





Communication in the Electronic Age: an Analysis of Face-to-Face Physician-Nurse Communication in the Emergency Department

Natalie C. Benda^{1,2}  · A. Zachary Hettinger^{1,3} ·
Ann M. Bisantz²  · Daniel J. Hoffman¹ ·
Nicolette M. McGeorge^{2,4} · Akhila Iyer¹ ·
Rebecca L. Berg² · Emilie M. Roth⁵ ·
Ella S. Franklin^{1,6} · Shawna J. Perry⁷ ·
Robert L. Wears^{7,8}  · Rollin J. Fairbanks^{1,2,3} 

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Abstract We describe the patterns and content of nurse to physician verbal conversations in three emergency departments (EDs) with electronic health records. Emergency medicine physicians and nurses were observed for 2 h periods. Researchers used paper notes to document the characteristics (e.g., partners involved, location of communication, who initiated communication) and content of nurse to physician conversations.

✉ Natalie C. Benda
Natalie.C.Benda@MedStar.Net

- ¹ National Center for Human Factors in Healthcare, MedStar Institute for Innovation, MedStar Health, Washington, DC 20002, USA
- ² Department of Industrial and Systems Engineering, State University of New York at Buffalo, Buffalo, NY 14228, USA
- ³ Department of Emergency Medicine, Georgetown University School of Medicine, Washington, DC 20007, USA
- ⁴ Armstrong Institute for Patient Safety and Quality, Johns Hopkins Medicine, Baltimore, MD 21202, USA
- ⁵ Roth Cognitive Engineering, Stanford, CA 94305, USA
- ⁶ School of Nursing, The George Washington University, Washington, DC 20006, USA
- ⁷ Department of Emergency Medicine, University of Florida, Jacksonville, FL 32209, USA
- ⁸ Clinical Safety Research Unit, Imperial College of London, SW7 2AZ, London, UK

Eighteen emergency nurses and physicians (nine each) were observed for a total of 36 h. Two hundred and fifty-five unique communication events were recorded across three emergency departments spread evenly across day, evening, and night shifts. A qualitative analysis of communication event content revealed 5 types of communication and 13 content themes. Content themes covered a broad range of topics including exchange of patient health information, management of the ED, and coordination of orders. Physician participants experienced significantly more communication events than nurse participants, while nurses initiated significantly more communication events than physicians. Most of the communication events occurred at the physician workstation followed by patient treatment areas. This study describes nature of verbal nurse to physician communication in the ED. Direct communication is still used to communicate important information, such as information about patients' status, in EDs with established electronic health records. Our results provide an overview of information exchanged in the ED which can serve as a basis for designing improved information support systems.

Keywords Emergency department communication · Nurse-physician communication · Verbal communication · Electronic health records

1 Introduction

Caring for patients in the emergency department (ED) requires a multi-disciplinary team of providers with varied training and skill sets. Different roles (e.g., nurses and physicians) have specialized tasks that must be coordinated to successfully diagnose and treat patients [1, 2]. Coordinating effectively across roles and between providers requires a high degree of communication and information sharing about the patient's status and care plan [3].

Communication among the healthcare teams has been cited as a critical component in the provision of safe, effective patient care [1, 4, 5]. Face-to-face communication has been found to be the most common method of information exchange [5–7]. However, complexities of the ED environment, such as crowding, interruptions, and transitions of care, make successful communication particularly challenging [8–11].

Studying communication helps to understand how activities are coordinated and how shared decision-making occurs. It can also provide insight as to how communication, information systems, and decision-making tools may be improved [12, 13]. Communication events in the ED have been studied previously by our team and others. One study found gaps in information sharing between roles in the ED and identified communication patterns among different team members [6]. However, this study (and others) focused solely on characteristics of communication including types of communication, whom the communication occurs between, and the frequency of communication [6, 14, 15]. Qualitative studies regarding communication have typically used interview or focus group techniques as opposed to investigating communication real time, in situ [8, 10, 11]. Although some have investigated the content of ED communication events in situ, they have emphasized specific steps in the care process (e.g., transitions of care) as opposed to providing a broader view of communication between ED care providers [16]. Furthermore, many of these studies occurred prior to the widespread implementation of commercial electronic health records (EHRs). Given the increasing prevalence of EHRs

internationally, additional research on communication in the context of these systems is warranted.

