Failures in communication and information transfer across the surgical care pathway: interview study

Kamal Nagpal, Sonal Arora, Amit Vats, Helen W Wong, Nick Sevdalis, Charles Vincent, Krishna Moorthy

ABSTRACT

Background and Objectives: Effective communication is imperative to safe surgical practice. Previous studies have typically focused upon the operating theatre. This study aimed to explore the communication and information transfer failures across the entire surgical care pathway.

Methods: Using a qualitative approach, semi-structured interviews were conducted with 18 members of the multidisciplinary team (seven surgeons, five anaesthetists and six nurses) in an acute National Health Service trust. Participants' views regarding information transfer and communication failures at each phase of care, their causes, effects and potential interventions were explored. Interviews were recorded, transcribed verbatim, and submitted to emergent theme analysis. Sampling ceased when categorical and theoretical saturation was achieved.

Results: Preoperatively, lack of communication between anaesthetists and surgeons was the most common problem (13/18 participants). Incomplete handover from the ward to theatre (12/18) and theatre to recovery (15/18) were other key problems. Work environment, lack of protocols and primitive forms of information transfer were reported as the most common cause of failures. Participants reported that these failures led to increased morbidity and mortality. Healthcare staff were strongly supportive of the view that standardisation and systematisation of communication processes was essential to improve patient safety.

Conclusions: This study suggests communication failures occur across the entire continuum of care and the participants opined that it could have a potentially serious impact on patient safety. This data can be used to plan interventions targeted at the entire surgical pathway so as to improve the quality of care at all stages of the patient’s journey.

INTRODUCTION

Surgical outcomes have been traditionally viewed as a function of patient comorbidities and procedural complexity, with little attention given to the system in which care is delivered. This view has changed over the last decade with other factors such as leadership, communication and teamwork having been shown to contribute to safety.1 2 Of these factors, communication is perhaps the most significant, both as a skill in itself and because effective communication is integral to the success of all the other ‘systems’ factors. Furthermore, an increased reliance upon shift working has placed a premium on the quality of information transfer and communication (ITC). Despite this, communication failures remain a leading cause of surgical adverse events.3-6 Previous studies have explored these communication issues in surgery7-9 but their focus has primarily been on the operating theatre. Analysis of the full care pathway is critical as communication failures are not discrete events—information loss in one phase of care can potentially compromise safety in a subsequent phase.10 Therefore, any strategy that aims to improve the system of surgery and thus patient safety should involve identifying and improving ITC processes across the entire surgical pathway.

To try to address these problems, briefings, checklists and other techniques have been introduced. However, typically very few studies have been preceded by an analysis of the information needs and communication vulnerabilities of the existing system questioning their fitness for purpose.11 12 For communication to be optimised, we must first map communication failures and vulnerabilities across the continuum of care. This would allow for a full understanding of the nature and scope of the problem and precise targeting of interventions.
This study aims to explore ITC failures across the entire surgical journey of patients during their hospital stay. Specifically, we aim to look for the ITC failures, their causes, impact and potential interventions.

METHODS

Participants
Eighteen healthcare professionals, including seven surgeons, five anaesthetists and six nurses (two ward, two theatre and two recovery nurses) (table 1) participated in the study. Participants were selected using a qualitative sampling frame\textsuperscript{13} to ensure a broad spectrum of demographic and professional characteristics and were also identified by snowball sampling techniques.\textsuperscript{14} Sampling ceased when categorical and theoretical saturation was achieved,\textsuperscript{15} that is, when no new information was being discovered about the categories. This study sample was chosen to cover all phases of the surgical care pathway.

Data collection
Semi-structured individual interviews were carried out by a researcher with a background in surgery and patient safety (KN). Communication processes were examined across three phases: preoperative, intraoperative and postoperative, initially through another methodology, Healthcare Failure Modes and Effects Analysis.\textsuperscript{16} Six critical phases of the surgical care pathway were identified. Of these, preoperative assessment and optimisation, preprocedure teamwork, postoperative handover, and daily ward care phases were found to be most vulnerable to ITC errors through hazard analysis, which were the focus of the interview.

Surgeons’, anaesthetists’ and nurses’ views on the following topics were explored: ITC failures across the four phases; causes of ITC failures; impact of ITC failures; and interventions to reduce these failures and to improve information flow.

Interviews took place between June and August 2008 on the hospital site where each healthcare professional worked. Ethical approval and written consent was obtained. An interview protocol was developed and piloted in two initial sessions, then distilled into a topic guide by the research team. Interviews were recorded and transcribed verbatim.

