

Tom W. Reader, Rhona Flin and Brian H. Cuthbertson
**Communication skills and error in the
intensive care unit**

**Article (Accepted version)
(Refereed)**

Original citation:

Reader, Tom W. and Flin, Rhona and Cuthbertson, Brian H. (2007) Communication skills and error in the intensive care unit. [Current opinions in critical care](#), 13 (6). pp. 732-736.

DOI: [10.1097/MCC.0b013e3282f1bb0e](https://doi.org/10.1097/MCC.0b013e3282f1bb0e)

© 2007 Lippincott Williams & Wilkins, Inc.

This version available at: <http://eprints.lse.ac.uk/29086/>

Available in LSE Research Online: March 2011

LSE has developed LSE Research Online so that users may access research output of the School. Copyright © and Moral Rights for the papers on this site are retained by the individual authors and/or other copyright owners. Users may download and/or print one copy of any article(s) in LSE Research Online to facilitate their private study or for non-commercial research. You may not engage in further distribution of the material or use it for any profit-making activities or any commercial gain. You may freely distribute the URL (<http://eprints.lse.ac.uk>) of the LSE Research Online website.

This document is the author's final manuscript accepted version of the journal article, incorporating any revisions agreed during the peer review process. Some differences between this version and the published version may remain. You are advised to consult the publisher's version if you wish to cite from it.

Communication Skills and Error in the Intensive Care Unit

Tom W Reader MA*, Rhona Flin PhD*, Brian H Cuthbertson** MD FRCA,

*School of Psychology, University of Aberdeen, Kings College, Aberdeen, Scotland, UK, AB24 2UB

**Health Services Research Unit and Intensive Care Unit, University of Aberdeen and Aberdeen Royal Infirmary, Foresterhill, Aberdeen, Scotland, UK, AB25 2ZD.

Name of institution where worked performed: University of Aberdeen, Aberdeen Scotland, UK.

Address for correspondence: Dr Tom Reader, School of Psychology, University of Aberdeen, King's College, Aberdeen, Scotland, UK, AB24 2UB

Phone +44 1224 273212; Fax +44 1224 273211; E-mail tom.reader@abdn.ac.uk

Financial support: This work was supported by a PhD studentship from the College of Life Sciences and Medicine (University of Aberdeen) and the Scottish Funding Council.

Reprints: Will not be offered.

Conflicts of interest: None.

Financial interests: None of the authors have any financial interests relating to this work

Abstract

Purpose of review

Poor communication in critical care teams has been frequently shown as a contributing factor underlying adverse events. There is now a strong emphasis on identifying the communication skills that can contribute to, or protect against, preventable medical errors. This review considers communication research recently conducted in the Intensive Care Unit (ICU) and also other acute domains.

Relevant findings

Error studies in the ICU have shown good communication to be crucial for ensuring patient safety. Interventions to improve communication in the ICU have resulted in reduced reports of adverse events, and simulated emergency scenarios have shown effective communication to be correlated with improved technical performance. In other medical domains where communication is also crucial for safety, the relationship between communication skills and error has been examined more closely, with detailed teamwork assessment tools being developed.

Summary

Critical care teams perform a multitude of activities where effective communication is crucial for ensuring patient safety and reducing susceptibility to error. In order to develop valid team training and assessment tools for improving teamwork in the ICU there is a requirement to better understand and identify the specific communication skills important for safety during the provision of intensive care medicine.

Keywords

Intensive care unit, communication, teamwork, error, patient safety

Introduction

Research in healthcare has shown patients to frequently experience unnecessary harm as a result of preventable medical errors. These events can result in the substantial and unnecessary suffering of patients, as well as a high financial cost in terms of extended hospital stays and litigation costs [1]. In terms of managing patient safety within the intensive care unit (ICU), the complex and multidisciplinary nature of intensive care medicine renders it particularly susceptible to the occurrence of medical errors. Within high-risk settings such as aviation and nuclear power, which share similar issues of work complexity, poor communication between team members has frequently been identified as causal factors in major incidents that have resulted in large loss of life [2, 3]. Within these settings, substantial research has been conducted to understand the factors that influence team communications [4, 5], and team training courses have been developed to train and assess communication skills [6]. Research in the ICU has shown poor communication between team members to be a common causal factor underlying adverse events [7], yet unlike other high-risk industries the relationship between team communications and safety in ICUs is less well understood, as are the factors that influence team member interactions under both normal and stressful operating conditions. Thus, there is a requirement to better understand how the communication behaviours of clinicians can contribute to patient safety in the ICU [8]. This article considers recent research into aspects of communication and error within the ICU, and briefly considers work in similarly complex acute medical settings.