Also, while it has been demonstrated that the introduction of electronic health records results in changes to the frequency of verbal communication and shared awareness between physicians and nurses [17, 18], to our knowledge, no study analyzing the in situ content and characteristics in the era of widespread EHR use has been completed.

Therefore, the purpose of this study was to analyze the content and patterns of physician-nurse communication in EDs which utilize EHRs and to characterize the role that verbal communication plays in these work environments. Specifically, we studied who engages in and initiates communication events, where these events occur, and what types of information are discussed. The information derived from this study can help inform the design of future information systems to better support the collaborative work of ED personnel.

2 Materials and Methods

2.1 Study Design

This study utilized observational methods to document the content of verbal communication between emergency medicine (EM) physicians and nurses. Other characteristics of the communication events, such as location of event and who initiated the communication event, were collected to determine how other factors may affect the information exchanged.

2.2 Setting

Observations were conducted in three urban emergency departments, all part of a larger 10-hospital, 280-ambulatory site, not-for profit, distributed healthcare delivery network. The EDs were all staffed by employed nurses, patient care technicians, and EM attending physicians. ED no. 1 has an annual patient census of 34,000, ED no. 2 has 59,000, and ED no. 3 has 87,000. EDs nos. 1 and 3 are the primary training sites for an EM residency program. Physicians in all EDs carry mobile telephones. Only nurses in ED no. 2 have mobile telephones. All hospitals use the same commercial EHR (Cerner, Kansas City, KS), including a computerized provider order entry system. Nurses perform all documentation in the EHR, and physician documentation is performed by a combination of handwritten paper documentation and template-based electronic documentation, both of which are added to the electronic health record. Each ED has a similar layout in that physician and nurse workstations are located in a centralized area surrounded by patient care areas (including private rooms, areas divided by curtains, and hallway beds). Research approval was obtained from the institutional review board for the healthcare system.

2.3 Study Participants

Eighteen EM nurses, residents, and attending physicians were recruited. Only EM residents were chosen, as residents in other specialties typically only spend 1 month in the ED and their lack of familiarity with staff and environment may have introduced confounding

factors. Participants were stratified across role and location, with three nurses and three physicians observed at each hospital and observation sessions scheduled during three time periods—morning (6 a.m.–12 p.m.), afternoon (12 p.m.–6 p.m.), and evening (6 p.m.–12 a.m.). Each of the 18 sessions lasted 2 h (36 h of observational data in total). Sessions were structured such that one participant of each role (physician or nurse) was observed per session. The initial sample size was selected to capture a broad, representative spectrum of ED communication balanced across time of day, participant role and institution. After initial analysis, it was determined that saturation in content had been achieved and thus the sample size is considered sufficient [19]. Participants provided verbal informed consent prior to data collection. No patient data were recorded by the observers.

2.4 Data Collection

Data collection methods were designed by two senior Ph.D. level researchers (AMB and EMR) with expertise in behavioral research methods in conjunction with three subject matter experts in emergency medicine (AZH, ESF, RJF) who also have experience with observational research methods. The two observers (NCB and DJH) performing data collection completed two, 2-h pilot sessions to ensure the feasibility and replicability of the methods. The lead observer (NCB) has extensive experience conducting observational research in the ED.