Data analyses
Transcripts were cross-checked with the original recordings to ensure accuracy. The primary researcher (KN) analysed all interviews using emergent theme analysis.\textsuperscript{17} Each interview was then coded independently by one of three additional members of the research team (with backgrounds in surgery and psychology). Finally, themes across the entire set of 18 interviews were reviewed to identify key emerging strands.\textsuperscript{17} The level of coding agreement between researchers (inter-coder reliability) was evaluated quantitatively (Pearson’s $r$ correlation coefficients).

Quality assurance of data analysis and interpretation
The consistency (reliability) and confirmability (validity) of data analysis and interpretation were assessed using two techniques. First, external validation of all stages of coding and interpretation of transcripts were performed independently by three experienced qualitative researchers. The results were compared and there were no significant inconsistencies. Second, member checking\textsuperscript{18} was carried out to ensure accurate interpretation of the data.

RESULTS

Coding reliability
We examined the correlations between the coders (primary coder vs second coder) for the number of items that each of them identified per interview. High correlations imply similar coding across researchers, therefore adequate reliability of the coding. The correlations obtained were high for all four questions: number of ITC failures: Pearson’s $r=0.84$, $p<0.01$; causes of ITC failures: $r=0.86$, $p<0.01$; effects of ITC failures: $r=0.74$, $p<0.01$; and interventions: $r=0.91$, $p<0.01$ (all $N=18$).

Tables 2–5 list the main findings for each question of the interview protocol and the number of participants that mentioned each item. This quantification of the qualitative data has been used by previous researchers and found to be very useful in highlighting the most important problems.\textsuperscript{19} In the following sections and tables, data relating to key themes are summarised. The code letter suffixed to each quotation refers to the surgeon (S), anaesthetist (A), ward nurse (WN), theatre nurse (TN) and recovery nurse (RN).

Table 1 Sample of healthcare professionals interviewed

<table>
<thead>
<tr>
<th>Category</th>
<th>Men</th>
<th>Women</th>
<th>Years of experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgeons</td>
<td>7</td>
<td>0</td>
<td>4–12</td>
</tr>
<tr>
<td>Anaesthetists</td>
<td>4</td>
<td>1</td>
<td>9–26</td>
</tr>
<tr>
<td>Nurses</td>
<td>0</td>
<td>6</td>
<td>6–25</td>
</tr>
</tbody>
</table>

ITC failures
Any ITC event involves three components: source, transmission and receiver. Therefore failure at any stage leads to an ITC failure. This is the basis of our classification for ITC failures in table 2.\textsuperscript{20}
Preoperative assessment and optimisation phase

Transmission failures were most common as per clinicians; all surgeons acknowledged that there is a lack of intradisciplinary and interdisciplinary communication. Problems identified with the patient in this phase are not typically communicated between surgical and anaesthetic teams leading to inadequate optimisation of the patient for surgery:

“lots of problems are picked up … but then that is not communicated between the preoperative assessment team and the surgical team. Similarly there’s a very poor communication between the preoperative assessment team and the anaesthetist” (S1).

All healthcare professionals further acknowledged that although opinions are sought from specialists in the process of preoperative assessment, they are seldom followed up. This leads to operations getting cancelled as patients are inadequately prepared for surgery. Moreover, multiple modes of information transfer (letters, personal conversations, telephone communications) lead to information loss:

“Some of the information is available electronically, some of it is on paper, some of it is verbal from the patient or their relatives, some of it is verbal from other medical groups so I think all of the information in one place would prevent errors occurring” (S6).

<table>
<thead>
<tr>
<th>Phase of care</th>
<th>Classification of failure type with examples and verbatim quotes</th>
<th>No. of subjects who said this</th>
<th>No. of times</th>
</tr>
</thead>
</table>
| Preoperative assessment and optimisation phase | Source failures  
- Information at different places  
- Consent/notes/investigations missing  
- Documentation inadequate  
Transmission failures  
- Lack of communication between anaesthetic and surgical teams  
- Information not relayed from pre-assessment to theatre  
Receiver failures  
- Investigations/specialists’ opinion not checked | 11 (S=6, A=2, N=3)  
15 (S=7, A=3, N=5)  
6 (S=3, A=3) | 13  
24  
6 |
| Preprocedure phase                          | Source failures  
- List changed multiple times  
- Incorrect/incomplete name on the list  
Transmission failures  
- No collaborative network among theatre team  
- Lack of communication between ward and theatre staff  
Receiver failures  
- Equipment/cross match/HDU and ITU bed availability not checked  
- Preoperative checklists not followed | 12 (S=4, A=3, N=5)  
8 (S=4, A=3, N=1) | 17  
8 |
| Postoperative phase                         | Source failures  
- Postoperative handover not done/incomplete  
- Poor/ illegible written handover  
- Too much information, difficult to differentiate important from unimportant  
Transmission failures  
- Debriefing does not happen  
- Operation notes not transferred  
Receiver failures  
- Nurse multitasking, not receiving complete information  
- Preoperative checklists not followed | 15 (S=6, A=4, N=5)  
3 (S=1, A=1, N=1) | 24  
3 |
| Daily ward care                             | Source failures  
- Information not available from the nurse (not on the rounds)  
- Notes/observation, fluid charts missing  
- Decisions from person leading round unclear  
Transmission failures  
- Poor communication within and across teams  
- Lack of organised process of handing over information  
Receiver failures  
- Care pathways not followed | 12 (S=6, A=4, N=2)  
3 (S=3) | 20  
3 |

