Communication Patterns in a UK Emergency Department

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Study objective: Good communication is important in patient care and plays an essential part of teamwork and patient safety. Communication in the emergency department (ED) can be chaotic, with the potential for error resulting from communication overload and problems of communication. The nurse in charge of the ED plays a crucial role in maintaining communication flow. The aims of this study are to identify the features of the communication load on the nurse in charge of the ED.

Methods: This was an observational, nonexperimental study, building on the methods of observation and analysis developed by Coiera. It was carried out in an inner-city hospital ED in London. The nurse in charge of the ED was observed. The following factors were studied: the level of communication, interruptions, and simultaneous events; the channel and purpose of communication; interaction types; unresolved communications and annoying aspects of the observed periods; and the effect of weekday, staffing, and patient levels on the level of communication.

Results: Eleven nurses were observed during 18 observation periods during a total of 20 hours. Analysis revealed that there were 2,019 communication events in 20 hours and that 1,183 (59%) were initiated by the nurse in charge. Two hundred eighty-six (14%) simultaneous events/tasks were identified by the observer. One thousand five hundred twenty-eight (76%) communications involving the nurse in charge were face to face, 144 (7%) were by telephone, 107 (5%) concerned the use of the computer, and 104 (5%) concerned the use of the whiteboard. The largest purpose of communication events was related to patient management (48%). There was a slight relationship between junior medical staff and the level of communication and a moderate relationship between communication load and the number of patients in the ED. In addition, a greater number of nurses on duty were associated with fewer communication events with the nurse in charge.

Conclusion: These findings are an important measure of communication load, which can disrupt memory and lead to mistakes. Improving communication between health care staff by reducing the levels of interruptions and minimizing the volume of irrelevant or unnecessary information exchange could therefore have important implications for patient safety. [Ann Emerg Med. 2007;50:407-413.]

INTRODUCTION

Good communication between health care staff is a salient prerequisite to ensuring that complex clinical environments are run smoothly and efficiently.[1] Poor communication among health care staff can substantially contribute to medical error.[2-4] When information is not communicated effectively, this can impose adverse effects on the patient in terms of clinical outcomes.[5-7] In Australia, a retrospective review of 14,000 inhospital deaths showed that communication errors were the lead cause and were held accountable for twice as many errors as inadequate clinical skill.[8] Further, an incident monitoring study reported that communication problems were related to 50% of all adverse events.[9]

Interruptions in health care settings are ubiquitous. Findings from the United States and Australia have shown that interruptions in work processes are frequent, occurring on average 10 times per hour.[10-13] Furthermore, health care staff often have to deal with 2 or more tasks concurrently.[11] These

Editor's Capsule Summary

What is already known on this topic
Emergency physicians are interrupted frequently and experience high communication loads.

What question this study addressed
What is the communication burden for senior emergency nurses?

What this study adds to our knowledge
In a busy, inner-city emergency department, senior nurse communication burden was substantial (~100 events per hour) and frequently involved interruptions and multitasking.

How this might change clinical practice
Decreasing the communications burden on the senior nurse might decrease this potential for error and improve performance.

findings are of concern for 2 reasons. Interruptions can disrupt memory and generate errors[14]; multitasking may result in memory overload, causing some of the information to be lost before processing is complete.[15]

Communication in the emergency department (ED) can be chaotic, with potential for error resulting from communication overload and problems resulting from poor communication.[10,11] The ED has been described as an interrupt-driven environment,[11,12] leading to task change.[12] In 2003, the Department of Health in England and Wales introduced a national target that 98% of patients who attend EDs will have completed their treatment and have left the department within 4 hours of arrival. This target has resulted in increased pressure to assess, investigate, treat, and either admit or discharge within this period and has the potential to increase the frequency of communication and hence interruptions.