During observation periods, all communication events between the participant and individuals of the other role were documented by two observers (NCB and DJH). For example, when physician participants were shadowed, interactions with nurses were captured, and vice versa. Communication events were defined as a verbal exchange/conversation or physical exchange of information artifacts (e.g., paper or charts). This did not include gestures and only included phone conversations in rare instances where the researchers could definitively determine the participant was communicating with an individual of the other role. The researchers took paper and pencil notes about the content of the conversations, including as much detail as possible. Each researcher independently documented observations, and notes were collated following each observation session (as described below). Researchers entered patient rooms to continue to observe communication events, except in rare instances when the patients did not give permission. Additional characteristics of the communication events were also recorded, including the communication partner (which specific nurse/physician), physical location, time of the event, and who (participant or partner) initiated the communication. The locations recorded were categorized as physician workstation, nurse workstation, patient area (including rooms or hallway beds), and other. The other themes constituted less than 10% of all events and included locations such as miscellaneous hallway areas, triage, and the waiting room. Contextual information, pertaining to tasks the participant performed, was also recorded throughout the observation session to allow for improved understanding of the communication events captured.

Immediately following each session, researchers met to reconcile any differences in their notes. Time stamps were used to match communication events between observers. Observers had synchronized clocks on the clipboards used during data collection, so their recorded communication event start times were always within 1 min of one other.

Observers confirmed agreement regarding event location and initiator role. The observers then synthesized their descriptions of the events to capture the most detailed

content possible and to create a single data source for analysis. There were few instances of disagreement in the content of the event, but more frequently instances where observers captured different details of the exchange. Disagreements were reconciled through discussion and, if necessary, resolved by subject matter experts in emergency medicine. Between-rater agreement statistics were not calculated, as the goal was not to obtain agreement between raters but to collect a more complete record of communication in a fast-paced, data-rich environment.

2.5 Data Analysis

Qualitative analysis of these data was performed using content analysis to detect common themes.

Content analysis was performed to describe themes in information exchanged during the communication events. Communication events were analyzed chronologically (as they occurred during observations) to preserve the context of the situation. A list of content themes with definitions and examples was iteratively developed using a constant comparison process; this ensured the accuracy and cohesiveness of the codes developed [19]. Themes were assigned to events based on group consensus. All authors contributed to the development of the coding scheme, and at least one human factors expert (AMB, EMR, RJF) and one subject matter expert in emergency medicine (AZH, ESF, RJF) participated in each session. Communication events could be assigned to multiple themes if they involved the exchange of different themes of information.

Table 1 provides sample excerpts from the field notes collected. This table also includes the resultant content themes for the given excerpts which are further described in Table 2. Dashed lines signify portions from a single communication event that were assigned multiple content themes.

Other studies in the ED have demonstrated differences in communication volume based on participant role, time of day, and other factors [6, 7, 14, 15]. For this study,

Table 1 Sample excerpts from field notes and resultant content themes

Excerpt	Content theme
<i>Nurse initiates communication at physician workstation</i> Nurse: “Plan for patient?” Physician: “Wait two hours and verify with poison control”	Plan and disposition
<i>Nurse initiates communication with physician while at nurse workstation</i> Nurse: “What did they call about?” <i>Regarding phone call physician just completed.</i> Physician: “Labs back now. Albumen back?” <i>Asking while nurse viewing labs in electronic medical record.</i> Nurse: “Probably just haven’t posted.” Physician: “Add ionized calcium.”	Task status
<i>Nurse initiates communication at physician workstation</i> Nurse: “I’ll generate order, trying to add on, I’ll put it [the order] in.”	Orders/medications/tests
<i>Nurse initiates communication at physician workstation</i> Nurse: “Can walk...”	Patient health status
“...got Tylenol, wound clean.”	Task status
Physician: “Can you go back in with translator phone?”	Other