A, anaesthetists; HDU, high-dependency unit; ITU, intensive treatment unit; N, nurses; S, surgeons.

Table 2: Information transfer and communication failures across all phases of care

Preprocedure teamwork

Source failures, including poor handover from the ward to the operating theatre, were the main problems identified in this phase. For example, information regarding allergies and preoperative medication status is often not transferred, with significant implications on patient safety:

“when the patient comes to theatre we take everything off the heparin, we don’t sort of handover to say the patient was on heparin when they were in the ward” (WN1).

Eight out of 18 healthcare professionals felt that communication failures among the operating theatre team prior to the start of the operation led to the omission of important preoperative checks. Thus potentially compromising safety further.

Postoperative handover

Many of the failures uncovered in this phase were due to an incomplete handover. Information was missing, incomplete or there was information overload. The postoperative handover process was mentioned by all participants as informal, unstructured and inconsistent:

“I think that the problem in postoperative handover is most likely to be forgetting to tell somebody … I think there is scope for more formality and recording of handover and handover protocols such that you don’t forget to mention the low blood pressure or to give steroids” (A4).

In addition, participants reported that the surgical team is often not present in the recovery room during

### Table 3  Causes of information transfer and communication failures

<table>
<thead>
<tr>
<th>Causes</th>
<th>No. of subjects who said this</th>
<th>No. of times</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Task and technology factors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>▶ Primitive forms of information transfer (ie, paper medical records, paper investigation forms etc)</td>
<td>13 (S=6, A=3, N=4)</td>
<td>16</td>
</tr>
<tr>
<td>▶ Inadequate mode of communication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>▶ Lack of protocol</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Team factors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>▶ Hierarchical obstruction to flow of information</td>
<td>6 (S=3, A=2, N=1)</td>
<td>6</td>
</tr>
<tr>
<td>▶ Poor leadership</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Individual factors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>▶ Memory lapses</td>
<td>13 (S=5, A=3, N=5)</td>
<td>17</td>
</tr>
<tr>
<td>▶ Inexperienced staff</td>
<td></td>
<td></td>
</tr>
<tr>
<td>▶ Nurses not empowered to play an active role</td>
<td></td>
<td></td>
</tr>
<tr>
<td>▶ Different competencies between junior doctors</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Work environment factors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>▶ High workload/inadequate staff</td>
<td>14 (S=6, A=4, N=4)</td>
<td>17</td>
</tr>
<tr>
<td>▶ Lack of administrative support</td>
<td></td>
<td></td>
</tr>
<tr>
<td>▶ Rapid turnover of healthcare professionals</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Organisational factors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>▶ Lack of specialist nurses</td>
<td>11 (S=4, A=4, N=3)</td>
<td>17</td>
</tr>
<tr>
<td>▶ Too many layers in the system</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A, anaesthetists; N, nurses; S, surgeons.

### Table 4  Consequences of information transfer and communication failures

<table>
<thead>
<tr>
<th>Impact of information transfer failures</th>
<th>No. of subjects who said this</th>
<th>No. of times</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Impact on patient</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>▶ Mortality/major complications</td>
<td>18 (S=7, A=5, N=6)</td>
<td>46</td>
</tr>
<tr>
<td>▶ Operation cancellations/delays</td>
<td></td>
<td></td>
</tr>
<tr>
<td>▶ Increased length of stay</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Impact on team</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>▶ Staff stressed, unhappy</td>
<td>16 (S=7, A=4, N=5)</td>
<td>22</td>
</tr>
<tr>
<td>▶ Low morale of team</td>
<td></td>
<td></td>
</tr>
<tr>
<td>▶ Service efficiency declines</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Impact on organisation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>▶ Wastage of resources</td>
<td>5 (S=2, N=3)</td>
<td>8</td>
</tr>
<tr>
<td>▶ Cost implications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>▶ Unnecessary investigations</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A, anaesthetists; N, nurses; S, surgeons.
this phase, so crucial surgical information may not be formally handed over. Furthermore, difficulty in prioritisation of the fragmented information received by the recovery nurse may lead to important information getting buried, thus delaying the patient’s recovery and discharge.

