Operating room and communication study: A reflection of non-technical surgical skills in a regional setting

Molly Clark, Dilshad Dooreemeah, Lisa Cogger, Francis Miller

Department of General Surgery, Northeast Health, Wangaratta, VIC, Australia

SUMMARY
Health care is multifaceted. This study aimed to examine situational awareness and how measures like name recognition can be a hurdle to operational safety. The results were that an inability to recall staff members' names exists even with introductions. Perhaps there needs to be more training centred on these "non-surgical" skills.

Key Words
Situational awareness; awareness; recall; name recognition; recognition

ABSTRACT

Background

Health care is a multifaceted system. Its delivery can be efficient, especially in the operating theatre where protocols have been instituted around introductions and timeouts. Errors still occur, however, which can often be attributed to human factors. We examine situational awareness and how measures like name recognition can be a hurdle to operational safety.

Aims

The primary objectives of this study were to identify the following:

1. Whether staff members within an operating theatre were able to identify other staff members present for the procedure by name recognition.
2. Whether the appropriate whiteboard checklists and World Health Organisation (WHO) team time out introductions were done to identify the members in each role.
3. How many times each role changes between/during an operation.
4. Whether the level of seniority and previous situational awareness training has an impact on a person's ability to recognise staff members/changes in staff during the operation.

Method

We conducted the study prospectively in the operating suite of one of Victoria's regional centres. It was a cross-sectional, observational study. Variables collected included whether a "time out", meaning a pre-operative pause to confirm patient and procedure, was completed, the function of each staff member, and how many times the person in each role changed. The study population included staff members who work in the operating theatre, who agreed to be interviewed.

Conclusion

During these surgical operating lists (meaning the operations planned for the day), neither the consultants nor registrars changed, while nursing staff changed an average of 1.43 times for each list. Name recollection varied between 25 per cent to 100 per cent. Trainees were statistically poorer than nursing staff (*p*=0.04), but we found no other difference between groups. On average, staff members had been working in the theatre for 6.81 years (SD 8.47). Data demonstrated that non-technical skills included in theatre protocol and Surgical Education and Training (SET) training were performed. Nursing staff had a higher average of years worked and almost 100 per cent of correct responses, which suggests that years of experience could have more influence over name recollection compared to formal situational training. Despite observation, there was still an inability to recall staff members names even with introductions.

BACKGROUND

The delivery of health care is multifaceted and as a result, errors within healthcare systems occur for various reasons. These errors can frequently be traced back to human error and can largely be divided into those of a technical and non-technical ability.[1,2] The latter includes miscommunication, lapses in teamwork, poor judgement, and workplace inefficiencies.[3,4] Non-technical skills can also include elements of situational awareness and decision-making.[5] Studies have found communication errors to have contributed to a range of 43 per cent to 70 per cent of errors made in surgical procedures.[5-7] Regarding the delivery of effective health care, researchers have shown that both technical and non-technical skills are important in highly functional teams.[5] These errors often represent a systems failure revolving around non-technical skills or shared activities, rather than surgery-specific technical ability.[1,2] Consequently, it is becoming increasingly important to address changes in teamwork to allow for better patient safety.[1,2]

Situational awareness refers to the ability of the individual to grasp the situation in time and space with regard to both the individual's work and the concurrent work of colleagues.[8] It incorporates both "local" and "global" awareness and relates to the idea of "achieving ensemble".[8] In the operating theatre, *local awareness* refers to details of the patient's status and the procedure at hand, while global awareness encompasses the activities taking place around the operation such as changes in staff and equipment availability. Being skilled in situational awareness indicates the ability to dually focus on both these aspects of the procedure simultaneously and to have effective interpersonal communication. Having effective non-technical surgical awareness is theorised to take place on the team level. Situational awareness relies on effective communication and subsequently teamwork, as well as the individual level and their comprehension of what the procedure is, knowing the patient, and who each member of their team is.[9,10]

In this study, we have sought to characterise the practices that lend themselves to good communication, and in particular, name recognition of one's co-workers.

METHOD

We conducted the study prospectively in the operating suite comprising three operating rooms and an endoscopy room in one of Victoria's regional centres. Each procedural session was conducted by one member of the study team for a morning operating list. The team comprised two nurses from theatre, an intern, and a surgeon.

The observations we documented included whether a "time out" took place at the start of the list and also if a whiteboard was used to list the names of theatre staff. We noted the number and function of each staff member in the room at the start of the day and how often, if at all, they changed during the morning's list.

