

Team cohesion and communications in Surgery: Re-designing the Surgical Safety Checklist (SSC) to support teamwork, patient safety and Safety 11 practices

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Abstract

This paper presents a case for redesigning the existing surgical safety checklist (SSC), to better support team cohesion/communications and safety culture. In so doing, it proposes the following enhancements:

- The redesign of the SSC needs to take into account Safety 11 concepts
- Redesign activities need to link to broader hospital safety management concepts and practices
- The SSC should be located in the context of both formal and informal planning/briefing practices involving different members of the multi-disciplinary team prior to the 'sign in' stage and post 'sign-out'

Further, this paper argues that good teamwork will necessitate behaviour change on the part of all relevant actors in surgery. This behaviour change will be underpinned by wider organisational change. Critically, organisational change is necessary to address the socio-technical 'root causes' of non-compliance and specifically, cultural issues.

In support of this, this paper draws upon the findings of the first phase of a clinical audit pertaining to teamwork practice and the use of the SSC, at a Dublin hospital. Overall, these enhancements - which go beyond existing guidelines (Health Service Executive and World Health Organisation), will better support team cohesion/communication and safety culture. This in turn will positively impact on patient safety.

Introduction

People often work alongside each other (i.e. operating as a group), but not in teams (Katzenbach and Smith, Cashman et al, 2004). Teams act as a cohesive unit, with a common positive purpose, with a collective competence and experience more than the individual, and with mutual accountability for results (Cashman et al, 2004). As highlighted by Hackman (1990), team effectiveness is not a given. Rather, teams develop their expertise over time. Successful team formation is essential to team performance. A defining characteristic of such team formation is 'team cohesion' (Moran, 2012). Further, team leadership has an impact on the quality of team performance and team effectiveness (West, 2012).

Patient safety depends upon open communication, trust, effective interdisciplinary teamwork and systems thinking (Francis, 2013; Madden, 2008; Department of Health and Children, 2001; Kohn, Corrigan, Donaldson, 1999). The Madden Report (2008) highlights many challenges to effective teamwork in healthcare (i.e. hierarchical culture which impinges on teamwork, lack of trust, and a reluctance to seek help if a mistake is made). As highlighted by the Medical Council (2010), “Medical practitioners must co-operate with colleagues and work effectively with healthcare professionals from other disciplines and teams. He/she should ensure that there are clear lines of communication and systems of accountability in place among team members to protect patients”.

Teamwork and communication is critical to safe surgery and the delivery of patient centred care. However, teamwork is not a given, and even ‘experts’ need help (Gawande, 2009). The WHO Surgical Safety Checklist (SSC) (2009) is a communication tool that supports teamwork and communication in Surgery. The World Health Organisation (WHO) SSC is structured in 3 stages: (1) before the induction of anaesthesia (“sign in”), (2) before the incision of the skin (“time out”) and (3) before the patient leaves the operating room (“sign-out”). Teamwork checks are performed at each stage. Evaluations of the effects of the WHO SSC have been very positive (Haynes, Weiser, Berry, Lipsitz, Breizat, Dellinger, Herbosa, Joseph, Kibatala Lapitan, Merry, Moorthy, Reznick, Taylor, Gawande, 2009; Weiser, Haynes Dziekan, Berry, Lipsitz, Gawande, 2010). A recent study evaluating the attitudes of theatre staff towards a modified version of the WHO surgical checklist at an Irish hospital, identified a need for the involvement of all theatre team members in the checklist process, and for ‘demonstrated support’ for checklist practice from senior personnel (O’Connor, Reddin, O’Sullivan, O’Duffy & Keogh, 2013). Safe surgery is an important priority for the Health Service Executive (HSE). In this regard, the HSE have issued Safe Surgery Implementation Guidelines (HSE, 2013, 2015).

Performance shaping factors include both internal and external factors. The behaviour/performance of theatre staff in surgery needs to be conceptualized from a socio-technical perspective. That is, it needs to take into account relationship between people, processes, procedures, technology/tools, environment, culture and training. In this regard, Salas (2011) argues that we must create and sustain an organisational system that supports teamwork. Safety (Safety-I) has traditionally focussed on the avoidance of bad events. That is, a reactive approach responding to what is going wrong and/or identified risks. Hollnagel and others argue that safety requires a proactive approach (Hollnagel, 2014, Hollnagel *et al*, 2015). ‘Focusing on what goes right, rather than on what goes wrong, changes the definition of safety from ‘avoiding that something goes wrong’ to ‘ensuring that everything goes right’ (Hollnagel, 2014). This is termed ‘Safety-II’. Importantly, ‘Safety II’ is underpinned by open communication (briefings and debriefing), routine reporting and a just culture (Hollnagel, 2014, Hollnagel *et al*, 2015).