Daily ward care
The most common ITC failures reported by healthcare professionals in this phase were source failures followed by transmission failures. Staff shortages, multiple handovers and multiple teams doing ward rounds simultaneously means that information is not fully passed across and within professional groups:

“The main problem here is we don’t always have the nurse following us when we go around. So it’s difficult to make an integrated assessment of the patient. It’s difficult for us to get to find out what has happened” (S4).

Participants also mentioned that information is often fragmented. Some of it is recorded in the patient’s medical notes, or in the drug charts and some passed on as verbal instructions, which makes it difficult to access. In addition, healthcare professionals also acknowledged the lack of communication between the surgical team:

another classic example that we see is that patients who’ve had a low anterior resection, may have an anastomosis and no one should be digitating them, or giving them anything PR, and you know a house officer or a junior member of the staff gives them a rectal suppository … there are issues with communicating post-operative management to everyone involved (S5).

Causes of ITC failures
We classified causes of these ITC failures in accordance with the seven-level framework classification of contributory factors proposed by Vincent21 [14].

<table>
<thead>
<tr>
<th>Interventions</th>
<th>No. of healthcare professionals</th>
<th>No. of times</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memory aids</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Checklists/protocols/pro formas</td>
<td>15 (S=6, A=4, N=5)</td>
<td>21</td>
</tr>
<tr>
<td>Postoperative communication/handover sheet</td>
<td>8 (S=3, A=4, N=1)</td>
<td>9</td>
</tr>
<tr>
<td>Technology interventions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electronic information and communication record</td>
<td>9 (S=5, A=2, N=2)</td>
<td>15</td>
</tr>
<tr>
<td>Smart card containing updated patients’ information</td>
<td></td>
<td></td>
</tr>
<tr>
<td>System changes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Email from pre-assessment to surgical team</td>
<td>11 (S=5, A=3, N=3)</td>
<td>17</td>
</tr>
<tr>
<td>Risk assessment unit to be established (joint decision unit for patient, anaesthetist and surgeon)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cultural changes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased interdisciplinary communication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient should be part of communication pathway</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juniors feel free to call seniors</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A, anaesthetists; N, nurses; S, surgeons.

Work environment factors were the most common reported causes, followed by task, individual, organisation and team factors (table 3):

“I think for things to happen the right way it’s got to be made easy for them to happen the right way. And it has to be part of the way you do things. If it’s an add-on, it gets dropped … design ways of making sure that things … are easy to follow by everybody” (S3).

Rapid turnover of staff members, stress at work and lack of administrative support were felt to be the common environmental factors leading to ITC failures. Task factors included lack of protocols. Variability and inconsistencies in various organisational processes were mentioned by 11 out of 18 healthcare professionals:

“Consistent and reliable risk assessment is one of the holy grails of preoperative anaesthesia … but it’s not clear whose responsibility it is” (S6).

Effects of ITC failures
All the participants said that ITC failures can directly or indirectly lead to patient harm (table 4). Some participants went to the extent to say that nearly all surgical disasters can find their origins in ITC failures:

I think what people don’t appreciate is that information transfer problems can make a difference between life and death. Communication is seen as a very soft issue and people think that it can’t have much of a bearing on outcomes and I completely disagree with that. The sooner you speak to somebody about a certain problem the sooner the action is taken, the sooner the problem is sorted out. The patient will obviously have a better outcome. And all the sooner, sooner, sooner, depends upon how the information is transferred (S1).

Beyond patient harm, ITC failures were also thought to destroy team dynamics and lead to stress:
“more stress for the nurses stress for the patient, stress for everyone, because there’s no proper communication” (WN2).

They can also have an impact on the organisation through unnecessary investigations, wastage of resources and theatre list cancellations, which can all potentially result in increased healthcare costs:

“the cost effectiveness of theatre time, if the operation is cancelled because the notes are not there or the wrong patient has been booked so it’s all that theatre time that’s been wasted and being paid for” (RN2).