We took aside and interviewed as many staff members as possible (53 in total). We asked the 53 interviewees to correctly name as many of the other theatre workers as possible and also how many years they had been working in the theatre complex. We also noted if they were wearing their hospital identification badge and whether it was clearly visible. Finally, we asked interviewees if they had done a formal situational awareness workshop. We divided the interviewees into four separate groups for the purpose of analysis: consultants, nursing staff, trainees, and theatre technicians.

Data analysis

Using the Microsoft Excel statistical package, we performed a regression analysis on the percentage of correct names for each interviewee versus length of time working in theatre. We used IBM SPSS software to perform a one-way analysis of variance between the four different groups. We then employed a Tukey post-hoc test to determine which groups statistically differed from each other. The result was considered relevant if the p value was below 0.05.

RESULTS

During a month-long period from December 2020 to January 2021, we collected data from 14 morning procedural lists from the following specialties: orthopaedics, general medicine, general surgery, urology, and obstetrics & gynaecology. We interviewed 53 staff members and had a total of 86 responses. We interviewed 25 of the 53 participants multiple times due to their presence in multiple morning lists. We asked each interviewee to sign a consent form agreeing to participate in the study. We present the participants' demographics (Table 1).

Table 1: Participants' demographics

Role l	Number of Participants (n=53)	Average # Number of Years Worked in Theatre*
Consultant	14	9.79
Registrars	11	0.81
Nursing	23	6.07
Technicians	5	15.20
*One consultant and three members of nursing staff had the "years working in theatre" section missing.		

Of the 14 operating lists, all 14 conducted time out prior to the list beginning. Thirteen of the 14 lists also had an updated whiteboard that had each role and the name of the person in that role at the beginning of the list. Twelve of the 14 lists started with a verbal introduction of each staff member.

During these lists, neither the procedural consultants nor their registrars changed during the morning. In contrast, nursing staff changed an average of 1.43 times each list while theatre technicians changed at least once per morning (Table 2).

Table 2: Average number of changes per role

| Designated Role	Average Number of Changes Per List
Surgeon	0
Surgical Registrar	0
Scrub Nurse	1.36
Scout Nurse	1.43
Anaesthetist	0.07
Anaesthetics Registrar	0
Anaesthetics Nurse	1.43
Theatre Technician	1.14

We conducted 86 interviews during the study. We documented the results (Table 3). While most interviewees were able to recall their co-workers' names well during this period, this recall was not uniform between the groups—it varied between 25 per cent to 100 per cent correct. Although not documented, on the few occasions when a radiographer entered the room, the consultants admitted that they would not have been able to say what their name was. These results included the occasions when not only a whiteboard was in use (we asked the interviewees not to look at it while being interviewed!) as well as the initial verbal introductions. We found that the trainees were statistically poorer than nursing staff at remembering their co-workers' names (p=0.04), but no other difference was found between different theatre groups.

Table 3: Proportion of correct responses in each faculty

Group	Number of 100% Responses	Total Number of Responses	Average % Recall
Consultants	17	22	77.3%
Trainees	11	17	64.7%
Nursing	34	35	97.1%
Technicians	9	12	75.0%

We interviewed 53 staff members. On average they had been working in the theatre for 6.81 years (SD 8.47) with a range of 0.2 to 26 years (Table 1, Figure 1).

Figure 1: Years worked vs name recall
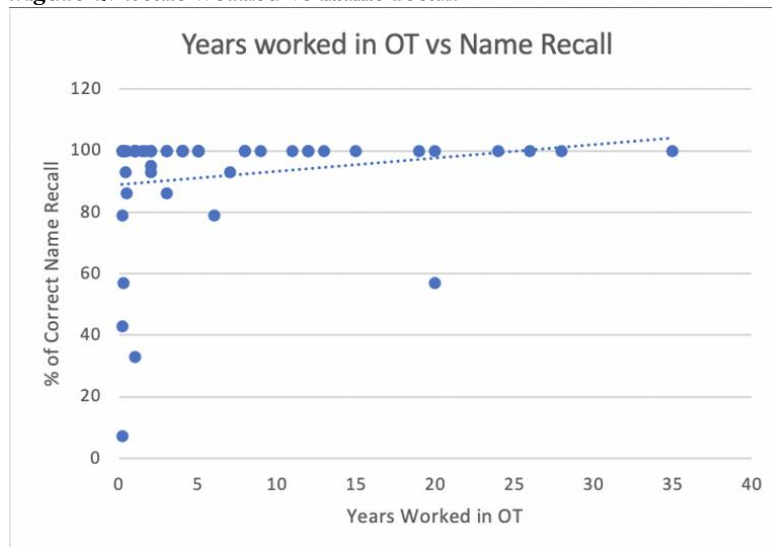
Regression analysis *p*=0.2

Of the 14 consultants interviewed, 7 had completed formal situational training (50 per cent). Of the 11 trainees (surgical and medical) interviewed, 4 had completed formal training. Of the nursing staff, 2 of the 23 interviewed had completed training and 1 of the 5 theatre technicians had undergone formal situational training.

