

ORIGINAL ARTICLE

Impact of a standardized admissions process using a nurse intermediary

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ABSTRACT

Objective: Transitions of care, including those between the Emergency Department (ED) and Internal Medicine (IM) for hospital admissions are complicated, variable processes that impact efficiency and patient safety. At our institution, a new, standardized admissions process that involved a nurse coordinator intermediary who served a dual role of facilitating admissions and overseeing bed board was implemented in July 2017. We aimed to evaluate the impact of the new process on ED throughput and safety outcomes of admitted patients.

Methods: A retrospective analysis of the admissions process for patients at an urban, academic ED was conducted over a 4-month period preceding and following process implementation. ED metrics, including admission decision to ED departure time, were reviewed. In addition, the number of admitted patients upgraded to the intensive care unit (ICU) via a rapid response team (RRT-ICU) within 24 hours of admission and direct physician-physician handoffs were analyzed via surveys of both IM and EM physicians.

Results: A total of 1,109 admissions were reviewed. The new admissions process resulted in a statistically significant decrease in boarding times for admitted ED patients ($p = .03$). The number of RRT-ICUs within 24 hours of admission did not change as a result of the intervention ($p = .5$). Direct physician handoffs increased, but not significantly, according to surveys of IM ($p = .39$) and EM physicians ($p = .34$).

Conclusions: The implementation of a standardized admissions process utilizing a nurse intermediary improved provider communication and ED throughput without negatively impacting patient safety.

Key Words: Administration, Handoffs, Admission

1. INTRODUCTION

Handoffs, defined as the “realtime process[es] of passing patient specific information from one caregiver to another or from one team of caregivers to another for the purpose of ensuring the continuity and safety of the patient’s care” are omnipresent in healthcare.^[1] The handoff process varies widely between contexts, providers and facilities, and that variation leads to inadequate and incomplete transfer of in-

formation, which contributes to medical errors and adverse patient outcomes.^[1-3] Communication failures, in particular, are at the heart of the variability and subsequent errors.^[1]

Retrospective reviews of malpractice claims in the ambulatory setting and emergency department (ED) showed that handoffs were a contributing factor in 20% and 24% of medical errors, respectively. When looking specifically at malpractice cases with communication breakdowns, 43% involved

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handoffs.^[4] Inadequate communication consistently appears as a factor contributing to medical errors, across settings and practitioners.^[4] Standardized communication tools, such as I-PASS (illness severity -patient summary, action list, situation awareness and contingency planning, synthesis by receiver), SBAR (situation, background, assessment, recommendation), and HAND-IT (handoff intervention tool) have been implemented in the ED setting to improve the process.^[5,6] Other standardized approaches using computerized or electronic handoff tools have also been suggested and utilized.^[7,8]

The process for patients being admitted to Internal Medicine (IM) from the ED within an urban, academic hospital in Philadelphia was the same for over a decade (see Figure 1). That process involved an intermediary IM attending physician or senior resident “triager” who was responsible for taking a telephone call from the admitting team in the ED and subsequently transferring that information to the accepting IM team. The process allowed for little, if any, direct physician-to-physician communication between the admit-

ting team and the accepting team for inpatient admissions. In this system, the IM triager did not have any knowledge of what beds were available in what geographic location. Conversely, the hospital bed board was not notified directly of pending admissions. Often there was a delay between the triager, team assignment, and assignment to a bed. ED to IM communication also was not formatted and clinical thought processes were not always apparent.

The vision for the new admissions process was to connect IM team assignment with inpatient bed assignment, to improve efficiency and patient safety, through a newly created interdisciplinary intermediary, the Admissions Nurse Coordinator (ANC) (see Figure 2). The ANC coordinated assigned IM teams to take admissions via an algorithmic process and also oversaw bed board. This gave the ANC the ability to see, in real time, available beds, much like a bed manager, who monitors hospital bed availability with the goal of reducing boarding times for admitted patients, while assigning a bed on an appropriate unit for the patient’s condition.^[9]