The nurse in charge of the ED plays a crucial role in maintaining communication flow. This role is very demanding, and in one UK hospital where the nurses work 12-hour shifts, they take the role of "nurse in charge" for only half the shift, when they are responsible for the daily monitoring and management of patients and staff in the ED. The nurse in charge therefore has a pivotal role in ensuring the smooth functioning of this complex clinical environment. Thus, it is important to study levels and patterns of communication exchange in this particular staff group. Furthermore, other studies have examined the communication load of staff in the ED,[16,17] including the relationship between interruption rate and shift intensity, as measured by the time taken for the emergency physician to assess the patient since registration.[17]

In 2002, Coiera and Tombs,[1] Coiera et al[11,18,19] produced a method to measure communication patterns, based on previous research in the clinical environment. The method, known as the communication observation method, provides a validated observational method in which to measure the communication load of different health care staff.[19] The communication observation method consists of the following components: subject observation, audio transcripts and field notes, events identified within the transcripts, coding event description, and analysis. Before and after the observation periods, the nurses are asked to clarify their role and any incomplete information arising during the observations, respectively.[19]

The primary aims of the present study were to use the communication observation method to investigate the communication load of the nurse in charge of the ED and to build on this method by collecting additional information that would help us to interpret the data, such as patient throughput and staffing levels.

MATERIALS AND METHODS
Study Design
This is an observational, nonexperimental study design.

Setting
The setting for this study was an inner-city hospital ED in London, UK. The ED is classified as type 1, consultant led; is open every day, all day and night; and accepts all undifferentiated receiving ambulances. It responds to 85,000 adults, 22,000 children, and 6,000 reviews (ie, reevaluation of wounds) each year. The department also has a Clinical Decisions Unit for patients who require a longer period of observation before discharge or are awaiting a time-critical diagnostic test before treatment can be given. Ethical approval was obtained from the relevant ethics committee.

Selection of Participants
A convenience sample was used to recruit the nurses because of the busyness of the department. The inclusion criteria for the research participants were those in charge of the ED who were willing to give informed consent to take part in the study and to be shadowed by the researcher for the given observation period.

Methods of Measurement and Data Collection and Processing
A lapel microphone was attached to the nurse in charge, connected to a small tape recorder, which was placed in the nurse's pocket. The researcher (R.D.) shadowed the nurse in charge for an agreed duration, taking field notes on the participants' activities. The researcher was trained in this method as follows: Before commencement of data collection, the researcher was introduced to the department by a research nurse who at the time was working on other projects. The researcher spent several hours shadowing the nurse in charge to familiarize herself with the department and departmental processes. Then, both the research and the research nurse piloted the data collection methodology to improve reliability. After this piloting phase, the researcher went on to collect the

data for this study. During data collection, the nurse in charge was able to suspend the recording at any time or to exclude information from the recordings retrospectively.

After the observations, nurses were additionally asked whether there were any unnecessary or unresolved communications and what was most annoying about this period with respect to communication. They were also asked about any potential problems (eg, with equipment, mislabeled specimens) and, as described in the communication observation method, to clarify the nature of any observed communications that were not completely clear to the observer at recording.

Outcome Measures

The following factors were studied: the frequency of communication, interruptions, and simultaneous events; the channel and purpose of communication; interaction types; unresolved communications and annoying aspects of the observed periods; and the effect of staffing and patient levels on the frequency of communication. We also recorded communication multitasking (eg, talking to someone and writing on the whiteboard) and other concurrently active tasks that did not involve communication of any form (eg, filing, handling equipment).

Primary Data Analysis

Data were collected in accordance with the Coiera et al[19] communication observation method, using their definition of an interruption: communications that were not initiated by the person being observed when having a synchronous communication. Synchronous communication is when 2 individuals exchange information at the same time, eg, on the telephone. The researcher's field notes were transcribed and were used in conjunction with the tape recording to identify individual communication events. Communication events are defined as the passing of a message from one individual to another across a communication channel. A new communication event occurs when a communication act starts in an otherwise event-free period or when, during a period of communication, there is a change in the purpose, channel, or participants in the conversation.[19] The purpose of communication, the type of communication channel, and the type of communication interaction were ascribed for each communication event.

