

Gaining Efficiency and Satisfaction in the Handoff Process

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BACKGROUND: Handoffs, or transfers of patient care responsibility, occur frequently on hospitalist teams. The reliability and efficiency of the handoff process is a national and local concern. Most studies in the literature regard physicians-in-training. We studied the morning handoff process of hospitalist teams comprised of staff physicians and nurse practitioner and/or physician assistants.

METHODS: An improvement team observed morning handoffs. Four problems were identified: unpredictable start and finish times, inefficiency, poor environment (hallway noise and distracting in-room conversations), and poor communication. The team restructured the process and observed post-intervention behavior at 15 and 90 days. A participant-provider survey was conducted before and after the intervention regarding wasted time, total time-in-report, and satisfaction with the process.

RESULTS: Pre-intervention 60.5% of providers (23/38) believed morning handoff was performed in a timely fashion compared to 100% (15/15) post-intervention ($P = 0.005$). Average time spent in morning report was 11 minutes, compared to 5 minutes after the intervention ($P < 0.0028$). Pre-intervention 6.5 minutes were believed wasteful, compared to 0.5 minutes post-intervention ($P < 0.0001$).

CONCLUSIONS: This study identifies deficiencies in the handoff process that were addressed by enhancing the physical environment (smaller room, noise reduction, closed door), assigned seating (visual cues by table tent cards), non-clinicians providing printed materials, standardization of written updates, team times (consistent & precise daily time for each team report), culture change including deference of attention to team receiving report with opportunity for questions, and minimization of side conversations. This intervention package resulted in an improvement in satisfaction and timeliness of clinicians involved. *Journal of Hospital Medicine* 2010;5:547–552. © 2010 Society of Hospital Medicine.

KEYWORDS: handoff, handover, shift change, signout.

Transfer of responsibility for patients, or handoff,¹ occurs frequently in hospitalist services, requiring excellent and timely communication to ensure patient safety. Communication failure is a major contributor to medical errors.^{2,3} Recognizing such findings, a growing body of literature addresses handoff techniques for learners.^{4–7}

Vidarthi described the handoff process as “traditionally informal, unstructured, and idiosyncratic,”⁴ and many believe efforts to formalize and structure this process are important for patient safety.⁸ Standardized handoff forms have improved accuracy of information.⁹ Web-based sign-out systems reportedly reduced the number of patients missed on rounds.¹⁰

Hospitalists also face challenges with effective communication during service change.¹¹ The Society of Hospital Medicine identified the handoff skill as a core competency for hospitalists, and recommendations based on a systematic review of the literature were published.¹² Inpatient

medicine programs are increasingly using midlevel providers such as nurse practitioners (NPs) and physician assistants (PAs) along with hospitalists to accommodate workload while maintaining the scholarly enterprise in academic centers.¹³ To our knowledge there is no literature examining the hospitalist service handoffs involving NP/PAs.

We wished to study the effectiveness and timeliness of the morning handoff from the night coverage providers to the daytime teams consisting of one hospitalist and one NP/PA. Our objectives were to identify deficiencies and to evaluate the effectiveness of a restructured handoff process.

Methods

The Mayo Clinic Institutional Review Board reviewed and approved this study.

Service List							
Patient		CC/PMHx	Meds	Allergies	Labs	Notes	To Do
Name Clinic Number Location Admit Date Admit Status	78Y M Tmax: 36.90 BP: 100/60 Pulse: 80 Height: 178.0 Admit Weight: 64.10 Daily Weight: 65	1. dislodged transgastric/jejunal feeding tube 2. h/o PE, on coumadin 3. recent subdural hematoma, facial and pelvic fractures after fall from wagon 4. recent diverticulitis DNR/DNI	heparin, metoprolol, mirtazapine, multivitamins, polyethylene glycol, trazodone, warfarin	NKDA	Bicarbonate: 29 BUN: 14 Cr: 0.4 Glu: 101 INR: 1.7 / 2.3 / 2.1	Friday replacement of G-J tube by complex GI endoscopy Likely dismissal back to nursing home Friday	[] Culture if fever
Name Clinic Number Location Admit Date Admit Status	85Y M Tmax: 37.30 BP: 122/54 Pulse: 66 Height: 167.0 Admit Weight: 75.50 Daily Weight: 76	#1 Right lower lobe pneumonia, community acquired. #2 Right upper quadrant pain #3 History of prostatic adenocarcinoma #4 History of monoclonal gammopathy of undetermined significance #5 Spinal stenosis and radiculopathy #6 Asthma #7 Hypertension #8 Paroxysmal atrial fibrillation DNI/DNR	albuterol/ipratropium, aspirin, atenolol, dalteparin, fluticasone/salmeterol, levofloxacin, polyethylene glycol, premix, terazosin	IBUPROFEN, KETOROLAC, sulfas	Alkaline Phosphatase: 85 AST (GOT): 18 Bicarbonate: 24 Bilirubin - Direct: 0.3 Bilirubin - Total: 0.9 BUN: 16 Cr: 1.1 Cl: 104 Glu: 114 Hb: 12.9 Plt: 169 K+: 4.4 Na: 138 WBC: 11.4		

