transfers. *Jt Comm J Qual Patient Saf* 2011;37:274–8.
- 4 Horwitz LI, Meredith T, Schuur JD, *et al*. Dropping the baton: a qualitative analysis of failures during the transition from emergency department to inpatient care. *Ann Emerg Med* 2009;53:701–10.
- 5 Blazin LJ, Sitthi-Amorn J, Hoffman JM, *et al*. Improving patient handoffs and transitions through adaptation and implementation of I-PASS across multiple handoff settings. *Pediatr Qual Saf* 2020;5:e323.
- 6 Apker J, Mallak LA, Applegate EB, *et al*. Exploring emergency physician-hospitalist handoff interactions: development of the handoff communication assessment. *Ann Emerg Med* 2010;55:161–70.