Contextual information captured in the notes is shown in italics

Table 2 Description of qualitative content topical codes

Content themes	Definition	Example	Number of events (%)
Patient health status	Patient health information (including mental status and attitude), also including results of tests or procedures	“Wants something for anxiety, needs to take other meds, says their pulse is irregular”—nurse “Ativan?”—physician “Takes something else, some kind of beta-blocker”—nurse	54 (20.5)
Plan and disposition	Overall plan/status with respect to plan/conjectures about what plan should be. Typically includes multiple plan components	“The patient has mono, give 2nd liter of fluids. Let me know when the parents are back”—physician to nurse	39 (14.8)
Orders/medications/tests	Often questions or directives regarding: specific tests, orders, procedures, consultants, or medications. Distinct from broader discussions of overall treatment and disposition	“Will need an IV for the patient. Going to write order for medications”—physician to nurse	38 (14.4)
Task status	Status of a specific task (e.g., in progress, still to be started, completed)	“What did they call about?”—nurse “Labs back now. Is the albumin back?”—physician “They probably just haven’t posted it.”—nurse	27 (10.3)
Task coordination	Related to assignment of tasks to people/times (who is going to do what, when)	“Going to do sign out, what do you need before then?”—physician to nurse	22 (8.4)
Patient information artifact	Paper artifact containing patient information (often, searching for or giving/taking of)	“Can you print out that CT?”—nurse “It’s already in the chart.”—physician	20 (7.6)
Other	Other topics including incidental conversation or social conversation	<i>Nurse speaking with physician about mutual colleague who had told them to say hello to the physician</i>	15 (5.7)
Staff information	Issues related to names, phone numbers, and shift times of staff members	“What’s the name of the admitting attending?”—physician “I don’t know yet.”—nurse	13 (4.9)
Medical equipment	Status, location, operation, and acquisition of medical equipment	“Need a glide scope?”—nurse “Yes.”—physician	11 (4.2)
Patient location/movement	Issues regarding finding a patient or coordinating patient movement to different phases of care. More specific to a patient plan than general bed management	“Bed 28 went to the OR.”—nurse “Okay, thanks.”—physician	10 (3.8)

Table 2 (continued)

Content themes	Definition	Example	Number of events (%)
Attempted communication	Communication attempt that did not succeed	<i>Asking charge nurse if patient eloped, realized charge nurse is not at their work station, goes to patient room to see if the patient is there.</i>	5 (1.9)
Bed management	Issues related to managing empty/full beds, patient flow, or cleaning	“Bed 9 can come out, getting ready to discharge bed 6” —Physician to charge nurse	5 (1.9)
Clinical/medical knowledge	General information about clinical practice, medicine, and health (“textbook knowledge”)	“How much charcoal should I give? How do I mix it?” —nurse “Mix all of it. Make sure patient drinks it all. Add additional liquid if needed.” —physician	4 (1.5)

Italics indicate descriptions of actions as opposed to direct quotations

Table 3 Summary of main effects

Theme	Results, num. (%)	Chi-square	<i>P</i> value
Initiated by*		11.27	< 0.01
Nurse	131 (61.5)		
Physician	82 (38.5)		
Participant role* (role being observed)		9.42	< 0.01
Nurse	103 (40.4)		
Physician	152 (59.6)		
Physical location*		16.72	< 0.01
Physician workstation	116 (45.5)		
Patient area	83 (32.5)		
Nurse workstation	38 (14.9)		
Other	18 (7.1)		
Hospital*		8.21	0.02
Hospital 1	65 (25.5)		
Hospital 2	88 (34.5)		
Hospital 3	102 (40.0)		

*Significant difference among groups

communication events were examined using descriptive statistics to highlight relative differences in the number of communication events according to the role of the participant being observed, role of the person initiating the communication event, the physical location of the event (e.g., workstation, patient room), hospital site, and the content of the communication event. The analysis was supplemented by statistical testing using Pearson's chi square tests (conducted using R software) [20].

3 Results

3.1 Characteristics of Study Participants

Nine ED nurses, six EM attending physicians, and three EM resident physicians participated in the study. The sample comprised 4 men and 14 women aged 23 to 60 years (mean 33.1 years; SD 10.16). Participants' experience in the ED ranged from less than 1 to 38 years (mean 5.62 years; SD 8.89 years). No participants were observed more than once.

3.2 Main Results

There were 255 unique communication events recorded during 36 total hours of data collection. Thirteen content themes were identified, as follows.

These themes covered a range of topics including patient health information, management of the ED, as well as completion and coordination of medical orders. Table 2 provides definitions and examples of each of the 13 themes as well as the

frequency of event occurrence of each theme. Each event represented an exchange between the participant and one communication partner.

