International Journal of Nursing Studies 51 (2014) 1195–1206

Contents lists available at ScienceDirect

International Journal of Nursing Studies

journal homepage: www.elsevier.com/ijns

Nurse–surgeon object transfer: Video analysis of communication and situation awareness in the operating theatre

Terhi Korkiakangas [a,b,*], Sharon-Marie Weldon [a], Jeff Bezemer [b], Roger Kneebone [a]

[a] Department of Surgery and Cancer, Imperial College London, UK
[b] Department of Culture, Communication and Media, Institute of Education, UK

ARTICLE INFO

Article history:
Received 11 April 2013
Received in revised form 8 January 2014
Accepted 10 January 2014

Keywords:
Scrub nurse
Surgeon
Instrument trolley
Body movement
Communication
Situation awareness

ABSTRACT

Background: One of the most central collaborative tasks during surgical operations is the passing of objects, including instruments. Little is known about how nurses and surgeons achieve this. The aim of the present study was to explore what factors affect this routine-like task, resulting in fast or slow transfer of objects.
Methods: A qualitative video study, informed by an observational ethnographic approach, was conducted in a major teaching hospital in the UK. A total of 20 general surgical operations were observed. In total, approximately 68 h of video data have been reviewed. A subsample of 225 min has been analysed in detail using interactional video-analysis developed within the social sciences.
Results: Two factors affecting object transfer were observed: (1) relative instrument trolley position and (2) alignment. The scrub nurse's instrument trolley position (close to vs. further back from the surgeon) and alignment (gaze direction) impacts on the communication with the surgeon, and consequently, on the speed of object transfer. When the scrub nurse was standing close to the surgeon, and "converged" to follow the surgeon's movements, the transfer occurred more seamlessly and faster (<1.0 s) than when the scrub nurse was standing further back from the surgeon and did not follow the surgeon's movements (>1.0 s).
Conclusions: The smoothness of object transfer can be improved by adjusting the scrub nurse's instrument trolley position, enabling a better monitoring of surgeon's bodily conduct and affording early orientation (awareness) to an upcoming request (changing situation). Object transfer is facilitated by the surgeon's embodied practices, which can elicit the nurse's attention to the request and, as a response, maximise a faster object transfer. A simple intervention to highlight the significance of these factors could improve communication in the operating theatre.

What is already known about the topic?

- Communication, anticipation and other non-technical skills play a crucial role in *situation awareness*, and link to responsiveness in changing situations.
- Scrub nurses' vigilance towards the stages of surgical operations and their ability to anticipate a surgeon's

* Corresponding author at: Institute of Education (University of London), Department of Culture Communication and Media, London Knowledge Lab, 23-29 Emerald Street, London, WC1N 3QS, UK. Tel.: +44 0207 763 2179.
E-mail address: t.korkiakangas@ioe.ac.uk (T. Korkiakangas).

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http://dx.doi.org/10.1016/j.ijnurstu.2014.01.007

need for instruments and objects can impact on the flow of operations.

What this paper adds

- The paper examines actual, video-recorded interactions between scrub nurses and surgeons during surgical operations.
- The paper identifies the *interactional* factors affecting object transfer, including instrument trolley positioning and visual orientation to surgeons' movements, as important areas for theatre nurses' training.
- The paper shows that degree of *situation awareness* is visible in the bodily conduct of nurses and surgeons, and can be affected by the relative positioning of the operating theatre professionals.

1. Introduction

Health care professionals, such as surgeons and nurses, work in interprofessional teams. This seemingly obvious fact has crucial importance to patient safety (Kneebone and Fry, 2011), as adverse incidents in surgical operations are often the result of breakdowns in team communication (Aggarwal et al., 2004; Lingard et al., 2004). Research on interprofessional communication in the operating theatre has drawn on different methodologies, including observational rating scales and interviews. Communication problems are frequently reported. According to Lingard et al. (2004), as much as 31% of all communications in the operating theatre could be categorised as failing some way. For example, information provided to colleagues can be inaccurate, delivered too late, or it fails to reach the individuals who need it, leaving issues unresolved until they become critical. In a recent systematic review, Weldon et al. (2013) found that there are not many video-based studies that elaborate on the actual, real-time communication behaviours in the operating theatre.