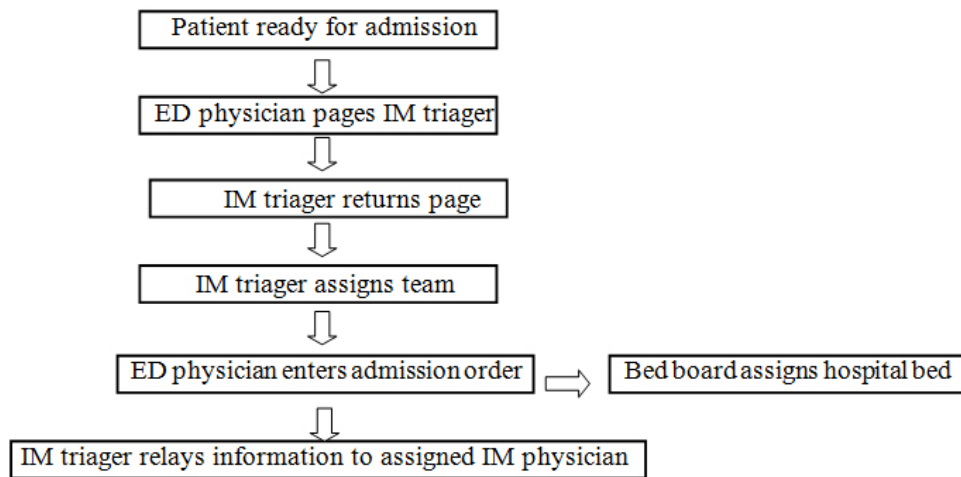


Figure 1. Pre-ANC admission process

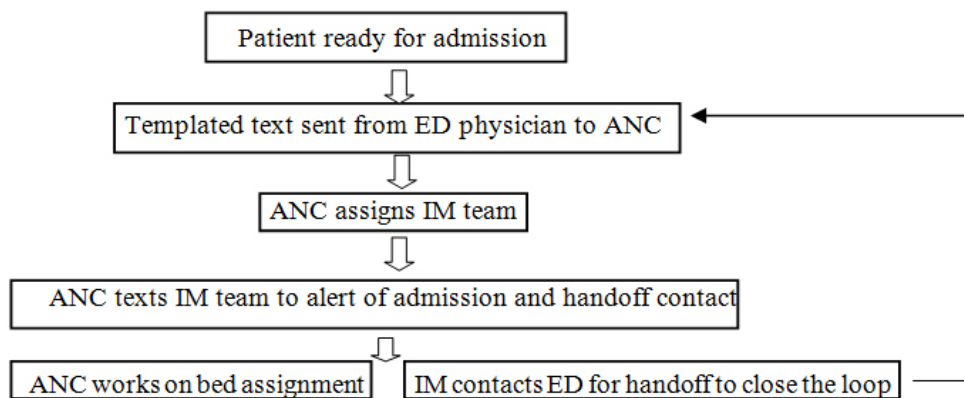


Figure 2. New ANC admission process

Rather than paging the IM triager and waiting for a call back, the new process used a HIPAA-compliant secure texting program that was already operational within the hospital system. Each physician in the hospital system is provided a cell phone with the secure texting program pre-downloaded for use, and additionally, the program is available on every hospital desktop computer. The text, created by the ED physician within the EMR, would pull patient information, including the patient's name, medical record number, telemetry monitoring need, inpatient or observation hospital classification, and contact information for the ED physician, into a templated format. This templated text was then sent to one centralized number, owned by the ANC. Once the secure text was received, the ANC subsequently assigned an IM team, based on a pre-existing algorithm, and alerted the team of the admission by sharing the same information sent from the ED team via a three-way secure text message, thus closing the communication loop between the ED and IM teams. The IM team was then able to either come to the ED for a face-to-face handoff or call the ED team for a direct verbal physician-to-physician sign out.

Additionally, in times of high volumes in the ED, or high inpatient census, the ANC rounded with ED leadership teams to improve patient throughput, decrease long waiting times for triaging assessments of patients, and anticipate bed needs to optimize patient safety and employee staffing.

We hypothesized the new standardized admissions process would expedite outflow from the ED and improve ED throughput. We also hypothesized the new process would allow for improved communication between the ED and IM teams, as evidenced by increased handoffs, without negatively impacting patient safety or process efficiency.

2. METHODS

The study was a retrospective analysis of patients admitted through the ED to an IM service in an 8-month period spanning the implementation of the new admissions process. The study took place at a large, urban teaching hospital with an annual ED volume of approximately 95,000 patients and an admission rate of 19%. The hospital has 732 licensed beds and 6 ICUs. There are 90 internal medicine residents, and 11 different medicine care teams staffed primarily by IM.