Descriptive statistics were utilized to examine the relative differences in communication volume according to the role of the participant being observed, initiator of the event, and physical location of the event (Table 3). Physician participants *experienced* more communication events than their nursing counterparts, while nurses *initiated* more events. Communication events occurred most often at the physician workstation or in patient treatment areas. Fewer events occurred at the nursing workstation. Locations where less than 10% of the total communication events occurred were coded as “other” and included hallways, triage areas, and workstations of consulting physicians.

Statistical tests indicated that there were significant differences in the number of events experienced by different types of providers, initiated by different types of providers, across hospitals, and across ED locations (Table 3).

Table 4 provides additional detail regarding the content of events initiated by each role at the various locations throughout the ED. The results show a pattern in which nurses frequently come to the physician workstation to initiate conversations about the status of the patient’s health as well as plans and disposition (totaling 30% of all communication events initiated by nurses). The content and location of conversations initiated by physicians were more varied, with no single combination of location and content theme representing more than 10% of the events initiated. Like nurses, physicians initiate communication most frequently from the physician workstation but discuss a more varied content.

4 Discussion

This study allowed us to describe the role of verbal communication in EDs where EHRs are implemented, discover patterns in how verbal communication occurs, and create a foundation for how information exchange in the ED could be better supported.

First, we found that even in an environment where EHRs are implemented, direct, face-to-face communication between nurses and physicians continues to be used for a wide variety of purposes. The theme most frequently observed during communication included sharing information about the patients’ current health or status, coordinating care tasks, and discussing future care plans and orders. This strategy (discussing care plans) is consistent with those highlighted in a recent report, which suggests that directly advising nursing staff of the plan for the patient, in addition to entering orders into an EHR, may improve efficiency [20]. Our study provided evidence that this strategy occurs in practice. Other communication themes included use of medical equipment, information about staff members, ED management, and movement and location of patients through the ED.

Face-to-face communication can provide an efficient means for conveying multiple pieces of complex information or steps (e.g., plan and disposition). It can also be crucial in creating shared awareness. Others have highlighted the importance of shared awareness in successful team performance in the ED as well as other healthcare domains [3, 21]. Our results provide additional support for this claim. For example, we found an instance where verbal communication enabled the communication partner

Table 4 Number and percentage of events initiated by each role by location and content theme