Communication breakdowns can have many consequences. They can cause delays that compromise the quality of patient care and the management of subsequent operations. As a result, delays in operations can incur substantial costs to hospitals (Wong et al., 2010). When an operation is in progress, surgeons and scrub nurses routinely exchange instruments, and this requires communication and alertness from both parties. Dropping instruments alone has been shown to extend operating time on average by 7.6 min (Khan et al., 2008). However, studies have not elaborated how non-vocal behaviours, such as eye-gaze and hand movements, might contribute to such incidents.

Task-related communication is closely linked to *situation awareness*. This concept refers to a dynamic process of acquiring information from the immediate environment and responding accordingly to changing situations. There is no single definition of situation awareness but its understanding can be roughly divided into two concerns: the view of awareness primarily as a psychological, cognitive phenomenon (e.g., Endsley, 1995); or as a distributed awareness, involving interactions between people, artefacts, and the environment (Stanton et al., 2006). The widely cited model by Endsley involves three levels: *perception* of environmental elements in a time and space, *understanding* their meaning, and using this information to *predict* events that are likely to happen. *Anticipation* is an important part of situation awareness, enabling an individual to respond rapidly to changing situations, and potentially preventing adverse incidents from occurring. Interpersonal communication and interaction with artefacts have also been suggested to impact the awareness of what is happening in one's surroundings (Endsley and Jones, 2001). However, some researchers have called for a broader attention to these factors, so as to move the focus from individual cognition to *collaboration* (Salmon et al., 2008).

Coordination of activities is important for the efficient delivery of surgical operations. Therefore, understanding of situation awareness from the angle of communication becomes relevant. Bromiley (2008) notes how a lack of situation awareness and breakdowns in communication count as *human factors* that are present in fatal incidents in healthcare, but also in 75% of aviation accidents. A lapse in situation awareness can occur when attention is "fixated" and a professional fails to re-orient and to change a course of action (Bromiley, 2008). As such, situation awareness has particular relevance for scrub nurses. These nurses are "scrubbed up" to work within the sterile zone, and they continuously guard, count, and handle sterile instruments and items, such as swabs and syringes, on the instrument trolley. Their main task is to pass these items to the surgeon, ideally at the precise time of need, so as to avoid any delays in the stages of an operation. Instrument exchange can be cognitively demanding, as the task requires constant vigilance and technical knowledge of the actual operation. Scrub nurses have to remain situationally aware to select the right instrument at the right time (Mitchell and Flin, 2008), and to "both think and remain 'ahead' of the surgeon" (Mitchell et al., 2011, p. 822).

Situation awareness has been suggested to be one of the most important non-technical skills that scrub nurses have to master in the operating theatre (Mitchell and Flin, 2008). While such skills have been researched and assessed among surgeons (e.g. Non-Technical Skills for Surgeons [NOTSS], Yule et al., 2008), less is known about how nurses' non-technical skills relate to situation awareness. Where nurses' situation awareness has been examined more generally, these studies have tended to draw on cognitive assessments (Wright, 2009) and interviews (Mitchell et al., 2011). While these are important methods, they do not always reveal the details of actual interactions and *how* people display awareness of the events around them: this is often *beyond* their awareness. Hence, operating theatre nurses often talk about a "tacit understanding" between colleagues (Gillespie et al., 2010, p. 736).

To address the relative lack of research on theatre nurses' non-technical skills, The Scrub Practitioners' List of Intraoperative Non-Technical Skills (SPLINTS) behavioural rating scale (Mitchell et al., 2012) has been recently developed. It focuses on the assessment of non-technical skills, *situation awareness*, *communication and teamwork*,