This study compared safety outcomes, physician-to-physician direct communication, and ED boarding times pre- and post-implementation of the ANC, which was in July 2017. The patient population studied included all patients admitted in the 4-month period from March to June, 2017 prior to the intervention, and from July to October, 2017 after the intervention that were a rapid response or cardiac arrest

("Code Blue"). All patients admitted through the ED to IM during the study periods who were a rapid response or Code Blue were eligible for inclusion. Any patients admitted to a specialty service, such as trauma, were excluded from the study population. Data was abstracted retrospectively via chart review.

Data collected included the boarding time, defined as the time from the decision to admit a patient in the ED to time of departure to an inpatient bed. Data on ED boarding times is routinely collected by department administrators on a monthly basis and reported as an average time for all patients admitted from EM to IM during that month. Data from each four-month study period was compared.

The purpose of the rapid response team (RRT) is to reduce the risk of injury or death through early identification, assessment, and stabilization of a patient, before their condition deteriorates to the point at which they require resuscitation. The RRT is an interdisciplinary team that responds when the RRT system is activated by a hospital employee, family, visitor, or staff member. When a rapid response is called on a patient or visitor, that patient is often upgraded to higher level of care. Outpatients and visitors are transported to the ED, while inpatients can be transferred to an ICU. While a rapid response can be upgraded to a Code Blue if the patient's clinical condition deteriorates to cardiac arrest, a Code Blue can also be called independently of a rapid response. As with RRTs, any outpatient or visitor suffering from a Code Blue are transported to the ED, while inpatients are transferred to an ICU. For this study, both RRT activations and Code Blue activations that resulted in inpatients being upgraded to the ICU within 24 hours of admission were reviewed by cross-referencing the list of RRTs and Code Blues generated by the page operator with documentation in the progress notes. The two categories were grouped together for analysis and referred to as RRT-ICUs.

The number of direct physician-to-physician handoffs was also evaluated. Surveys of IM and EM physicians were used to determine how many reports of direct handoffs had been given prior to the implementation of the ANC process and after the process was initiated. The survey included questions about level of training of respondents, satisfaction with the process, and percentage of admissions where direct handoff occurred.

Total ED patient volume per month, the total number of admissions, and the total number of admissions to the ICU were also evaluated for comparison in the pre- and post-intervention periods.

Data for each outcome measure were obtained and analyzed for both the 4-month pre-intervention and 4-month post-

intervention time periods and compared using Z-scores. This study was approved by the Institutional Review Board at the study institution.

3. RESULTS

541 patients were admitted in the 4-month period from March to June, 2017 prior to the intervention and required an RRT-ICU. 568 were admitted in the 4-month period after the intervention, from August to October, 2017 and required an RRT-ICU. The average boarding time decreased from 209 minutes prior to the ANC to 173 minutes, which was statistically significant ($p = .03$).

The rate of RRT-ICUs remained unchanged at 44 patients in total pre- and post-intervention ($p = .5$).

IM and EM physicians were surveyed both before and af-

ter the intervention. 43 IM physicians and 45 EM physicians responded to the pre-intervention survey, while 34 IM physicians and 45 EM physicians responded to the post-intervention survey. Prior to the implementation of the ANC, IM survey responders reported receiving direct handoff for 35% of admissions. EM physicians reported direct handoff for 21% of patients. After the intervention, IM survey responders reported receiving direct handoff for 64% of admissions. EM physicians reported direct handoffs for 63% of patients. There was an increase in direct physician-to-physician communication, but the change was not statistically significant ($p = .39$ for IM, $p = .34$ for EM). A summary of the results can be found in Figure 3.

The approximate patient volumes per month did not change, nor did the total number of admissions or admissions to the ICU (see Table 1).

Table 1. Total ED volume, total medicine admissions, total ICU admissions pre-and post-implementation of ANC

	Total ED Volume	Total Medicine Admissions	Total ICU Admissions
March 2017	7,322	1295	195
April 2017	7,566	1310	204
May 2017	7,476	1287	225
June 2017	7,356	1304	193
ANC Implemented July 2017			
July 2017	7,575	1297	193
August 2017	7,351	1336	204
September 2017	7,175	1249	196
October 2017	7,391	1259	213