Data were collected for the number of nursing and medical staff on duty in the ED, and this was considered in relation to the mean number of communication events to ascertain whether staffing levels had an effect on communication levels. This was examined by using the range of the mean number of communication events per minute for each observation that had the same number of staff for each profession working. Data on patient levels during the observation period were also collected. Spearman's correlations using SPSS for Windows, version 14 (SPSS, Inc., Chicago, IL) were calculated to elucidate significant associations between the staffing levels and patient levels during the observation period and the mean number of communication events observed per minute.

RESULTS
Characteristics of Study Subjects

Eleven nurses in charge of an inner-city hospital ED were observed while they conducted their daily nursing activities. The sample comprised 2 men and 9 women of varying ages, ranging from 27 to 46 years (mean 33.78 years; SD 5.65 years). Nurses' experience ranged from 4 to 11 years (mean 6.67; SD 2.11 years). Four of the nursing staff were observed more than once.

Data collection took place during a 6-month period (January to June 2005) on a typical weekday between 9 AM and 6 PM. A total of 20 hours of data were collected from 18 observational study periods of varying duration, ranging from 30 to 90 minutes. Ten recordings were carried out in the morning, commencing at times ranging from 9 AM to 10:20 AM. One recording was carried out at midday between noon and 12:30 PM. The remaining 7 recordings were carried out between 2 PM and 5:10 PM. Data collection was cancelled on one occasion (out of the 18 observation periods) because of an "urgent clinical load" (ie, the nurse in charge was too busy to be recorded). In addition, recordings were suspended a total of 7 times in 5 observation periods, 5 of which were due to nurse-in-charge breaks and 2 to confidential conversations with staff members.

We identified a total of 2,019 distinct communication events in the 20-hour period, which means that on average there were 100.9 communication events per hour, or 1.68 per minute. One thousand one hundred eighty-three (59%) were initiated by the nurse in charge, whereas the remaining 836 (41%) were classified as interruptions to correspond with the Coiera et al[11] definition, indicating that the mean interruption rate was 42 per hour. Communication multitasking was evident on 286 (14%) occasions, which was in addition to any other concurrently active tasks that did not involve communication of any form. There were 47 (2%) third-party interruptions, in which a person interrupted an ongoing communication event.

Table 1. Type of communication channel.

Type of Communication Channel	Number of Communication Events (%)
Face to face*	1,528 (76)
Telephone*	144 (7)
Computer	107 (5)
Whiteboard	104 (5)
Pager	35 (2)
Patient records	35 (2)
4-h Target	19 (1)
Tannoy (loudspeaker system)	7 (<1)
Paper source, eg, patient transport form, staff allocation sheet, booking request form, incident reporting form	40 (2)

*Synchronous communication channels.

Table 2. Purpose of communication event.

Purpose of Communication Event	Total (%)
Patient management (eg, ordering or getting test results)	961 (48)
Staff management (eg, organizing staff breaks)	362 (18)
Ward management (eg, keeping track of how many beds are available in majors)	327 (16)
Administration (eg, general information technology)	112 (5)
Equipment (eg, handling keys to the medicine cupboard)	102 (5)
Social (eg, general conversation, asking people how their weekend was)	72 (4)
Study (eg, communication events relating to the present study)	64 (3)
Education (eg, talking to staff about sending them on staff training days)	19 (1)

Table 3. Type of communication interaction.

Interaction Type	Total (%)
Number of communication events initiated by NIC	
Giving information	546 (27)
Give request	465 (23)
Instruct request	117 (6)
Number of communication events not initiated by NIC	
Receive request	428 (21)
Receiving information	380 (19)
Instruct receive	15 (1)
Not otherwise specified	
General	68 (3)

NIC, Nurse in charge.