The observer noted whether the participant had a name badge that could be easily read when the participant was not scrubbed. Fourteen participants were wearing readable ID badges (26.42 per cent), while 39 were either not wearing them or the name badge was obscured (Table 4).

Table 4: ID badge usage

Group	Wearing Visible Badges	Total	% Wearing Visible ID Badges
Consultants	5	14	35.7%
Trainees	8	11	72.7%
Nursing	6	23	26.1%
Technicians	2	5	40.0%

DISCUSSION

The impact of practical skills in the field of surgery has been widely recognised. Technical skills are often seen as the most effective way to reduce errors/complications in the operating theatre.[10] Research suggests that a higher level of technical ability (referring to the use and management of surgical tools) corresponds with the likelihood of a surgeon being able to perform a procedure safely.[5,10-12] However, with the most adverse events (including errors and "close calls") occurring in the operating theatre, there has been a push to focus training on non-technical skills.[1,13,14]

Not surprisingly, research has shown that there is a link between seniority, technical surgical experience, and situational awareness. Technically experienced surgeons tend to perform better than trainees when assessing situational awareness in the operating theatre.[10,15] In Australia, technical training is well regulated through competency-based Surgical Education and Training

(SET) programs, and in comparison, the Physician Competency Framework includes competencies such as communication.[16] This framework suggests that technical competency has an element of quality assurance while non-technical skills—for example, situational awareness and effective interfaculty communication—do not have a measure for safety and effectiveness.[8]

Our study demonstrated that non-technical skills included in theatre protocol and SET training such as whiteboard introductions were preformed consistently with 13 out of 14 of the lists beginning with a whiteboard time out, and 12 of these lists included verbal introductions. In constrast, other elements such as name recognition were more varied. There was a clear trend between years of experience in theatre versus name recollection (Figure 1). Despite there being no significant difference upon regression analysis (p=0.2), the trend could suggest that there is a relationship between years of experience, clinical seniority, and ability to recall names, which in turns implies ability to communicate in a clearer, more direct fashion. The only statistical significance between staff members occurred between the trainees and nursing staff: close to 100 per cent of nursing staff correctly guessed every staff member (p=0.039). The fact that trainees have an average of 0.81 years of experience in the operating theatre compared to nursing staff having an average of 6.07 years, suggests that years of work and experience could have more influence over ability to recall names compared to other variables such as formal situational training. Given that study participants were aware that they were being observed and questioned, it may be expected that they would perform well. In many cases, however, there was still an inability to recall staff members' names even with a verbal introduction and whiteboard time out prior to the initiation of the morning list.

Clinical Implications

Effective teamwork relies heavily on task interdependency, meaning each individual (in theatre this refers to surgeons, anaesthetists, and surgical nurses) must coordinate their actions.[5] The coordination of this process is dependent on the idea of closed loop communication, which in turn is reliant on awareness of the identities of the other team members.[5] Despite the importance of effective teamwork, communication breakdown is still identified as a major contributing component of surgical teamwork errors compromising patient safety.[3] Previous studies suggest that due to the hierarchical nature of the operating theatre, there is a level of apprehension associated with instruction when surgical team members were unable to identify members by name.[9,17] Name recognition and open communication can be assisted through the use of self-introduction as well as pre-briefing checklists.[17] One could argue that name identification could be classified as critical to basic communication between staff members, and therefore vital to both effective teamwork but also patient safety.

CONCLUSION

Several elements can contribute to an effective surgical procedure. Surgical components included SET training, surgical skills, and level of seniority, while non-surgical components largely focused on communication through the use of whiteboard/verbal introductions and name recollection.

This study demonstrated that non-technical skills included in theatre protocol and SET training such as whiteboard introductions were preformed consistently. In contrast, name recognition was more varied. The trends displayed could suggest that a relationship exists between years of

experience, clinical seniority, and ability to recall names, which in turns implies ability to communicate in a clearer, more direct fashion. The fact that nursing staff having a higher percentage of correct recall and a higher average number of years worked compared with trainees, suggests that years of work and experience could have more influence over ability to recall names than other variables like formal situational training. One could argue that name identification could be classified as critical to basic communication. And given that—despite repetition bias and observer awareness—name recognition was still a challenge in some of these groups, perhaps there should be more training centred on these "non-surgical" skills.