FIGURE 1. Electronic template. [Color figure can be viewed in the online issue, which is available at wileyonlinelibrary.com.]

Setting

At the time of this study, the Division of Hospital Internal Medicine (HIM) at our institution consisted of 22 hospitalists, 11 NPs and 9 PAs (hereinafter NP/PAs), and 2 clinical assistants (CAs). The CAs assist with clerical duties not covered by Unit Secretaries:

1. Obtaining outside records
2. Clarifying referring physician contact information
3. Scheduling follow-up outpatient appointments for tests, procedures, and visits
4. Attendance at morning handoff

Each CA can assist 3 or 4 daytime service teams.

Daytime Service Organization

Six HIM services, each managing up to 12 patients, are staffed by a partnership of 1 hospitalist and 1 NP/PA: Four services are primary general medicine services, and 2 consulting (orthopedic comanagement) services.

Night Coverage

Three of 4 primary daytime services and one consult service team transfer care to the (in-house) night NP/PA. The night NP/PA addresses any acute-care issues and reports at morning handoff to the 3 primary services and 1 consult service. In a designated conference room the morning handoff occurs, with at least 1 (day team) "service representative" present. This is usually the NP/PA, as the day team hospitalist concurrently receives a report on new admissions from the (in-house) night hospitalist (who also covers one service and backs up the night NP/PA).

Improvement Process

An improvement team was formed within the Division of HIM consisting of 3 hospitalists, 3 NP/PAs, and 2 CAs to assess the existing handoff process at 7:45am between the Night NP/PA and daytime services. The improvement team met, reviewed

evidence-based literature on handoffs and discussed our local process. Four problems were identified by consensus:

1. Unpredictable start and finish times
2. Inefficiency (time wasted)
3. Poor environment (room noisy and distracting conversations)
4. Poor communication (overwrought and meandering narratives).

Intervention

The improvement team structured a new handoff process to address these deficiencies.

1. Environment: Moved to a smaller room (lower ceiling, less ambient noise).
2. Identification: table cards designating seats for participants (reduced queries regarding "what service are you, today?").
3. Start Times: Each service team assigned a consistent start time (labeled on the table card) within a 15-minute period, and although earlier reportage could occur, any service team present at their designated time has priority for the attention of the night NP/PA, and the opportunity to ask questions.
4. Quiet and Focus: HIM members were reminded to remain quiet in the handoff room, so the service receiving report "has the floor" and personal conversations must not impede the principals.
5. Visual Cue: Green "Good to go" sign placed on team table cards when no verbal was required.
6. Written e-Material: The improvement team required elements of a brief written report in a specified column of our existing electronic service list (ESL). The ESL is a custom designed template importing laboratory, medication, and demographic data automatically but also capable of free text additions (Figure 1). All providers were instructed to update the ESL every 12 hours.

Baseline Pre-intervention Survey

1. In the last quarter what proportion of days while on service did you attend morning handoff? %

2. Helpful information was conveyed in morning handoff.

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
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3. Morning handoff was performed in a timely manner.

Yes	No
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4. Estimate the number of minutes each day you would spend in morning handoff. Minutes

5. Estimate the number of minutes in morning handoff you thought were wasteful. Minutes

6. What would increase the likelihood of your attendance at morning handoff?

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7. Please specify your role:

NP/PA	Physician	CA
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Post-Intervention Survey

1. Have you been on service in the last 15 days?

Yes	No
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2. If yes, what proportion of days on service did you attend morning handoff? %

3-8. Same as baseline survey questions 2-7.

9. Please provide feedback regarding changes to morning handoff.

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FIGURE 2. Survey Questions.

7. Admission and Progress Notes: After manual electronic medical record search, the CAs printed any notes generated in the preceding 12 hours and placed them by the team table card.

The improvement team provided education for the new process at a division meeting and through e-mail. The rec-

ommended report sequence was night NP/PA reporting and day service teams asking questions and seeking clarifications. We discouraged editorial comments and “chit-chat.”