Table 4. Interaction type.

Interaction Type	Description
Give request	A request for information by the subject, that is, the subject is asking for information
Receiving information	Receipt of information by the subject
Receive request	Receipt of a request by the subject, that is, the subject is being asked for information
Giving information	Sending information from the subject
Instruct request	A request for action by the subject
Instruct receive	Receipt of instruction for action by the subject
General	Any communication that does not relate to any of the above, eg, greeting, thanking, apologizing

A total of 9 communication channels were identified (Table 1), with 1,672 synchronous communications accounting for 83% of all communication events.

Eight distinct task communication purposes were identified (Table 2); 961 (48%) communication events were concerned with patient management.

The majority of interactions involved the nurse in charge giving information (eg, to another person, writing on the whiteboard, typing on the computer) or the nurse in charge asking a question, accounting for 546 (27%) and 465 (23%) communications, respectively (Table 3). Table 4 is a glossary of the different communication types. Of the remaining communication events, 428 (21%) involved the nurse in charge being asked a question, eg, "Is the patient in cubicle D going home?"; 380 (19%) involved the nurse in charge being given information, eg "Patient in cubicle C is going to Clinical Decisions Unit"; 117 (6%) concerned the nurse in charge instructing an individual to perform a task, eg, "Can you please keep an eye on blood pressure for the patient in cubicle E"; 68 (3%) involved "general" synchronous communication, eg, "hello"; and, last, only 15 (1%) involved the nurse in charge being instructed to perform a specific duty by another person, eg, "Can you please give these keys to the occupational therapists when you see them."

Postobservation interviews were collected for 17 of the 18 recordings, some of which were incomplete because of the busyness of the ED. Eleven nurses stated that there had been no unnecessary communication events during the recording. Four nurses said that there had been unnecessary communication events, though none of them elaborated on this any further because of the limited time they had to answer the questions. Of the remaining 2 nurses, one did not answer the question and the other was unable to answer the question because the ED became too busy.

For unresolved communication events, 11 nurses reported that there had not been any (the remaining 6 nurses did not provide a response). However, from this subgroup the field notes and recording provide evidence that there were in fact 3 unresolved communication events. For example, the nurse in charge was explaining to nurse A whether those patients in majors (who would soon breach the national 4-hour target policy) would be discharged or admitted. The nurse in charge told the nurse that there were 3 beds on Clinical Decisions Unit. The nurse in charge was then interrupted by nurse B, who informed her that he had patient X's notes and asked whether the nurse in charge wanted the patient's notes. The nurse in charge told nurse B that patient X had gone to the Clinical Decisions Unit and asked him to take the patient notes there. The nurse in charge did not go back to the previous conversation with nurse A (for the duration of the recording) about the patients who were about to breach the 4-hour target in majors.

The most common response concerning what was most annoying about these data was that they had "too may things to deal with at once." Of 8 nurses who reported this, 4 gave specific examples, such as "talking to a member of staff whilst on the phone at the same time" or "having to deal with 2 phone calls at once." A further 4 nurses reported occasional problems such as ". . . problems with trying to sort out an account cab to take a patient to another hospital" and ". . . having to wait for the porter to take a patient to the ward [the patient was getting irate]." Two nurses stated that there was nothing annoying (ie, no more than usual) about the recording period with respect to communication.

See Table 5 for staffing levels. There was no relationship between the number of consultants/attending physicians on duty and the mean number of communication events observed per minute ($r_{17}=-0.248$, nonsignificant) or between the number of registrars/residents on duty and the mean number of communication events observed ($r_{17}=0.167$, nonsignificant). However, there was a slight relationship between the junior

Table 5. The range of communication events per minute for the different numbers of medical and nursing staff on duty.