REFERENCES

1. Bleakley A, Boyden J, Hobbs A, et al. Improving teamwork climate in operating theatres: the shift from multiprofessionalismto interprofessionalism. *J Interprof Care*. 2006;20(5):461–70. doi: 10.1080/13561820600921915

2. Fletcher GC, McGeorge P, Flin RH, et al. The role of non-technical skills in anaesthesia: a review of current literature. *Br J Anaesth*. 2002;88(3):418–29. doi: 10.1093/bja/88.3.418

3. Birnbach DJ, Rosen LF, Fitzpatrick M, et al. Introductions During Time-outs: Do Surgical Team Members Know One Another's Names? *Jt Comm J Qual Patient Saf*. 2017;43(6):284–8. doi: 10.1016/j.jcjq.2017.03.001

4. Fong de Los Santos LE, Evans S, Ford EC, et al. Medical Physics Practice Guideline 4.a: Development, implementation, use and maintenance of safety checklists. *J Appl Clin Med Phys*. 2015;16(3):5431. doi: 10.1120/jacmp.v16i3.5431

5. Gillespie BM, Chaboyer W, Murray P. Enhancing communication in surgery through team training interventions: a systematic literature review. *AORN J*. 2010;92(6):642–57. doi: 10.1016/j.aorn.2010.02.015

6. Yule S, Flin R, Paterson-Brown S, et al. Non-technical skills for surgeons in the operating room: a review of the literature. *Surgery*. 2006;139(2):140–9. doi: 10.1016/j.surg.2005.06.017

7. Gawande AA, Zinner MJ, Studdert DM et al. Analysis of errors reported by surgeons at three teaching hospitals. *Surgery*. 2003;133(6):614–21. doi: 10.1067/msy.2003.169

8. Bleakley A, Allard J, Hobbs A. 'Achieving ensemble': communication in orthopaedic surgical teams and the development of situation awareness–an observational study using live videotaped examples. *Adv Health Sci Educ Theory Pract*. 2013;18(1):33–56. doi: 10.1007/s10459-012-9351-6

9. Gillespie BM, Gwinner K, Fairweather N, et al. Building shared situational awareness in surgery through distributed dialog. *J Multidiscip Healthc*. 2013;6:109–18. doi: 10.2147/JMDH.S40710

10. Graafland M, Schraagen JM, Boermeester MA et al. Training situational awareness to reduce surgical errors in the operating room. *Br J Surg*. 2015;102(1):16–23. doi: 10.1002/bjs.9643

11. Bell RH, Jr. Why Johnny cannot operate. *Surgery*. 2009;146(4):533–42. doi: 10.1016/j.surg.2009.06.044

12. Grantcharov TP, Reznick RK. Training tomorrow's surgeons: what are we looking for and how can we achieve it? *ANZ J Surg*. 2009;79(3):104–7. doi: 10.1111/j.1445-2197.2008.04823.x

13. Sarker SK. Courses, cadavers, and counsellors: reducing errors in the operating theatre. *BMJ*. 2003;327(7418):s109. doi: 10.1136/bmj.327.7418.s109

14. Morey JC, Simon R, Jay GD, et al. Error reduction and performance improvement in the emergency department through formal teamwork training: evaluation results of the MedTeams project. *Health Serv Res*. 2002;37(6):1553–81. doi: 10.1111/1475-6773.01104

15. Powers KA, Rehrig ST, Irias N, et al. Simulated laparoscopic operating room crisis: An approach to enhance the surgical team performance. *Surg Endosc*. 2008;22(4):885–900. doi: 10.1007/s00464-007-9678-x
16. Willems A, Waxman B, Bacon AK, et al. Interprofessional non-technical skills for surgeons in disaster response: a literature review. *J Interprof Care*. 2013;27(5):380–6. doi: 10.3109/13561820.2013.791670
17. Gillespie BM, Gwinner K, Chaboyer W et al. Team communications in surgery – creating a culture of safety. *J Interprof Care*. 2013;27(5):387–93. doi: 10.3109/13561820.2013.784243

PEER REVIEW

Not commissioned. Externally peer reviewed.

CONFLICTS OF INTEREST

The authors declare that they have no competing interests.

ETHICS COMMITTEE APPROVAL

This study received ethics approval from the North East Health Human Ethics Committee. The approval reference is LNR/69679/NEHW-2020-239428(v4).