A member of the improvement team monitored the new handoff process for 15 days, and 3 months later for 10 days.

TABLE 1. Provider Survey Results Pre- and Postintervention

Survey Question	Preintervention	Postintervention	P
What proportion of days while on service did you attend morning report? (%)	78	87	0.4119
Helpful information was conveyed in morning report, n (%)			0.112
Strongly agree	9 (25)	9 (56)	
Agree	15 (42)	6 (38)	
Neutral	8 (22)	1 (6)	
Disagree	4 (11)	0	
Strongly disagree	0	0	
Morning report was performed in a timely manner, #yes/#no	23/15	15/0	0.005
Estimate the number of minutes each day you would spend in morning report (minute)	11	5	<0.0028
Estimate the number of minutes in morning report you thought were wasteful (minute)	6.5	0.5	<0.0001

TABLE 2. Provider Survey Feedback: Representative Comments

Deficiency	Pre-Intervention	Post-Intervention
Timeliness	“Efficiency needed”	“I found the changes lead to more concise and valuable time spent in report”
	“Timely, scheduled and efficient reports would help increase my attendance”	“I personally enjoyed having the times set so you are held accountable for a certain handoff”
	“Set report times so I don't have to listen to everyone else's report”	“More organized and efficient”
Environment	“Too much time wasted”	“Love the good to go card! Can start on rounds”
	“Not having to listen to chit chat unrelated to patient care...would improve my attendance”	“There is less chit chat...”
	“Services should receive report in a quieter room”	“Seems less chaotic with less people overall in the room so less distraction”
Quality	“Need a quieter and smaller room”	“Because the room is quieter, I did not have to repeat information”
	“Too noisy”	“Quiet and respectful”
	“I would like a more organized format... More information isn't needed, just the correct information in a timely manner”	“I felt that the amount of information shared was only what was pertinent and important”
	“If I first had the opportunity to review ESL and any notes generated in the last 12 hours, this would improve report”	“Written information on the ESL assured that I didn't forget something important”
	“Less editorializing about events and less adrenaline”	“I liked having the progress notes generated overnight available for review”
	“Need only meaningful information”	“Excellent report with prompt dissemination of information”

Survey

An anonymous survey (Figure 2) concerning staff satisfaction with handoff was conducted immediately before and 15 days after the intervention. In the e-mail containing the postintervention survey, providers were asked to respond only if they had been on service the preceding 15 days (and thus eligible to participate in handoff). To help insure this, the first question read, “Have you been on service during the past 15 days?”

Statistics

To compare the relationship of preintervention and postintervention survey responses, Fisher's exact test was used to compare categorical variables and 2 sample *t*-test and Wilcoxon rank sum test were used for continuous variables. Comparisons that adjusted for the possibility of someone responding to both the preintervention and postintervention surveys were not performed since the surveys were anonymous. A *P* value <0.05 was considered statistically significant. For the item concerning the percentage of days morning report was attended while on service, based on a common standard deviation estimate of 35.3, we had 80%

power to detect a difference of 29.1 (pre vs. post). This computation assumes a 2-sample *t*-test of $\alpha = 0.05$ with sample sizes of 36 and 18. We have 59% power to detect a difference of 27% (67% pre vs. 94% post) for those who at least agree that helpful information was conveyed during handoff. This computation is based on a 2-sided Pearson χ^2 test with $\alpha = 0.05$.

Qualitative data analysis of respondents' answers to the open-ended survey questions “What would increase the likelihood of your attending handoff?” and “What feedback do you have regarding the changes to handoff?” was performed using the constant comparative method¹⁴ associated with grounded theory approaches to identify themes and categories.¹⁵ To establish interrater reliability, three investigators (MCB, DTK, LLK) independently identified coding categories for the data set, compared results, redefined coding categories as needed, and reanalyzed the data until 80% agreement was reached.

Results

Thirty-six of the 44 providers (82%) answered the preintervention survey, including 18 of 22 hospitalists (82%), 17 of 20 NPs/

PAs (85%), and 1 of 2 CAs (50%). During the intervention based on our staffing model, 21 providers had the opportunity to participate in handoff, and 18 (86%) answered the postintervention survey, including 5 of 6 hospitalists (83%), 9 of 14 NPs/PAs (64%), and 2 of 2 CAs (100%). All respondents to the postintervention survey reported being on service during the previous 15 days.