Number of Staff on Duty	Number of Observations	Range of No. of Communication Events/min
Consultants/attending physicians		
2	2	1.78–1.85
3	6	1.64–2.18
4	5	1.23–1.96
5	5	1.32–2.12
Registrars/residents		
2	10	1.23–1.96
3	1	1.6
4	7	1.51–2.18
SHOs/interns		
2	1	1.23
3	3	1.32–1.96
4	4	1.24–1.85
5	2	1.73–2.18
6	2	1.51–1.78
7	1	2.12
8	3	1.64–1.96
11	1	1.89
Nurses		
10	1	2.12
11	1	1.96
12	5	1.23–2.18
13	7	1.51–1.96
14	1	1.32
15	1	1.24
17	2	1.56–1.85

SHO, Senior house officers.

medical staff working during the observation period and the mean number of communication events observed: $r_{17}=0.526$; $P<.05$. Furthermore, there was a negative relationship between the number of nurses on duty and the mean number of communication events observed ($r_{16}=-0.569$; $P<.025$), indicating that the more nurses on duty, the fewer mean communication events observed for the nurse in charge.

Table 6 displays the total number of patients in the ED during the data collection period and the mean number of communication events per minute. The number of patients who left the department during the observation period is also included, along with those who arrived after the observation commenced and those who were already in the department at the start of the observation period.

A Spearman's correlation revealed a moderate relationship between the number of patients in the department and number of communication events ($r_{17}=0.627$; $P<.01$).

Further correlations were conducted to explore whether there was a relationship between the number of patients who left the department during the observation period and the mean number of communication events observed. The results revealed no significant relationships ($r_{17}=0.124$, nonsignificant).

LIMITATIONS

Because of the pivotal role of the nurse in charge in ensuring the smooth and efficient running of the ED, the present study investigated the communication load, and to some extent the cognitive load, of this particular staff group. However, a limitation of this study is that the results cannot be generalized to other clinical staff groups (such as junior physicians or middle-grade physicians or even other registered nurses) in the ED. Although this was not the aim of the present study, it would be useful to collect such data, particularly if there is an association in terms of communication loads. In addition, the nurse in charge was not observed in the evenings or at the weekends. Future research could focus on this to delineate at what points (in general) the nurse in charge is busiest in terms of "communication load," and interventions may be designed to attempt to reduce this problem.

A further limitation is that one of the observation periods was changed because of the workload at the time in the department, which could have affected the analyses. Additional limitations include the sample size, incomplete interview data, and our assumption that the staff who were allocated for duty in the department were actually present during the observation periods.

DISCUSSION

Our study showed that the nurses in charge of the ED had to deal with high levels of information exchange as part of their daily working activities, with a new communication event occurring on average every 0.59 minute (36 seconds), or 1.68 communication events every minute. This equates to 100 communication events per hour and is greater than that previously reported, eg, 36.5 events per hour.[11]

In accordance with previous research,[11,14] staff members in the ED seem to favor synchronous communication channels (eg, face-to-face talking, telephone) when talking to the nurse in charge, as opposed to asynchronous communication channels (eg, whiteboard), with this accounting for 83% (N=1,672) of all communication events. On 836 (41%) occasions, synchronous communication was initiated by someone other than the nurse in charge, which is similar to the Coiera et al[11] findings that interruptions in ED health care staff accounted for 30.6% (N=393) of all observed communication events. In addition, third-party interruptions accounted for 2% (N=47) of all communication events.

According to our results, we believe that the number of times in which the nurse in charge was interrupted could pose salient implications for the effective communication. If the nurse in charge is distracted from what he or she is doing (eg, writing on the whiteboard), it may disrupt the thought process, which in turn could have adverse effects on the quality and completeness of the previous intended message. In this study, interruptions were defined as *any* communication event not initiated by the index party. These communications may, of course, still have been important, and further work is required to classify the types of interrupting communications and consider what proportion is warranted and which might be considered

Table 6. Patient levels during the observation periods.