Communication skills and error in the ICU

Patients in the ICU have been shown to be particularly susceptible to experiencing a medical error. The multinational Sentinel Events Evaluation study has documented the number of critical incidents (an occurrence that harmed, or could have harmed, a patient) that occur during a standard 24-hr period in ICUs across 29 countries [9**]. In a sample of nearly 2000 adult patients, critical incidents were found to affect approximately 20% of patients. The most frequent errors were associated with medications and lines, catheters and drains, and patients were most susceptible to error during mid-morning. Considering the relatively high likelihood of experiencing a critical incident whilst receiving intensive care, ICU research has attempted to ascertain common causes of error. In particular, the relationship between safety and

communication error in the ICU has been recognised for some time [7]. In one of the most extensive human factors investigations of error in the ICU, Donchin and colleagues [10] found that although nurse and doctor communications were found to occur in just 2% of all activities performed in the unit, these were associated with over a third of detected errors. Alongside safety, communication skills in the ICU have also been shown to be important for the quality of care received by patients. For example, high levels of collaboration between nurses and doctors being shown to result in improved patient mortality rates and reduced average patient length of stay [11, 12].

Error reporting systems now frequently focus upon poor communication as an antecedent to error in the ICU. An recently conducted analysis of published ICU critical incident studies found that just under half of all contributory factors underlying critical incidents were related to non-technical skills (e.g. teamwork and decision-making), with poor communication frequently being reported as contributing to the occurrence of critical incidents [13**]. The review concluded that information on the contributory role of communication is often superficial, with little analysis being performed on the team members most susceptible to error, or the specific communication problems that result in critical incidents. Pronovost and colleagues [14**] recent report on web-based patient safety reporting systems has provided a richer source of data for understanding the role of poor communication in critical incidents. Their reporting system was voluntary and anonymous, and collected data on 2075 incidents from 23 ICUs over a period of 24 months. It was found that the most common forms of error were related to medications (42% of incidents), incorrect/incomplete delivery of care (20%), equipment failure (15%), and lines, tubes, and drain (13%). Of those, the events involving lines, tubes, and drains were most likely to cause patient harm (48% of events). A wide range of factors were found to underlie critical incidents, with team factors contributing to 32% of errors. In total, 57% of those errors were related to problems with verbal or written communication during routine care, 37% were related to problems with verbal or written communication during handovers, 21% were related to team structure and leadership, and 6% were related to problems in verbal or written communication during crises. Examples of incidents included clinician's not communicating order changes to nursing staff, incorrect patient information being passed between different teams, and

poor information dissemination on severely ill patients being transferred to ICU. Due to the prevalence of team factors in critical incidents, Pronovost and colleagues [14**] have stressed the importance of implementing team-training programmes and team based activities (e.g. multidisciplinary rounds) that encourage interdisciplinary communication during patient decision-making. Furthermore, ensuring that junior team members feel able to communicate openly on issues of patient care with senior team members is also identified as crucial for safety.

Beyond studying the role of communication in incidences of medical error in the ICU, research has also examined the effect of improving interdisciplinary communication upon patient safety [15*]. In the US, quality improvement initiatives have involved implementing physician led multidisciplinary rounds where clinicians encourage all team members to communicate and contribute to the patient decision-making process. The introduction of this intervention was associated with a decline in adverse event rates over the course of a year. Jain and colleagues [15*] reported that better communications during rounds were central to the improvements, as they enhanced enhancing interdisciplinary teaching and the coordination of patient care. Attitudinal research has also provided some interesting data, finding that positive perceptions of teamwork and communication are associated with lower self-reported error rates in the Netherlands [16*]. Specifically, positive perceptions on factors such as timely and accurate information transfer were associated with lower perceptions of errors, although no predictive relationships were established. Lastly, Puntillo and McAdam [17*] have discussed the importance of clear and constructive communication for improving end-of-life care in the ICU. Specifically, nurses have reported that there is poor communication between nurses and doctors during decision-making on end-of-life care [17*]. In particular, differences in training and perspective are cited as resulting in communication problems, with a lack of communication on issues of end-of-life care resulting in poorer information being provided to patient' families [18].

It can be found that studies of error in the ICU have shown poor communication to frequently be a causal factor in critical incidents. Furthermore, some insight has been provided on the communication skills important for maintaining patient safety. Whilst examining the link between communication and clinician error is important for understanding how patient harm occurs in the ICU, the data returned from these

studies are limited in terms of understanding how team communication behaviours can affect team performance during routine and emergency situations. However, research using critical care simulators has provided some provided insight into communication skills and ICU team performance.

