PROCESS DESIGN FOR MULTIDISCIPLINARY PATIENT CARE MEETINGS: CONSIDERING THE HUMAN FACTOR

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Abstract: This paper describes a study of content and communication processes in multidisciplinary meetings of healthcare professionals, using a Human Factors engineering approach. The goal of the study, which took place in a teaching hospital in Toronto, Canada, was to understand the processes of collaboration and information exchange that take place in the meetings, and to identify potential supports for the meetings, including the use of information technology. The methodology included data collection through observation of the multidisciplinary patient care meetings, and quantitative analysis of verbal exchanges in those meetings. The results suggested the need for a standardized approach to information exchange using structured language.

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1. INTRODUCTION

There is a growing awareness of the value of Human Factors and systems engineering approaches to improved patient safety (e.g., Battles, 2006), through design for quality and safety (Reid et al., 2005). Given the complexity of organizational structures and processes within healthcare, methodical approaches and associated frameworks should be particularly useful. There are a number of Human Factors frameworks for analyzing organizational reliability, including the Input – Transformation - Output model (Karsh et al., 2006), the Structure-Process-Quality model (Donabedian, 1988), and the Systems Engineering Initiative for Patient Safety (SEIPS) (Carayon et al., 2006). In addition, using cognitive task analysis and other methodologies, Human Factors analysis can model workflows and assist in implementing process improvements that consider human capabilities and limitations (Alvarado et al., 2004), including the understanding of patterns of communication and the identification of user requirements prior to the implementation of information technology.

Interprofessional collaboration has been promoted as a way to address the unacceptably high rate of errors in patient care (Corrigan et al., 2000). In our research we have identified communication processes and information flows between healthcare professionals as a particularly promising area for ergonomic analysis. This paper describes a study designed to model and analyse the communication patterns between physicians and nurses in a multidisciplinary healthcare setting.

2. THE CONTEXT

The focus of the research is on the information exchange processes that occur in Bullet Rounds in General Internal Medicine (GIM) at an urban teaching hospital in Toronto, Canada. Bullet Rounds are multi/interdisciplinary collaborative group meetings of health care personnel engaged in patient care. They take place four mornings a week and are attended by all or a subset of physicians (staff doctor, residents, and medical students), nurse managers (in charge of administration, ensuring staffing levels are appropriate, general management of wards), charge nurse(s), emergency nurse (occasional), Occupational Therapists, Physical Therapists, Dietician (occasional), Social Workers, Pharmacist, and Speech/Language Therapist (occasional). The purpose of the meetings is to establish a treatment program and discharge plan for the patients in GIM, with a focus on quality of care (including error reduction) and efficiency. The challenges surrounding such meetings include differing professional perspectives and training, lack of consistent processes, and a constantly changing environment.

3. TASK ANALYSIS AND MODELING

The initial phase of the Study involved documentation of qualitative data collected during bullet rounds. The first author attended Bullet Rounds meetings as a non-participant observer and took extensive notes. Observations of 20 meetings over the course of 3 months in 2005 took place, for an approximate total of 30 hours of observation. For each rotation approximately 15 physicians participate in Bullet Rounds: during the observational phase the
The Field Notes were used to construct structural and process models of Bullet Rounds, which were validated by domain experts in interviews. The goal of the models was to assist in the development of ergonomic guidelines and design recommendations.

1.1. Models

![Figure 1: Bullet Rounds Work System Environment](image)

Figure 1 models the Bullet Rounds “work system” structure (Carayon et al., 2005). The patient is the centre of the Bullet Rounds system, surrounded by the participant discipline, each of which has its own work system that they bring to Bullet Rounds. The model shows that Bullet Rounds are not independent: they are situated in the organizational (hospital) work system and must interact with other work systems within the hospital, as well as reach out beyond the hospital and interact with community work systems.

Figure 2 (shown in the Appendix) is a model of the process of patient care and traces the flow of a patient through the hospital. In circle A the patient is admitted, generally through the Emergency department. Once admitted the patient becomes part of the Bullet Rounds work system. The patient will come in contact with many different work systems in a complicated, non-linear process with multiple loops and handoffs. The Bullet Rounds work system interacts with in-Hospital services for patient care (circle B), and with services both inside and outside the hospital to achieve discharge (circle C). The model illustrates the complexity of the interaction of work systems that contribute to patient care and that must be taken into account when considering interventions into the process.