Date of Observation	Number of Patients Who Arrived During the Observation Period	Number of Patients Already in the Department When the Observation Commenced	Total No. of Patients Present or Arriving	Number of Patients Who Left the Department	Total Number of Patients in the ED at Observations	No. of Communication Events/min (Total Communication Events Observed÷Duration of Observation)
25/02/2005	11	15	26	3	23	2.18
09/06/2005	20	25	45	18	27	2.12
20/06/2005	33	19	52	17	35	1.96
22/06/2005	13	44	57	17	30	1.96
22/03/2005	17	25	42	12	30	1.91
02/03/2005	11	31	42	13	29	1.89
21/06/2005	13	19	32	7	25	1.85
01/06/2005	28	11	39	19	20	1.78
02/06/2005	20	18	38	14	24	1.73
31/03/2005	19	10	29	8	21	1.73
18/02/2005	6	27	33	11	22	1.64
12/04/2005	14	6	20	3	17	1.63
03/03/2005	5	22	27	7	20	1.60
15/06/2005	28	11	39	14	25	1.56
24/01/2005	15	29	44	15	29	1.51
12/05/2005	13	10	23	12	11	1.32
23/06/2005	23	14	37	16	21	1.24
14/06/2005	17	8	25	12	13	1.23

unwarranted. The correlations suggest that it is the presence of more junior physicians and a higher volume of patients that are associated with more communication events, whereas having more nurses on duty has the opposite association. It could be that other nurses in the department are able to protect the nurse in charge from a higher volume of communication.

In addition, communication multitasking (ie, the nurse in charge conducting 2 communication events simultaneously) was observed on 286 (14%) occasions. This, together with other concurrently active tasks that the nurse in charge was involved in, could be a serious threat to the effective communication between the nurse in charge and health care staff. This view is based on research that suggests that several concurrent tasks may disrupt memory because the number of items that can be held in working memory is small.[15]

In Retrospect

In retrospect, if we were given the opportunity to repeat the study, we would have conducted some of the data collection and subsequent analysis differently. For example, though observing the nurse in charge was a fairly straightforward process, the additional data on staffing and patient levels were collected retrospectively. We would collect these data at the recordings to avoid missing data relating to staff rota sheets. We would also collect data at other periods, such as weekends and evenings. In addition, we would establish from the nurse in charge's perspective which communication events were essential and which were irrelevant or unnecessary. Furthermore, it would be useful to explore the nurse in charge's opinion about what aspects of the communication or tasks other ED staff could have dealt with. This information could be then used to produce

recommendations on how to reduce the communication load and hence cognitive load for the nurse in charge.

There is a significant need to reduce the sheer volume of communication load that the nurse in charge has to deal with daily. This notion and the related stress experienced were reiterated when we reported the findings to the senior nurses in the ED. They were surprised that there were not more communication events related to telephone calls, which was one aspect that they would like to see modified to include some sort of filter so that only essential calls come through to them. Future research could investigate the following: potential methods in which communication, particularly synchronous communication, can be reduced for the nurse in charge; and specific strategies to lower the number of times that the nurse in charge is interrupted. We believe that the efforts and resources to undertake such work would be modest in comparison to the benefits that the findings could have to patients, health professionals, and the health system as a whole.

In summary, we found a very high level of communication events for the nurse in charge in an inner-city ED in London, of which 41% were initiated by someone else and 14% were communication multitasks. Staff mostly used synchronous types of communication, with the majority relating to patient management. There was a slight relationship between junior medical staff and the level of communication with the nurse in charge and a moderate relationship between the total number of patients in the ED and communication load. We found a negative relationship between the number of nurses on duty and communication levels concerning the nurse in charge, suggesting that other nurses may take some of the

communication load from the nurse in charge. Effective communication is important in patient care and plays an essential part of teamwork and patient safety. Improving communication between health care staff by reducing the levels of interruptions and minimizing the volume of irrelevant or unnecessary information exchange could therefore have important implications for patient safety.

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