Communication skills and team performance in simulator studies

High-fidelity simulators can be useful for investigating the communication skills that are most likely to result in effective team performance, with research investigating the communication behaviours of intensive? care teams during simulated emergencies. For example, Lighthall and colleagues [19] study of critical event scenarios in the ICU demonstrated the utility of simulation for understanding communication and errors in ICU teams. Their analysis of communication errors during team performance found team members to not communicate their care priorities to one another, that physicians overloaded nurses with requests leading to key tasks not being performed promptly, that ineffective leadership resulted in ineffective use of time and personnel, and that in some instances there was an absence of communication on the initiation of new therapies.

High-fidelity simulator studies have also been used to examine the communication abilities of ICU residents during the resuscitation of critically ill patients [20**]. Through analysing videos of Canadian ICU residents resuscitating simulated patients, residents were assessed on their communication skills alongside their skills for leadership, problem solving, situational awareness and resource utilization. Experts on resuscitation and critical care used a behavioural rating system to assess the behaviours of residents. The communication skills of residents were rated most highly if they communicated clearly at all times, encouraged input and listened to staff feedback, and consistently used directed verbal and non-verbal communications. Residents were rated poorly if they did not communicate with staff, did not acknowledge staff communications, and never used directed verbal and non-verbal communications. Overall, participants were found to perform well, with residents who had three years post-graduate training being found to produce higher scores than those with one-year of post-graduate training. However, reliability testing found relatively poor consistency in the ratings of communication performance, indicting some revision was required on the system used to rate performance. Furthermore, no

relationship between communication skills and objective measures of team performance were reported.

Ottestad and colleagues [21**] have also developed a scoring system for assessing the communication and teamwork skills of critical care teams. In particular, teams are assessed during the management of septic shock in a high-fidelity patient simulator, with the relationship between teamwork and technical performance being examined. For this study, participants included ICU residents and a support team of nursing staff, respiratory therapists and anaesthesiologists. Based on crew resource management (CRM) principles from aviation, seven dimensions of behaviours (e.g. teamwork, planning, leadership), were assessed with good communication underpinning high-levels of performance on most dimensions. For example, teams were rated highly if they made clear and direct requests, employed closed loop communications, delegated tasks effectively, communicated the urgency of patient problems, prioritised aspects of care effectively, made sure all team members were comfortable with their allotted tasks and shared information on the patient care plan. Teams were rated poorly if they did not request appropriate information, delegate tasks, and did not communicate priorities and patient problems. Teams rather than individuals were assessed, and correlations were found between ratings on technical performance (e.g. making diagnosis, antibiotic use, placing an additionally intravenous catheter) and scores on the behavioural aspects of performance (i.e. teamwork and communication).

Communication research in other acute medical environments

Investigations of communication and error in the ICU have provided useful information for understanding the relationship between teamwork and patient safety in intensive care medicine. However, an extensive amount of research has examined the relationship between communication and error in other domains of acute medicine, and especially within the operating theatre. Whilst the findings from these studies related to the operating theatre, they feature themes that are pertinent to intensive care medicine.

Williams et al [22**] have recently conducted an extensive analysis of communication errors in the operating theatre. In an examination of 328 incident reports where poor communication contributed to errors, numerous factors were

found to result in communication problems. These included factors such as the ineffective delegation of responsibilities, poor role clarity, shift changes, patient background information not being communicated, nurses not attending patient rounds, hierarchical team structures, and inaccurate assumptions on the knowledge and skills of team members. Based on these findings, a number of detailed suggestions were proposed for improving communication between surgeons and residents; for example improving documentation during handovers, and ensuring experienced surgeons are always made aware of the knowledge and skill base of junior residents. Observational studies of surgical cases have also provided useful information on the relationship between poor communication and error [23**]. Observations on 10 complex surgical cases found poor communication and information flow to have a negative effect on team performance as a whole. In total, 88 distinct events being identified when information was lost or degraded (e.g. when surgeon communicated patient information to the team), with 86% of these events having consequences for progression patients from one stage of the operation to another. Furthermore, patient handovers and the movement of patients from one phase of care to the next (e.g. from the operating theatre to the recovery room) were most vulnerable for information loss and inadequate discussion of clinical information was identified as a commonly occurring error. Lastly, a recent review of surgical malpractice claims identified the most common types of communication breakdown that were reported as harming to patients. Insufficient verbal communication between attending surgeons and other team members was shown to frequently result in poor information transfer between team members, with patient transfers and handovers again being particularly susceptible to communication problems [24*]. Thus communication studies in the operating theatre have shown the importance of certain communication skills (e.g. good handovers, team discussions on clinical information, understanding team member information needs) in terms of reducing the probability of errors occurring. These are likely to also be important for the intensive care environment.