As summarized in Table 1, compared to 60.5% of survey participants ($n = 38$) who thought morning handoff was performed in a timely fashion preintervention, 100% ($n = 15$) felt it was performed in a timely fashion postintervention ($P = 0.005$). The average time spent in morning report before the intervention was 11 minutes, as compared to 5 minutes after the intervention ($P < 0.0028$). Prior to the intervention, 6.5 minutes of the handoff were viewed to be wasteful, as compared to 0.5 minutes of the handoff in the postintervention survey ($P < 0.0001$). Attendance and quality of information perceptions did not demonstrate statistically significant change.

During the 15-day observation period, morning handoff started by 0745 on 14 of 15 (93%) of days and finished by 0800 on 15 of 15 (100%) of days. Table cards, ESL, and progress notes were on the table by 0745 on 15 of 15 (100%) of days following the intervention. Three months after the intervention, the following were observed: morning handoff started by 0745 on 10 of 10 (100%) of days; finished by 0800 on 10 of 10 (100%) of days; and table cards, ESL, and progress notes were on the table by 0745 on 10 of 10 (100%) of days.

Qualitative Data Analysis

Three themes were identified in both preintervention and postintervention surveys: timeliness, quality of report and environment (Table 2). In the preintervention survey, timeliness complaints involved inconsistent start time, prolonged duration of handoff, and inefficiency due to time wasted while teams waited for their handoff report. Comments about report quality mentioned the nonstandardized report process that included nonpertinent information and editorializing. Environmental concerns addressed noise from multiple service team members assembled in 1 large room and chatting while awaiting report. In the postintervention survey, respondents' comments noted improved efficiency, environment, and report quality.

Discussion

We describe an intervention that set the expectation for formal, structured written and verbal communication in a focused environment involving outgoing and incoming clinicians, resulting in improved satisfaction. Before the intervention, the improvement team identified by consensus 4 problems: unpredictable start time, inefficiency, environment, and report quality. Formal structuring of our handoff process resulted in statistically significant improvement in handoff timeliness and efficiency in the view of the HIM division members. Process improvement included precise

team specific start times within a 12-minute window to improve "reliability and predictability" and eliminating non-productive waiting. Additionally, receiving teams were clearly identified with table cards so that no time was wasted locating the appropriate service for report, and minimizing role-identification challenges. The "good to go" sign signaled teams that no events had occurred overnight requiring verbal report. Handoff timeliness persisted 3 months after the intervention, suggesting that the process is easily sustainable.

Postintervention survey comments noted the improved environment: a smaller, quieter room with the door closed. Before the intervention, all day team providers, CAs and night provider met in a large, loud room where multiple conversations were commonplace. Previous study of the handoff process supports creating an environment free of distraction.⁴

Postintervention survey responses to the open-ended questions suggested improved provider satisfaction with the quality of the report. We believe this occurred for several reasons. First, having a precise start time for each team within a 12-minute window led to a more focused report. Second, the ESL provided a column for providers to suggest plans of care for anticipated overnight events to improve preparedness and avoid significant omissions. Third, hospital notes generated overnight were made available which allowed daytime providers to review events before handoff, for a more informed update, or just after verbal report to reinforce the information just received, a technique used in other high-reliability organizations.¹⁶ This measure also provided an "at-a-glance" view of each patient, decreasing the complexity of handoff.¹⁷

This study has important limitations. We address the handoff process of 1 hospitalist group at a single academic center. NP/PAs are the clinicians with first-call responsibility for the night coverage of our patients, and the handoff process between the night NP/PA and daytime provider was studied. The handoff between physicians for patients admitted overnight was not assessed. Another limitation is that the time spent in handoff is reported as a participant estimate. There was no objective measurement of time, and respondents may have been biased. An additional limitation of our study concerns the preintervention and postintervention surveys. Both surveys were anonymous, which makes discerning the absolute impact of the intervention difficult due to the lack of paired responses. Lastly, our institution has an ESL. This option may not be available in other hospital systems.

Several deficiencies in the handoff process were addressed by providing key clinical data verbally and in written format, enhancing the physical environment, and defining each team's handoff start time. Our process improvements are consistent with the handoff recommendations endorsed by the Society of Hospital Medicine.¹² Subsequent direct observation, subjective reports, and survey results demonstrated improvement in the handoff process.

Future studies might measure the effectiveness of morning handoff by end-shift interviews of the daytime clinicians. Similarly, a study of evening handoff could measure the efficiency and effectiveness of report given by day teams to night-coverage colleagues. Furthermore, if the handoff report skill set can be more rigorously defined and measured, a hospitalist clinical competency for hospitalists and NP/PAs could be developed in this core process-of-care.¹²

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