Content theme	Initiator role				Nurse initiated—number of events (%)				Nurse initiated—number of events (%)					
	Physical location				Physical location				Physical location					
	Physician workstation	Patient area	Nurse workstation	Other	Physician total	Physician workstation	Patient area	Nurse workstation	Other	Physician workstation	Patient area	Nurse workstation	Other	Nurse total
Attempted communication	0 (0)	0 (0)	1 (1.2)	0 (0)	1 (1.2)	2 (1.6)	0 (0)	1 (0.8)	0 (0)	2 (1.6)	0 (0)	1 (0.8)	0 (0)	3 (2.4)
Bed management	2 (2.5)	0 (0)	0 (0)	1 (1.2)	3 (3.7)	2 (1.6)	0 (0)	0 (0)	0 (0)	2 (1.6)	0 (0)	0 (0)	0 (0)	2 (1.6)
Clinical/medical knowledge	1 (1.2)	0 (0)	1 (1.2)	0 (0)	2 (2.5)	2 (1.6)	0 (0)	0 (0)	0 (0)	2 (1.6)	0 (0)	0 (0)	0 (0)	2 (1.6)
Did not hear	1 (1.2)	0 (0)	0 (0)	0 (0)	1 (1.2)	2 (1.6)	0 (0)	0 (0)	1 (0.8)	2 (1.6)	0 (0)	0 (0)	1 (0.8)	4 (3.3)
Medical equipment	0 (0)	2 (2.5)	1 (1.2)	0 (0)	3 (3.7)	0 (0)	5 (4.1)	0 (0)	2 (1.6)	0 (0)	0 (0)	0 (0)	2 (1.6)	7 (5.7)
Orders/medications/tests	5 (6.2)	7 (8.6)	2 (2.5)	1 (1.2)	15 (18.5)	5 (4.1)	5 (4.1)	0 (0)	5 (4.1)	5 (4.1)	0 (0)	0 (0)	0 (0)	10 (8.1)
Other	0 (0)	0 (0)	1 (1.2)	3 (3.7)	4 (4.9)	7 (5.7)	1 (0.8)	0 (0)	0 (0)	7 (5.7)	1 (0.8)	0 (0)	0 (0)	8 (6.5)
Patient health status	4 (4.9)	2 (2.5)	2 (2.5)	1 (1.2)	9 (11.1)	22 (17.9)	6 (4.9)	2 (1.6)	0 (0)	6 (4.9)	2 (1.6)	2 (1.6)	0 (0)	30 (24.4)
Patient information artifact	5 (6.2)	1 (1.2)	2 (2.5)	0 (0)	8 (9.9)	5 (4.1)	0 (0)	0 (0)	0 (0)	5 (4.1)	0 (0)	0 (0)	2 (1.6)	7 (5.7)
Patient location/movement	4 (4.9)	0 (0)	0 (0)	0 (0)	4 (4.9)	5 (4.1)	0 (0)	0 (0)	0 (0)	5 (4.1)	0 (0)	0 (0)	0 (0)	5 (4.1)
Plan and disposition	4 (4.9)	1 (1.2)	1 (1.2)	1 (1.2)	7 (8.6)	15 (12.2)	1 (0.8)	1 (0.8)	2 (1.6)	15 (12.2)	1 (0.8)	1 (0.8)	2 (1.6)	19 (15.4)
Staff information	2 (2.5)	2 (2.5)	4 (4.9)	0 (0)	8 (9.9)	2 (1.6)	0 (0)	1 (0.8)	0 (0)	2 (1.6)	1 (0.8)	1 (0.8)	0 (0)	3 (2.4)
Task coordination	1 (1.2)	2 (2.5)	6 (7.4)	0 (0)	9 (11.1)	8 (6.5)	2 (1.6)	5 (4.1)	2 (1.6)	8 (6.5)	2 (1.6)	5 (4.1)	0 (0)	15 (12.2)
Task status	3 (3.7)	2 (2.5)	2 (2.5)	0 (0)	7 (8.6)	3 (2.4)	3 (2.4)	1 (0.8)	3 (2.4)	3 (2.4)	1 (0.8)	1 (0.8)	1 (0.8)	8 (6.5)
Total	32 (39.5)	19 (23.5)	23 (28.4)	7 (8.6)	81 (100)	80 (65.0)	24 (19.5)	11 (8.9)	8 (6.5)	123 (100)				

Percentages are based on the total events for each role

to recognize and correct a potential error (e.g., wrong order—wrong patient), highlighting the criticality of communication among different care team members.

Our data collection method (using field notes as opposed to audio recording) did not support formal analysis and classification of communicative functions (e.g., speech acts) for each of the events observed. However, during data analysis, we did note that both roles (physicians and nurses) utilized verbal communication to perform a variety of actions, including asserting (stating the status of patients' health or other aspects of ED care), directing (instructing or requesting their communication partner to complete a task), committing (stating that they will complete a task) and expressing (relaying thoughts or beliefs, typically regarding the prognosis for the patient) [22].

Nurses in the study initiated significantly more communication events than physicians, while physicians were involved in significantly more communication events than nurses (see Table 3). It is likely that physicians were involved in more communication events with nurses, than vice-versa, because of the way patient care teams were structured (typically one physician and several nurses). Each physician worked with a number of nurses on the patient care team, while any individual nurse worked primarily with only one physician.