Interventions
There is a widely shared view among participants about the need for interventions to improve information flow and reduce ITC failures across the whole continuum of care. Structured, organised, transparent and efficient ITC was described as the basis for all interventions. Regarding the content of interventions, participants mentioned checklists, smart card, cultural and system changes (table 5). Checklists have been shown to change the outcome of the patients. Almost all participants emphasised the need for the development of tools for standardisation of information transfer. Participants felt that there should be a central information repository, which should have all the relevant patient information and could be accessed when required:

let’s imagine a smart card that the patient carries with them and you put into a machine and you add to it, well at this phase I want you to give a litre of saline ... so all the information is there and the recovery nurse doesn’t have to say “what did he say”, they can look and say well actually this is the information that we need to acquire for this patient, this is the management for that patient (A4).

A need for cultural and system changes also emerged through the interviews, that is, a culture of openness, transparency where everybody can raise their concern and is not afraid of the seniors. In addition, there should be a system overhaul, that is, pre-assessment communication with the surgical team, automatic alerts, surgical care pathway checklist/electronic list. It was felt by the participants that through improved communication and better teamwork, even mortality and morbidity can be reduced:

so you cannot change the fact that complications will occur in surgery, but you can definitely change what the outcome of the complications with good communication and good information transfer. And good teamwork between the various people such as surgeons, anaesthetists, the nurses and doctors, if you improve that then you can definitely reduce the postoperative mortality (S1).

DISCUSSION
This is the first prospective study to systematically identify ITC failures across the entire surgical care pathway. Its qualitative approach enabled these issues to be explored in a way that would not have been possible with quantitative methods. Importantly, this study confirms earlier findings that ITC failures are common in surgery, are equally distributed along the whole continuum of care and can cause patient harm. Checklists, system changes and technological interventions can improve communication and information transfer.

More significantly, this study goes beyond other studies focused only on the operating theatre and helps address the bigger picture of this problem. We found that there was a lack of communication between different teams, and in cases where information was available, it was either difficult to access or fragmented. The causes and effects of these failures identified in this study also echo the findings of previous work. Apart from patient harm, the participants mentioned the healthcare system seems to suffer enormous inefficiencies because of poor ITC practices.

Healthcare professionals did have a clear view about the interventions to improve the process of information transfer so that it is more structured and systematic. In particular, checklists were thought to have great potential — perhaps reflecting the success of the checklist in other industries. This is in accordance with a recent WHO study which found that implementation of a surgical safety checklist was associated with a significant improvement in patient safety practices. The mandatory introduction of this WHO checklist in England in 2010 may help to improve some of the communication and information transfer processes in every operating theatre across the country—we have yet to see its outcomes. Despite highlighting the simple measures like checklists, study also identifies that major organisational, system and cultural changes are needed to enhance the ITC.

A revamp of preanaesthetic unit, improved communication between the preanaesthetic unit and the surgical team, clarity of responsibility were a few of the interventions identified. This finding echoes the conclusions from previous studies. In their study, Williams et al also suggested major change in institutional habits to improve the ITC. Process mapping has been used in the past to improve the current practices and decrease the errors. The study by Aulbach et al showed the improvement in blood transfusion safety by process mapping and subsequently implementing wireless electronic transfusion verification technology.

This study does have limitations. An obvious limitation was the fact that we interviewed a small sample of surgeons, anaesthetists and nurses and there is a possibility that their views may not have captured all of the
relevant concepts. However, our sampling strategy and methodology provided rich information from a range of healthcare professionals and the fact that we reached saturation, that is, no new themes emerged, supports the generalisability of our findings. Another fact that needs to be taken into account is that this study is based on subjective assessment of the clinicians, but these clinicians had a varied amount of experience and we believe that it represents the most common ITC errors throughout the surgical care pathway. We also accept that important communication failures occur across the primary/secondary care boundary, before admission and on discharge; these need to be addressed in subsequent studies.

Further research should build upon this study by conducting an observational study of ITC failures within the surgical system. We believe that this study may also guide the development of measures to evaluate ITC failures and in subsequent interventions to mitigate their effects. Understanding and addressing these failures will enhance the quality and safety of patient care across the entire surgical pathway.

Contributors KN, KM, NS, CV were involved in conception and design, analysis and interpretation of data. KN, HW, SA, AV were involved in acquisition, analysis and interpretation of data. SA, KN, AV, HWW drafted the initial article. KM, NS, CV revised it critically for important intellectual content. KN, SA, AV, HWW, NS, CV, KM had final approval of the version to be published.

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Competing interests None.

Ethics approval The project protocol was submitted to the National Research Ethics Service (Joint UCL/UCLH Committees on the Ethics of Human Research). They felt it was a ‘service evaluation’ study so did not require ethical approval. REC reference number: 08/H0715/112.

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