3. ANALYSIS OF FIELD NOTES

Using the IOM medical error categorization taxonomy (Corrigan, 2000) the Field Notes were analysed for actual or potential errors. Dialogue about individual patients was reviewed and allocated to an error category as appropriate, which provided a preliminary idea of potential issues. The errors identified reside mainly in the categories of “Inadequate monitoring or follow-up of treatment” and “Failure of Communication”.

<table>
<thead>
<tr>
<th>IOM Error Category</th>
<th>Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Diagnostic</td>
<td>a. Error/delay in diagnosis</td>
</tr>
<tr>
<td></td>
<td>b. Failure to employ indicated tests</td>
</tr>
<tr>
<td>2. Treatment</td>
<td>a. Processing the order (medication)</td>
</tr>
<tr>
<td></td>
<td>b. Medication administration uncertainty</td>
</tr>
<tr>
<td></td>
<td>c. Avoidable delay in treatment or in responding to an abnormal test</td>
</tr>
<tr>
<td>3. Preventive</td>
<td>a. Inadequate monitoring or follow-up of treatment</td>
</tr>
<tr>
<td>4. Failure of Communication</td>
<td></td>
</tr>
</tbody>
</table>

The following are examples of each of the error categories that were observed in Bullet Rounds.

1a. Physician questions how the diagnosis of Parkinson’s got into patient’s chart. Physician present did not make that diagnosis

1b. A physician points out there is a patient waiting to go home. Tests were ordered Tuesday night (it’s now Friday) and it will not happen at the weekend, causing delay in discharge that could have been avoided

2a. A physician discovers the patient is not getting the medication she ordered

2b. A physician asks if there is a standing order for morphine. There is, but no one is sure if the patient has been getting it every 8 hours or not

2c. A cancer patient needs chemo. No one knows if they went for it or not, there is no note to say they did

3a. A patient is taken to radiation but left there, no one on the team knows if it happened or not

4. It is not clear from binder notes what has been done

A second analysis was then done in order to understand the information flow in Bullet Rounds. An adapted version of the Team Observation Protocol (TOP) taxonomy was used to analyse the content of Bullet Rounds meetings from several
perspectives: the types of statements made by speakers, which group speaks the most and what they speak about, along with the main types of information shared and by whom. There are seven categories of statement in TOP: they are Client, Team, Questions, Information, Interpretation, Alternatives, and Decisions. TOP was chosen as the categorisation tool because it has been used to analyse conversations that took place in multidisciplinary team meetings in the Health Care Field (Gibbons, 1999).

The Field Notes were organized into discrete pieces of verbal exchange (speech fragments) by each person to allow coding, which was then carried out on each statement (text fragment). The statements were coded according to TOP categories, and counts per category taken. For example, the excerpt below from Bullet Rounds comprises three statements which were coded as Information/Question, Information, and Information, respectively.

1. Dr: Congestive heart failure, failed discharge. Need family meeting. Leave at Nursing home? Need to treat with diuretics?
2. N: Has low hemoglobin
3. Dr: "I wasn’t told that at all – no-one told me that”.

The information category was the most frequent, and was broken down into subcategories: Patient Status, Outside Bullet Rounds, Instructions, Process Related. Frequencies were calculated for each subcategory.

The results in Table 2 below show that most statements fall into the information category, which also contains numerous examples of missing information. This is related to the next most frequent category, questions, which are often requests for more information. Physicians and nurses have by far the highest level of participation in Bullet Rounds. Physicians talk mostly about information from outside Bullet Rounds (such as specialist reports, test results etc) to provide additional information required by the team but are fairly evenly spread over all the subcategories while nurses talk mainly about patient status. These specifics must be taken into account as background in the design of any supporting information technology.

<table>
<thead>
<tr>
<th>Statement Types</th>
<th>Information – 63%</th>
<th>Includes many instances of missing information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participation at Bullet Rounds</td>
<td>Questions – 26%</td>
<td>Physicians – 58%</td>
</tr>
<tr>
<td>Information Types</td>
<td>Physicians - #1 is Outside Bullet Rounds but more evenly spread between all categories</td>
<td>Nurses - #1 is Patient Status</td>
</tr>
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4. DISCUSSION

The purpose of Bullet Rounds meetings is to update the patient discharge plan, and the analysis of the content of Bullet Rounds has shown that information is the key requirement for this process. However, the analysis has also shown that required information is often missing, giving rise to additional questions, answers to which must often be sought outside of the meetings. Patient status information is central to the Bullet Rounds process, and nurses are the main providers of this information.