Most communication occurred at the physician workstation, with nurses initiating the majority of communication events at this location. This may reflect the fact that the physician workstation is a predictable, and common, place for physicians to be located, demonstrating how the built environment and workplace norms may affect communication patterns [23, 24]. Nurse-initiated communication at physician workstations most often pertained to patients' health status or plans and disposition (see Table 4). This may reflect that these types of critical information are best exchanged through verbal communication. However, it is still important to design IT systems to support communication of this information in instances where verbal conversations are not possible or may be delayed. This could include an ability to flag or push notifications of important changes in patient health status, which may facilitate faster recognition of critical issues but will not eliminate the need for the verbal exchange of information. The ability for both care team members to view and edit the working plan and diagnosis asynchronously would also be useful. Functionality should also be included that allows team members to see which other team members have viewed different pieces of information to ensure that critical pieces of information (e.g., dramatic changes in vitals) are not missed.

Physicians initiated more communication events from their workstation than any other location (40% of all events) regarding various topics, as well as initiating a large number of events at the nurses' workstations (presumably, as a location where they could find the nurses). Finally, both nurses and physicians initiated a relatively large percentage of events in patients' rooms; this may reflect the opportunistic nature of communication in the ED as patient rooms are a place where the care team may frequently be co-located with fewer distractions. It also suggests the need for portable technology that would allow nurses or physicians to record information while it is discussed in patient treatment areas.

4.1 Limitations

There are study limitations that should be considered in determining the implications of our results. Data were collected from face-to-face verbal conversations between physicians and nurses. Therefore, the data does not contain information unique to other

pathways such as within roles (e.g., nurse to nurse) or to other care providers (e.g., nurse to technician), which may play a significant but very different roles in the ED communication. Physician-nurse communication was specifically chosen for the purposes of this analysis to understand how these two roles make decisions and jointly care for patients.

Further, we did not study asynchronous, non-verbal communication and were limited in our study of telephone communication. Thus, we did not analyze communications occurring through phone calls (unless communication partners could be definitively determined) and notes communicated through physical, paper documentation. Occurrences of communication via notes or paper documentation were recorded under the “patient information artifact” content theme; however, the specific content of the paper artifact was not analyzed. The intent of this study however was not to exhaustively study physician-nurse communication but to understand the role of verbal communication in the presence of other information exchange mechanisms.

Content and characteristics of physician-nurse communication were collected via semi-structured field notes, which does not allow for the capture of turn-by-turn analysis possible with audio-recorded conversations. We were, however, able to identify themes and patterns within conversations without the limitations and privacy concerns that audio recording in clinical environments and at patient bedsides would present. An additional limitation was that event duration information was not collected, because our goal was to capture communication content. There are other studies which focus primarily on ED event durations (including communication events) [7, 15]. Finally, in-person observation presents the potential for a Hawthorne effect because subjects were aware they were being monitored. However, data collection occurred in academic ED’s where physicians and nurses are accustomed to frequent observation by trainees and others and likely had minimal impact.

5 Conclusions

This study described the nature of face-to-face verbal communication between physicians and nurses in providing care to patients in the ED. Verbal communication was used to convey information about patient health, plans and disposition, orders, and the status of various actions. This study highlights the roles that verbal communication plays despite the advent of computerized health records which support electronic communication. Further research regarding communication strategies, such decisions regarding when to use verbal communication, and how to integrate the use of electronic communication is needed to understand why these choices are being made and to identify which strategies are most appropriate in different situations. These insights can be used to provide guidance regarding the design of electronic health information systems so that they better facilitate teamwork and communication through information sharing in an emergency department setting.

