Communication Behaviours in a Hospital Setting: An Observational Study

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synchronous and asynchronous communication, ethnography, informal communication, collaboration

Objective: This paper reports an exploratory study to identify patterns of communication behaviour amongst hospital-based healthcare workers.

Design: Non-participatory, qualitative observational study.

Setting: UK district general hospital.

Subjects: Eight physicians and two nurses.

Results: Communication behaviours resulted in an interruptive work place, which appeared to contribute to work practice inefficiency. Medical staff generated twice as many interruptions via the telephone and paging system as they received. Hypothesised causes for this level of interruption include a bias by staff to interruptive communication methods, a tendency to seek information from colleagues in preference to printed materials, and poor information provision in support of role-based contact. Staff was also observed to infer the intention of messages based upon insufficient information and clinical teams demonstrated complex communication patterns, which could lead to inefficiency.

Conclusion: The results suggest a number of improvements to processes or technologies. Staff may need instruction in appropriate use of communication facilities. Further, excessive emphasis on information technology may be misguided since much may be gained by supporting information exchange through communication technology. Voicemail and e-mail with acknowledgement, mobile communication, improved support for role-based contact, message screening all may be beneficial in the hospital environment.

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INTRODUCTION

The health care system appears to suffer enormous inefficiencies because of poor communication infrastructure and practices. One estimate suggested that the US health system could save $30 billion per annum with improved telecommunications.[1] A retrospective Australian survey of hospital admissions found that communication problems were the most common cause of preventable disability or death, and were nearly twice as common as those due to inadequate medical skill[2].

Yet despite this evidence, there has been little examination of the communication systems within health care. What recent work has been done, mainly in the promotion of Telemedicine, is driven largely by technology rather than an understanding of clinical needs.[3] Given the paucity of existing information, this paper reports on an exploratory study of communication patterns in a hospital setting.

METHODS

Setting: The study was conducted between March 3 and June 22 1995 at Frenchay Trust Hospital in Bristol, UK. Frenchay Trust is a 500-bed teaching hospital. Medical staff was equipped with radio-pagers and several telephones were available in wards. Staff did not routinely carry mobile telephones.

Data Collection: A non-participatory and qualitative observational study was conducted.[4,5,6] Observations were made of eight physicians from the General Medicine Department, varying from junior House Officer to senior Consultant, and two nurses from the Medical wards, while they carried out their routine duties. Subjects volunteered to participate in the study after a description of the study method was circulated.

Subjects were shadowed between two and four hours by one of three researchers during the morning or afternoon of a normal weekday. A total of 29 hours and 40 minutes of activity was

observed. Researchers kept a log of events and event descriptions. Subjects carried a small

radio-microphone that recorded their speech and could suspend recording, or retrospectively

exclude recorded material. Two subjects elected to suspend observation, one to permit a

confidential discussion with a patient, and the other for a private telephone call. Observations

were followed by interviews with subjects to obtain clarification of observed events.

RESULTS

A total of 96 call events involving the attempted use of the telephone or paging system was

identified in the data, giving a frequency of 1 event every 18.5 minutes, with a range amongst

subjects from 0 to 1 event every 9.1 minutes (Table 1). The frequency amongst the 5 'busiest'

subjects was 1 event every 11.6 minutes. Sequences of face to face conversation were harder to

uniquely identify and were not recorded with the call events, but captured within the qualitative

data.

An individual was reached in 74% of call events. 33% of 56 observed attempts to make a phone

call failed, usually because the line was busy. There is reason to suspect that the observers

influenced staff behaviour, and that the true connection rate is lower. For example, while 100%

of observed staff answered their pagers (21 events), only 33% of nine unobserved pages were

answered.

In 91 of the 96 events, we were able to identify the role of both the caller and receiver, including

non-observed call participants. Pooling these data produced a wider picture of the

communication traffic between different groups in the hospital (Figure 1). However, since only

two nurses were studied, the traffic between nurses and non-medical staff is undersampled, and

should not be compared directly with the other data.

- Senior consultant physicians were involved in almost no call events (one from 96). While junior medical staff bore the brunt of call events, nursing staff made a similar number of outgoing calls.

- There is a well-recognised flow of communication events from nursing to medical staff [7,8] and this was also observed in these data, with 16 of 20 events between nursing and medical staff initiated by nursing staff.

- While it is recognised that medical staff receives many paging interruptions [7,8], our data showed that medical subjects generated about twice as many outgoing events (43) as they received (23). Overall, subjects generated 65 events and received 31, indicating that medical and nursing staff are net generators of communication traffic in the hospital. Outgoing calls from all medical staff were directed to booking investigations (19), to other medical staff (15), and to medical secretaries and administrative staff (11).

- 42% of call traffic for medical staff thus came from their medical colleagues. The conversations ranged from requests for specific patient details, to questions of diagnosis and therapy. While some information was obtained from formal sources like patient notes or laboratory results, in this study textbooks, journals or other publications were not consulted at all.