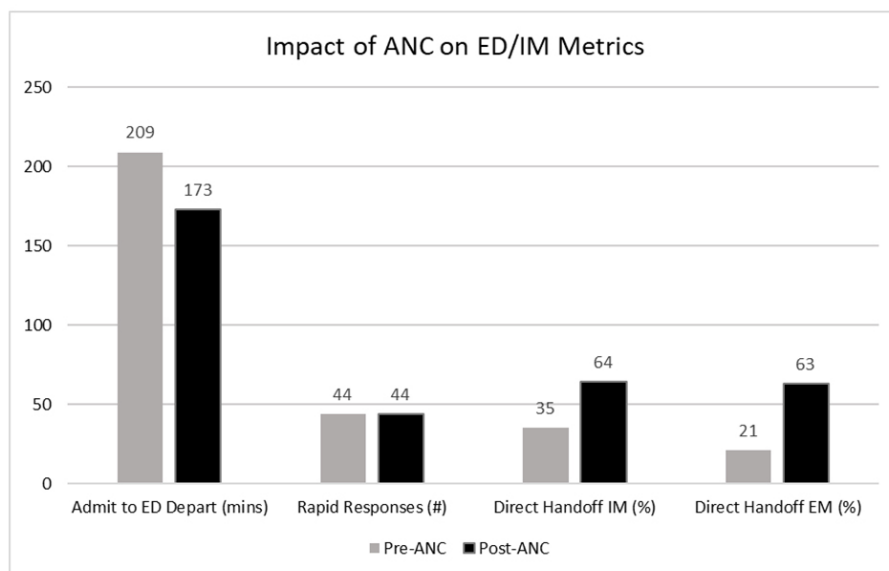


Figure 3. Outcome metrics pre- and post-implementation of ANC

4. DISCUSSION

Handoffs have been extensively studied, both in the ED-IM context and outside of those parties. Transitions of care during handoffs were identified by the Joint Commission as potential sources of sentinel events. The Joint Commission cautions providers that ineffective, inadequate communication in handoffs poses real risks to patient safety.^[1] This has been substantiated in prior studies.^[5-7, 10, 11] Benjamin et al. in particular, highlighted the consequences of communication errors, which included deterioration in the patient's clinical condition. The cost of these medical errors, many of which result from communication failures during handoffs, has been conservatively estimated to range from \$73.5-\$98 billion.^[12]

The implementation of the ANC had no significant impact on the number of patients requiring a rapid response or upgrade to the ICU within 24 hours of admission in our study. This indicates that the intervention did not create additional adverse events, particularly those surrounding deterioration in the patient's conditions.

Communication failures around handoffs have been traced to contextual factors (both environmental and personnel related), lack of face to face communication, and standardization,^[12] and many corresponding solutions have been proposed to reduce errors stemming from inadequate patient handoffs. Previously validated standardized communication tools, such as I-PASS, SBAR, and HAND-IT have been successfully and effectively implemented in the ED setting.^[5, 6] Other standardized approaches using computerized or electronic handoff tools have also been suggested and utilized.^[7, 8]

The ANC process included a standardized admission template that utilized a secure, electronic texting system. This standardized template served the dual purpose of clearly signaling the beginning of the admissions process, providing consistent information to the inpatient team, and allowing the ANC to simultaneously begin locating an appropriate bed for the patient. Furthermore, the number of direct verbal hand-offs between ED and IM physicians increased, which allowed for more informed transfer-of-care. While the optional verbal communication that followed the electronic handoff was not standardized, this practice is in line with

that reported by Gonzalo et al. which resulted in improved perceptions of provider communication during handoffs.^[13]

Standardized admissions handoffs have also been shown to positively impact ED length of stay.^[11] Dahlquist et al demonstrated a statistically significant reduction in ED length-of-stay from 311 minutes to 263 minutes ($p < .05$).^[8] Additionally, direct, rather than consultative admission models have been shown to be more efficient with regards to ED turnaround times.^[14] The ANC admission process showed similar gains in process efficiency and patient flow, as the time-to-departure for patients admitted to an inpatient medical team was reduced. The expedited departure of admitted patients theoretically reduces ED overcrowding and, therefore, allows for new, inbound, patients to be evaluated in the ED as more beds become available.

Other variables that are constantly in flux in any ED setting could have had an impact on throughput during the study period. For instance, lab delays or delays in transport to an inpatient bed are potential confounders that may have impacted the study. However, no specific interventions targeting throughput were implemented during the study time frame. The approximate patient volumes per month did not change, nor did the total number of admissions or admissions to the ICU (see Table 1). Limitations of the study include the seasonal variability of disease processes, seasonal variability in total number of admissions, and the fact that the pre- and post-intervention time periods were in different months. The study was also conducted at a single center, and results, therefore, may not be generalizable. In addition, the chart abstractors were not blinded to the study and demographics for eligible patients were not analyzed.