Improving communication in intensive care

Developing tools for training and assessing communication and teamwork in the ICU presents a substantial challenge. Within surgery attempts have also been made to understand and model the factors that predict effective teamwork [25*, 26*], and to develop team training and assessment tools [27]. These tools are based on an

extensive task analysis to understand the specific teams skills important for safety and the behaviours that indicate proficiency in those skills [28*, 29, 30]. Whilst interventions and tools do currently exist for improving communication within the ICU [31], there remains significant work to be done. In particular, the work tasks performed by ICU caregivers are highly varied, with teams admitting patients, diagnosing illnesses, developing treatment plans, performing complex procedures, making end-of-life decisions and liaising with families and other hospital units [32**]. Furthermore, the communication strategies used to manage activities in the ICU have been found to vary significantly depending on the task [33], and to influence the cognitions of ICU team members [34*]. Therefore, in order to develop tailored team-training interventions, further research is required to better identify the communication skills and behaviours crucial for maintaining safety. A range of techniques exist to do this, including cognitive interviews, hierarchical task analysis, observations during real and simulated performance, studies of cognition, attitudinal surveys and root-cause analyses of errors.

Conclusions

Poor communication and teamwork frequently contribute to occurrences of medical error in the ICU. Furthermore, interventions to improve communication in the ICU have resulted in reduced reports of adverse events and simulated scenarios have shown that effective communication between team members is correlated with improved technical performance. However, compared to domains such as surgery, the communication and teamwork skills important for safety are less well defined. As critical care teams perform a multitude of activities requiring effective communication, there is a requirement to better identify and understand the communication skills associated with safety in the ICU during specific tasks.

References and recommended reading

Papers of particular interest, published within the period of review, have been highlighted as:

* Of special interest

** Of outstanding interest

1. Vincent C. Patient safety. London: Elsevier; 2006.
2. Lucas D. The causes of human error. In: Human factors in safety critical systems. Redmill R. Oxford: Butterworth Heinemann; 1997. pp. 37-65.
3. Weick K. The vulnerable system: An analysis of the Tenerife air disaster. *J Manage* 1990, 16:571-593.
4. Bowers C, Jentsch F, Salas E, et al. Analyzing communication sequences for team training needs assessment. *Hum Factors* 1998, 40:672-679.
5. Kanki B, Palmer M. Communication and crew resource management. In: Cockpit resource management. Weiner M, Kanki B, Helmreich, R (editors). San Diego: Academic Press; 1993. pp. 99-136.
6. Weiner E, Kanki B, Helmreich R. Cockpit resource management. San Diego: Academic Press; 1993.
7. Wright D, Mackenzie M, Buchan I, et al. Critical incidents in the intensive therapy unit. *Lancet* 1991, 14:676-681.
8. Leonard M, Graham S, Bonacum D. The human factor: the critical importance of effective teamwork and communication in providing safe care. *Qual Saf Health Care* 2004, 13:85-90.
- * 9. Valentin A, Capuzzo M, Guidet B, et al. Patient safety in intensive care: results from the multinational Sentinel Events Evaluation (SEE) study. *Intensive Care Med* 2006, 32:1591-1598.
Large scale study documenting critical incidents from 220 ICUs across 29 countries.
10. Donchin Y, Gopher D, Olin M, et al. A look into the nature and causes of human errors in the intensive care unit. *Crit Care Med* 1995, 23:294-300.
11. Baggs JG, Schmitt MH, Mushlin AI, et al. Association between nurse-physician collaboration and patient outcomes in three intensive care units. *Crit Care Med* 1999, 27:1991-1998.

12. Shortell SM, Zimmerman JE, Rousseau DM, et al. The Performance of Intensive Care Units: Does Good Management Make a Difference? *Med Care* 1994, 32:508-525.

** 13. Reader T, Flin R, Lauche K, et al. Non-technical skills in the Intensive Care Unit. *Br J Anaesth* 2006, 96:551-559.

Analysis of common causes found to underlie errors in ICU critical incident studies.

** 14. Pronovost P, Thompson D, Holzmueller C, et al. Toward learning from patient safety reporting systems. *J Crit Care* 2006, 21:305-315.

Analysis of data from a web-based critical incident reporting study used in 23 ICU. Considerable information contained on the relationship between team communications and error.