- It often required a series of calls to book an investigation. For example, subject five, a senior medical registrar, made eight phone calls (three failed to connect) and one page over 54 minutes to arrange one CT scan. Subject eight, a nurse, made two pages (both unanswered) to medical staff and two phone calls to a clinic over 12 minutes in an unsuccessful attempt to organise an endoscopy. Such sequences usually involved the caller following a trail of telephone numbers, reflecting in part the decentralised organisation of some departments.

Subject five had to speak to a variety of radiology administrative staff, radiographers and radiologists before he could complete the CT scan booking.

- All six calls to the switchboard, and most of the 19 calls to secretaries and administrative staff were seeking contact information for individuals in roles (eg. the cardiac surgeon on-call). Some subjects were unsure about which role could assist them with a task, e.g. "who do I call to arrange a venogram?". One specialist nurse who dealt exclusively with elderly patients was repeatedly paged in error to see patients outside her responsibility. The hospital's phone directory was partly structured around roles, but gave no indication of what tasks or responsibilities were associated with a role.

Most subjects generated and received multiple interruptions, either face-to-face, or through call events. In the post-observation interviews, subjects rarely considered the effect a phone call or page would have on the other party. Their actions could thus be characterised as habitual and 'selfish', in that they valued completion of their own tasks over their colleagues' tasks. Some experienced staff was the exception.

When interviewed, some medical subjects indicated that they assessed the urgency of a page by the number of times they were called and call origin. For example, a page from their home ward suggested to some that nursing staff were calling with minor tasks, and they would not reply unless paged twice in succession which would indicate urgency. Similarly, failure to get a reply to a page within a short period was often taken to mean that no answer was coming, with the caller moving on to another ward.

Our data also contained examples of inefficiencies with team communication. For example, a senior consultant tried to transfer a patient to another's team by delegating the request, involving at least two intermediaries. By the time the second consultant received the message, it was substantially distorted and had the potential to endanger the patient. Problems were also

observed with co-operative tasks when team members were geographically separated. In one example, a medical house officer and senior house officer were separated and duplicated an order for a portable X-ray because they were unaware of each other's actions. The radiographer consolidated the two requests after calling for clarification.

DISCUSSION

The study results should be understood within the limitations of the methodology adopted. Firstly the study was observational, so the resulting qualitative descriptions may not have statistical significance. Further, only a small cross-section of hospital workers was studied, and different results might come from another population. Finally, it is likely that subjects altered their behaviour because of the presence of observers.

High use of synchronous communication methods: During the study, staff seemed to almost favour interruptive communication mechanisms such as face-to-face discussion, paging or the telephone, rather than using less interruptive methods. Some nursing staff did write down tasks for doctors at the ward desk in preference to paging them, but this was infrequent. There are well known psychological costs associated with interruption, leading to diversion of attention, forgetfulness and errors [9, 10,11.] Further, interruption often requires rescheduling of work plans. The interrupt-driven nature of the hospital work environment thus has the potential to generate extra costs in staff time and efficiency, although there was no evidence in this study that patient outcomes were adversely affected.

Interruption is related to the type of communication method chosen. Synchronous communication occurs when two individuals participate in a conversation at the same time, for example using the telephone. Asynchronous communication occurs when the exchange does not require both to be active participants at the same time, for example exchanging a series of letters. It is a characteristic of synchronous communication that a request to speak creates an

interruption, but with an asynchronous message the receiver chooses the moment to check or reply to the message. Why did subjects not use less interruptive asynchronous methods whenever possible? Several explanations for a bias to synchronous communication seem plausible:

- The study hospital, like many at present, did not provide asynchronous channels such as voicemail or e-mail [12], thus biasing choice towards synchronous mechanisms.

- There seemed to be a need in such an event-driven environment to deal with tasks as they arose. For a communication task to be 'ticked off the list', subjects seemed to want an immediate acknowledgment of message receipt. Acknowledgment was possible with synchronous channels but not with the available asynchronous channels.

- Most subjects did not seem to reason about the consequences of their communication actions, their use of resources, or alternative approaches.

There is a preference for information access through conversation: The high call traffic observed between medical staff (42%) is in accord with a previous study of office-based clinicians, in which about 50% of information came from colleagues, 26% from personal notes, and 12% from laboratory data [13]. Further support comes from studies of computer users, who preferentially consulted local 'experts' for guidance in preference to printed manuals [14,15].

The reliance of subjects upon discussion to resolve information needs has suggested to others that this is in response to poor printed or computer-based information sources [13]. Another hypothesis is that communication is actually the preferred mechanism for information gathering. Clinical problems are often poorly defined, and clarification can be obtained through conversation. Thus, medical staff may opportunistically interrupt each other because face-to-face discussion is highly valued but difficult to schedule, and any opportunity is avidly seized.

Role-based contact: A quarter of call events were associated with identifying the name of an individual occupying a specific role, suggesting that poor support for identifying role occupants contributes significantly to the overall call traffic. The long sequences of information seeking calls we observed (eg subject five's string of nine contacts to organise a CT scan) could have been shortened if information about roles and contactability was more accessible.