5. CONCLUSIONS

Standardized communication through a texting template, centralized processing and tracking of patient triaging through a nurse intermediary, concurrent bed assignment, and transparency of the triaging algorithm has helped to improve communication between the ED and IM departments, without adversely impacting patient safety.

CONFLICTS OF INTEREST DISCLOSURE

The authors declare they have no conflicts of interest.

REFERENCES

- [1] The Joint Commission [Internet]. c2020. [cited Feb 2020]. Available from: www.jointcommission.org
- [2] Starmer AJ, Landrigan CP, I-PASS Study Group. Changes in Medical

Errors after Implementation of a Handoff Program. *N Engl J Med*. 2014; 371: 1803-1812. PMID: 25372088. <https://doi.org/10.1056/NEJMs1405556>

- [3] Müller M, Jürgens J, Redaelli M, et al. Impact of the communica-

- tion and patient hand-off tool SBAR on patient safety: a systematic review. *BMJ Open*. 2018 Aug 23; 8(8): e022202. PMID: 30139905. <https://doi.org/10.1136/bmjopen-2018-022202>
- [4] Riesenber LA, Leitzsch J, Massucci JL, et al. Residents' and Attending Physicians' Handoffs: A Systematic Review of the Literature. *Acad Med*. 2009 Dec; 84(12): 1775-1787. PMID: 19940588. <https://doi.org/10.1097/ACM.0b013e3181bf51a6>
- [5] Smith CJ, Britigan DH, Lyden E, et al. Interunit handoffs from emergency department to inpatient care: A cross-sectional survey of physicians at a university medical center. *J. Hosp. Med*. 2015 Nov; 10(11): 711-717. PMID: 26199192. <https://doi.org/10.1002/jhm.2431>
- [6] Smith C, Buzalko R, Anderson N, et al. Evaluation of a Novel Handoff Communication Strategy for Patients Admitted from the Emergency Department. *West J Emerg Med*. 2018; 19(2): 372-379. PMID: 29560068. <https://doi.org/10.5811/westjem.2017.9.35121>
- [7] Benjamin MF, Hargrave S, Nether K. Using the Targeted Solutions Tool ® to Improve Emergency Department Handoffs in a Community Hospital. *Jt Comm J Qual Patient Saf*. 2016; 42(3). [https://doi.org/10.1016/S1553-7250\(16\)42013-1](https://doi.org/10.1016/S1553-7250(16)42013-1)
- [8] Dahlquist RT, Reyner K, Robinson RD, et al. Standardized Reporting System Use During Handoffs Reduces Patient Length of Stay in the Emergency Department. *Journal of Clinical Medicine Research*. 2018; 10(5): 445-451. PMID: 29581808. <https://doi.org/10.14740/jocmr3375w>
- [9] Bekker R, Koole G, Roubos D. Flexible Bed Allocations for Hospital Wards. *Healthcare Management. Health Care Manag Sci*. 2017; 20: 435-466. PMID: 27059369. <https://doi.org/10.1007/s10729-016-9364-4>
- [10] Gross T, Benjamin L, Stone E, et al. Handoffs: Transitions of Care for Children in the Emergency Department. *Am. Acad. Ped*. 2016 Nov; 138(5). PMID: 27940798. <https://doi.org/10.1542/peds.2016-2680>
- [11] Maughan BC, Lei L, Cydulka RK. ED handoffs: observed practices and communication errors. *Am J Emerg Med*. 2011 Jun; 29(5): 502-11. PMID: 20825820. <https://doi.org/10.1016/j.ajem.2009.12.004>
- [12] Andel C, Davidow SL, Hollander M, et al. The economics of health care quality and medical errors. *J Health Care Finance*. 2012; 39(1): 39-50.
- [13] Gonzalo J, Yang J, Stuckey HL, et al. Patient care transitions from the emergency department to the medicine ward: evaluation of a standardized electronic signout tool. *Int J Qual Health C*. 2014 Apr; 26(4): 337-347. PMID: 24737836. <https://doi.org/10.1093/intqhc/mzu040>
- [14] Patient handoffs: The gap where mistakes are made. *Patient Safety Monitor Journal*. Dec. 2017. Gale Academic OneFile. Available from: https://link-gale-com.libproxy.temple.edu/apps/doc/A514634880/AONE?u=temple_main&sid=AONE&xid=e741ee2b