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References

- Eisenberg EM, Murphy AG, Sutcliffe K, Wear R, Schenkel S, Pery SJ et al (2005) Communication in emergency medicine: implications for patient safety. *Commun Monogr* 72(4):390–413
- Slade D, Manidis M, McGregor J, Scheeres H, Chandler E, Stein-Parbury J, et al. (2015) The context of communication in emergency departments. In: *Communicating in hospital emergency departments*. Springer Berlin Heidelberg, p. 25–54
- Eisenberg EM (2008) The social construction of health care teams. In: Nemeth C, editor. *Improving healthcare team communication: Building on lessons from aviation and aerospace*. Ashgate Publishing
- Risser DT, Rice MM, Salisbury ML, Simon R, Jay GD, Berns SD (1999) The potential for improved teamwork to reduce medical errors in the emergency department. *Ann Emerg Med* 34(3):373–383
- Kilner E, Sheppard LA (2010) The role of teamwork and communication in the emergency department: a systematic review. *Int Emerg Nurs Elsevier Ltd* 18(3):127–137
- Fairbanks R, Bisantz AM, Summ M (2007) Emergency department communication links and patterns. *Ann Emerg Med* 50(4):396–406
- Spencer R, Coiera E, Logan P (2004) Variation in communication loads on clinical staff in the emergency department. *Ann Emerg Med* 2004/08/28 44(3):268–273
- Cameron K, Engel KG, McCarthy DM, Buckley B, Mercer Kollar LM, Donlan SM et al (2010) Examining emergency department communication through a staff-based participatory research method: identifying barriers and solutions to meaningful change. *Ann Emerg Med Elsevier Inc* 56(6):614–622
- Redfern E, Brown R, Vincent CA (2009) Identifying vulnerabilities in communication in the emergency department. *Emerg Med J* 26(9):653–657
- Varjoshani NJ, Hossaini MA, Khankeh HR, Ahmadi F (2015) Tumultuous atmosphere (physical, mental), the main barrier to emergency department inter-professional communication. *Glob J Health Sci* 7(1):144–153
- Bagnasco A, Tubino B, Piccotti E, Rosa F, Aleo G, Di Pietro P et al (2013) Identifying and correcting communication failures among health professionals working in the emergency department. *Int Emerg Nurs Elsevier Ltd* 21(3):168–172
- Nemeth CP (2012) *Improving healthcare team communication: building on lessons from aviation and aerospace*.
- Patterson ES, Cook RI, Woods DD, Render ML (2004) Examining the complexity behind a medication error: generic patterns in communication. *IEEE Trans Syst Man, Cybern—Part A Syst Humans* 34(6):749–756
- Woloshynowych M, Davis R, Brown R, Vincent C (2007) Communication patterns in a UK emergency department. *Ann Emerg Med* 50(4):407–413
- Coiera EW, Jayasuriya RA, Hardy J, Bannan A, Thorpe ME (2002) Communication loads on clinical staff in the emergency department. *Med J Aust* 176(9):415–418
- Patterson PD, Pfeiffer AJ, Weaver MD, Krackhardt D, Arnold RM, Yealy DM et al (2013) Network analysis of team communication in a busy emergency department. *BMC Health Serv Res* 13(109)
- Horwitz LI, Krumholz HM, Green ML, Huot SJ (2006) Transfers of patient care between house staff on internal medicine wards: a national survey. *Arch Intern Med* 166(11):1173–1177
- Taylor SP, Ledford R, Palmer V, Abel E (2014) We need to talk: an observational study of the impact of electronic medical record implementation on hospital communication. *BMJ Qual Saf* 23(7):584–588
- Benda NC, Meadors ML, Hettinger AZ, Ratwani RM (2016 Sep 10) Emergency physician task switching increases with the introduction of a commercial electronic health record. *Ann Emerg Med* 67:741–746
- R Development Core Team (2013) R: a language and environment for statistical computing. Vienna, Austria: R Foundation for Statistical Computing
- Klauer KM. 14 tips to improve clinical efficiency in emergency medicine [Internet]. American College of Emergency Physicians Now 2015. Available from: <http://www.acepnow.com/article/14-tips-to-improve-clinical-efficiency-in-emergency-medicine/2/?singlepage=1>
- Searle J (1975) A taxonomy of illocutionary acts. In: *Language, mind, and knowledge*. Minneapolis, Minnesota
- Slade, Diana, Marie Manidis, Jeannette McGregor, Hermine Scheeres, Eloise Chandler, Jane Stein-Parbury, Roger Dunston, Maria Herke and CMM. The context of communication in emergency departments. In: *Communicating in hospital emergency departments*. Springer Berlin Heidelberg; 2015. p. 25–54
- Xiao Y, Schenkel S, Faraj S, Mackenzie CF, Moss J (2007) What whiteboards in a trauma center operating suite can teach us about emergency department communication. *Ann Emerg Med* 50(4):387–395