Communication policies are often unsound: Some subjects had clear policies about the way they managed their communication, for example to decide whether a page would be answered. Such inferences about the intention of caller or receiver were unsound on a number of grounds. Firstly, the assessment of urgency by doctors and nurses is likely to be different. Situations judged to be non-urgent by nurses have been shown to require as much medical assessment as ones deemed urgent [17]. Secondly, these paging policies were based on minimal information that could not support robust conclusions about the call originator or receiver, their level of busyness, or their intention. Since the paging system was the main channel for calls between medical and nursing staff, this is likely to be a problem area for communication.

Further Research: Our results are based upon a small study and there is an immediate need to accurately characterise the size and form of different communication flows, including face to face conversations. For example, while past analyses of paging behaviour focussed on the incoming burden created for doctors [7,8], our data suggest that doctors and nurses are net generators of traffic. Secondly, we have suggested that communication traffic is apparently higher than necessary, resulting in an interrupt-driven work environment. Our hypotheses about the causes of these interruptions need to be tested, and in particular we need quantitative analyses to identify if the suspected negative consequences are actually having a substantial impact either on clinical workers or on patient care.

This study also suggests that much is to be gained by supporting information exchange through communication. While informatics almost exclusively emphasises computer information systems, the phone is a part of a human information system, and it may often be preferred because it is better suited to many clinical tasks and settings than computer-based solutions. The implications of this change in emphasis for the form and role of the electronic medical record are significant.

Some of the identified communication problems suggest ways of improving existing processes or introducing technological solutions to support the process of care:

- Firstly, there seems to be a need for individual workers to consider consciously the effects of their communication behaviour on their own efficiency and effectiveness, as well as on others.

- Health care workers were highly mobile during their working day. The mobility of staff and the difficulty contacting these 'moving targets' suggest that support for mobility through the use of wireless technology (e.g. cellular telephones) might be beneficial [20].

- Early attempts to introduce message boards in an effort to reduce paging traffic have failed [18]. They required medical staff to travel to central boards, and nursing staff did not have any feedback about when messages were likely to be read or acted upon. Providing messaging facilities such as voicemail and e-mail might succeed in decreasing the reliance on synchronous channels, partly because they can be accessed wherever staff is working [19]. However, the study suggests such messaging services may need to provide acknowledgment to reassure staff that messages have been acted upon.

- Many of the communications observed were to roles rather than named individuals. A role-based 'yellow pages' database can dynamically associate roles with people as assignments

change, and be easily accessed on a computer network to reduce information seeking effort and errors. [21].

- Recipients of calls in our study had no information to meaningfully screen calls. However, information such as caller identity, perceived urgency of task, and nature of task can be attached to e-mail and voicemail, and these features may provide added incentive to their routine adoption. Currently there is no means by which the recipient of a call can 'pre-publish' their availability to help prospective callers, but such systems are technologically feasible [21].

- Supporting collaboration amongst geographically separated team members to communicate the state of individual tasks may reduce duplication of effort and communication costs e.g. mobile computers could allow teams to work from a common task list.

Contributors

Enrico Coiera initiated the study into clinical communication behaviour, co-designed the study protocol, participated in data collection, analysed 5 subjects in depth, collated and analysed the quantitative call event data, formulated the hypotheses for synchronous bias and information seeking, analysed policy usage and role-based contact, and wrote the paper. Vanessa Tombs co-designed the study protocol, participated in data collection, analysed 5 subjects in depth, analysed team communication patterns, participated extensively in the overall qualitative data analysis and contributed to the paper.

Guarantor: Enrico Coiera

Conflict of Interest: Hewlett-Packard is a manufacturer of computer equipment and medical devices.

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List of Tables:

Table 1: Call events categorised by subject, call type and ordered by total frequency. Number of successful connections are shown in parenthesis. Key: C = consultant physician, HO = house officer, SHO = senior house officer, SR = senior medical registrar, N = nurse.

Subject	Role	Sent page	Received page	Made call	Received call	Duration (hr:mm)	Total Events
7	C	0	0	0	0	2:55	0
2	HO	0	0	0	0	2:59	0
1	C	0	0	1 (1)	0	3:15	1 (1)
6	SR	0	0	2 (2)	0	2:05	2 (2)
9	HO	3 (0)	3 (3)	6 (6)	0	2:41	12 (9)
8	N	4 (2)	0	4 (4)	5 (5)	2:09	13 (11)
10	HO	0	2 (2)	11 (10)	0	2:55	13 (12)
5	SR	0	4 (4)	10 (7)	0	3:39	14 (11)
3	N	1 (0)	2 (2)	13 (4)	1 (1)	3:23	17 (7)
4	SHO	1 (1)	10 (10)	9 (3)	4 (4)	3:39	24 (18)
Total		9 (3)	21 (21)	56 (37)	10 (10)	29:40	96 (71)
Connect rate		33%	100%	66%	100%		74%

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Figure 1: Communication traffic based upon call events between different groups in the study hospital, including non-observed call participants. Key: D = doctors, N = nurses, Ix = investigatory facilities eg radiology, endoscopy, S = switchboard, A = administrative and secretarial staff.

Ix

19   3

15   D   4   N   1

16

5   1

S

11   8

2   3

A