* 15. Jain M, Miller L, Belt D, et al. Decline in ICU adverse events, nosocomial infections and cost through a quality improvement initiative focusing on teamwork and culture change. *Qual Saf Health Care* 2006, 15:235-239.

Examines the effect of a quality improvement initiative on teamwork and patient outcomes.

* 16. van Beuzekom M, Akerboom SP, Boer F. Assessing system failures in operating rooms and intensive care units. *Qual Saf Health Care* 2007, 16:45-50.

Attitudinal study examining perceptions on teamwork and error.

* 17. Puntillo K, McAdam A. Communication between physicians and nurses as a target for improving end-of-life care in the intensive care unit: Challenges and opportunities for moving forward. *Crit Care Med* 2006, 34:S332-S340.

Review of the literature on communication between physicians and nurses during end-of-life care.

18. Azoulay E, Pochard F, Chevret S, et al. Meeting the needs of intensive care unit patient families: a multicenter study. *Am J Respir Crit Care Med* 2001, 163:135-139.

19. Lighthall GK, Barr J, Howard SK, et al. Use of a fully simulated intensive care unit environment for critical event management training for internal medicine residents. *Crit Care Med* 2003, 31:2437-2443.

** 20. Kim J, Neilipovitz D, Cardinal P, et al. A pilot study using high-fidelity simulation to formally evaluate performance in the resuscitation of critically ill patients: The University of Ottawa Critical Care Medicine, High-Fidelity Simulation, and Crisis Resource Management I Study. *Crit Care Med* 2006, 34:2167-2174.

Simulator based investigation of teamwork during the patient resuscitations.

** 21. Ottestad E, Boulet J, Lighthall G. Evaluating the management of septic shock using patient simulation. *Crit Care Med* 2007, 35:769-775.

Simulator based investigation investigating the relationship between non-technical and technical skills during the management of septic shock.

** 22. Williams R, Silverman R, Schwind C, et al. Surgeon information transfer and communication: Factors affecting quality and efficiency of inpatient care. *Ann of Surg* 2007, 245:159-171.

Investigation of errors in surgery where communication has been identified as a key causal factor. Highlights aspects of communication in surgery that are also relevant to the ICU.

** 23. Christensen C, Gustafson S, Roth EM, et al. A prospective study of patient safety in the operating room. *Surgery* 2006, 139:159-173.

Observational study of communication and information flow during surgery. Highlights aspects of communication in surgery that are also relevant to the ICU.

* 24. Greenberg C, Regenbogen S, Studdert D, et al. Patterns of communication breakdown resulting in injury to surgical patients. *J Am Coll Surg* 2007, 204:533-540.

Review of surgical malpractice cases where communication breakdowns resulted in error.

* 25. Healey A, Undre S, Vincent C. Defining the technical skills of teamwork in surgery. *Qual Saf Health Care* 2006, 15:231-234.

Discussion on the role of teamwork skills in surgery.

* 26. Undre S, Sevdalis N, Healey A, et al. Teamwork in the operating theatre: cohesion or confusion? *J Eval Clin Pract* 2006, 12:182-189.

Investigation of perceptions of teamwork and team roles amongst operating theatre staff.

27. Unsworth K, West M. Teams: The challenges of cooperative work. In: Introduction to work and organizational psychology. Chanel N. Cornwall: Blackwell; 2000. pp. 327-346.

* 28. Yule S, Flin R, Paterson-Brown S, et al. Development of a rating system for surgeons' non-technical skills. *Med Educ* 2006, 40:1098-1104.

Report on the development of a behavioural ratings system for surgeons' teamwork skills.

29. Flin R, Maran N. Identifying and training non-technical skills for teams in acute medicine. *Qual Saf Health Care* 2004, 13:80-84.

30. Mishra A, Catchpole K, Dale T, et al. The influence of non-technical performance on technical outcome in laparoscopic cholecystectomy. *Surg Endosc*, In press.

31. Pronovost PJ, Berenholtz SM, Dorman T, et al. Improving communications in the ICU using daily goals. *J Crit Care* 2003, 18:71-75.

** 32. Malhotra S, Jordan D, Shortliffe E, et al. Workflow modelling in critical care: Piecing together your own puzzle. *J Biomed Inform* 2007, 40:81-92.

Task analysis of different work activities performed by ICU caregivers.

33. Albolino S, Cook R, O'Connor M. Sensemaking, safety, and cooperative work in the intensive care unit. *Cog, Tech Work*, In press.

*34. Reader T, Flin R, Mearns, K, et al. Interdisciplinary communication in the ICU. *Br J Anaesth* 2007, 98, 347-352.

Study of interdisciplinary communication and understanding patient care goals in the ICU