The flow of patient status information provided by nursing is circular, in that it cycles in and out of Bullet Rounds.

Figure 3: Nursing Information Flow into and out of Bullet Rounds

Figure 3 models the flow of information from a nursing perspective into and out of Bullet Rounds. In circle A the floor nurse writes notes on patient status and care, which are then taken to Shift Change Rounds (link #1). Shift Change Rounds, circle B, are nursing meetings at which the night floor nurses report on the patients to the day floor nurses: this is most often done via taped reports and the day staff have not necessarily seen the patients at this point of their shift. During report, notes on patient status and care are exchanged and written into the Kardex Binder, the binder used by nursing to record care, for the floor nurses, and the Shift Notes Binder for the Charge Nurse, who takes them to Bullet Rounds (link 2). In circle C the notes on patient status and care in the Shift Notes Binder are shared by the Charge Nurse at Bullet Rounds. The instructions for patient care for the floor nurse which are a result of the discussion in Bullet Rounds are written into the Kardex Binder (link 3). This process of information transfer contains multiple handoffs and portions that are non-synchronous, conditions which may promote error (Corrigan et al. 2000). In addition, while the flow of information from Bullet Rounds is used to plan patient care for the day there is currently no inclusion of what information must be provided for the next day’s Bullet Rounds meeting. The information provided may not therefore correspond to physician needs.
To counteract this information gap, it may be helpful for nursing to know what information is/will be required by the physicians. During Bullet Rounds observations there was no evidence of this type of discussion. There are a number of factors that contribute to this: one is that the meetings do not have any particular structure and there is no consistent approach to how information is shared. There is a computer system into which doctors enter orders outside of Bullet Rounds, which links into the pharmacy system. However, paper based records are used as the basis for discussion in current bullet round meetings. Each discipline uses a different type of notes with no consistent format: nurses bring freehand shift notes whose purpose is to provide patient updates from the night before; doctors have their personal notes and other groups have patient lists, on which they write their own notes. In addition, communication is hampered by noise, illegible writing and language issues.

The provision of the appropriate information to the right person in a timely manner is important, and analysis of Bullet Rounds statements shows that doctors and nurses are the prime communicators in Bullet Rounds. However, the communication styles of nurses and physicians are very different: physicians have a problem-solving action-oriented approach, while nurses are trained to describe and narrate and not to make diagnoses. Human Factors approaches to error reduction have emphasized the importance of shared situation awareness (Endsley, 2000) and mental models so that people working in teams are working from a common understanding of what is happening, especially in complex, high risk environments (Haig et al. 2006, Leonard et al. 2004). To bridge communication gaps Human Factors research has emphasized the use of standardized and structured language and processes such as the SBAR framework (Situation, Background, Assessment, and Recommendation). SBAR starts with the essential point or Situation; Background refers to what is known about the context and objective data of how we arrived at the Situation; Assessment refers to an assessment of where we are, and Recommendation to what needs to be done and when, and what success looks like. Structured communication approaches have been used successfully in aviation and the military to reduce errors, and are now being applied to health care because it is also a high stakes error prone environment where the unexpected happens quite regularly. It has for example been used in healthcare contexts such as Operating Rooms, and Rehabilitation settings (Leonard et al. 2004, Guise et al. 2006). This structure may be helpful in Bullet Rounds to prompt the identification of information that will be required for the next day and reduce information gaps. The ability to anticipate required information would be a valuable tool in reducing the necessity for follow up outside of the Bullet Rounds meetings.

6. CONCLUSIONS

In this study, information exchange was a dominant activity in bullet rounds, accounting for around half of all communications. Problems arose in synchronous information exchange, as they often will in multidisciplinary collaboration, because participants had different needs and perspectives. Thus methods are needed to make information exchange more structured and more effective so that differences in communication do not undermine the communication process. The required methods and interventions need to be efficient and straightforward, so that they can accommodate the speed at which bullet round meetings take place.

Since nurses play a central organizing and communication role in Bullet Rounds, while physicians retain a decision making capacity, it is important that communications from nurses to physicians be structured in such a way that not only is the current condition of the patient and her care described, but also decision making is facilitated. In order to address these issues, we propose the development of collaborative technologies that will help to structure the communication processes between doctors and nurses. In particular, it is recommended that the SBAR approach be used as the starting point for developing the required collaborative technology.

7. ACKNOWLEDGMENTS

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Figure 2: The Process of Patient Care