Research Context, Objectives and Method

Research Context

The Adelaide and Meath Hospital Incorporating the Children’s Hospital (AMNCH) provides child-health, adult, psychiatric and age-related healthcare services. There has been a strong history of engagement with the SSC at AMNCH. The first local implementation of the SSC occurred in 2009, in advance of the HSE Safe Surgery guidelines. A further version was implemented in 2011. In 2013, the third (and current version) was introduced. In August 2013, the Theatre Department issued a policy document relating to Patient Identification Verification for Surgical/Invasive Procedures through the ‘Surgical Safety Checklist’, in the Operating Theatre of the Tallaght Hospital (Tobin, 2013). This has since been updated and makes

reference to relevant SSC procedures (Tobin, 2015). Currently, the AMNCH SSC checklist is printed on the induction room and theatre walls. Theatre personnel refer to checklist items from memory. An electronic system (the Patient Information Management System - PIMS), is used in parallel to the SSC, to record compliance with the SSC. This is in line with HSE guidelines (i.e. recording of checklist stage, team members involved and times completed).

Objectives

A locally initiated clinical audit of teamwork practice in relation to the use of the SSC is currently being undertaken at AMNCH. The overall objective of this audit is to redesign the existing checklist following evidence based human factors research concerning existing teamwork/SSC practice. The research is structured in terms of two phases. Phase 1 involves an initial indicative audit of teamwork practice in relation to the use of the hospital's SSC (comprising interviews and observations, research analysis and provisional recommendations for an improved checklist). Phase 2 examines change recommendations in more detail – involving (1) stakeholder based co-design workshops to identify changes and an implementation plan, (2) piloting a new checklist/practice and measuring performance/impact and (3) an awareness campaign linked to this. Overall, this research can be characterized as qualitative action based research, following a 'stakeholder involvement/evaluation' methodology (i.e. AMNCH staff act as co-designers of an improved SSC). This links to the existing Plan, Do, Study, Act (PDSA) quality improvement methodologies adopted by the hospital.

Overview of Phase 1 Research

First, relevant SSC standards including WHO (2008), HSE (2013, 2015) and publically available hospital SCC templates/examples were reviewed. A detailed interview was conducted with a Nurse Manager, to understand the background to the implementation of the SSC at the hospital and current human factors issues. Also, the researcher reviewed the PIMS system and associated reporting outputs.

The researcher briefed nursing personnel in advance of the theatre observations and interviews. Further, posters were positioned in hospital social areas and in theatre, to communicate the purpose of the clinical audit to staff. Ten observations spanning different theatres/surgery types (Orthopaedics, Urology, Paediatrics, Trauma and Vascular) were undertaken. Also, the researcher conducted twenty three interviews with theatre staff. This included Clinical Nurse Managers, theatre nurses [scrub and circulating}, Surgeons and the Anaesthesia team. Some of these interviews were opportunistic (in theatre and/or post-surgery). Structured interviews were conducted with three nurses (Theatre manager, Theatre Nurse and Admissions Nurse), one Anaesthetist and two Surgeons. The Researcher obtained an ethics waiver from the hospital for this research. For a detailed breakdown of research steps/activity, please see Appendix 1: Research Stages & Steps.

Key Findings

The following is a summary of the key findings of theater observations and interviews:

- Nursing personnel are a key co-ordinating interface between all roles
- Much of the functional logic of theatre work depends on informal communications/information sharing between nursing personnel and the other members of the team (i.e. informal social process)

- Team members understand each other roles/function
- In general, team members exhibit appropriate behaviours (i.e. assertiveness, respect, communication, co-ordination, clinical leadership)
- The SSC is familiar to all and the importance of complying with the SSC in relation to communications/safety culture and patient safety is well understood
- The SSC (i.e. AMNCH Implementation) is well integrated with work activity
- Mostly, staff reflect a positive attitude towards using the SSC
- Theatre personnel engage with the SSC at different levels (mostly nurse led)
- Staff are using the SSC – but not always appropriately and/or accurately
- Not all steps are happening formally (this issue spans all three phases)
- There are some key concern in relation to briefing and debriefing around patient risk (risks to be addressed in surgery, and post-operative concerns)
- The performance of the checklist follows from (and links to) various prior briefings (both formal and informal) undertaken by some similar and different roles, both earlier in the process (from admissions to team briefings at the start of the day etc) and later in the process (recovery)
- Time pressure has an impact on SSC compliance – particular in relation to patient handover (sign-out phase)
- Surgeons need to show leadership re compliance with SSC and safety culture
- The physical design of the workspace (social rooms, induction rooms) impedes teamwork
- There are some gaps in relation to the existing implementation of the SSC and recent HSE SSC guidelines

It was also noted that staff do not obtain teamwork training (i.e. training in non-technical skills). Further, it was observed that any SSC redesign activity needs to take into account the lessons learned from past redesign activities. Specifically, this concerns the need for management buy-in and the importance of adopting a ‘stakeholder evaluation’ approach.

Discussion

Non Compliance & Root Causes

The SSC is intended as a formal checklist and not a guide. As such, non-compliance issues must be addressed. Team performance must be understood from a socio-technical perspective. Preliminary root-cause analysis suggests broader issues linking to teamwork/communications values/culture (i.e. teamwork culture, safety culture/attitudes, perception of different roles, professional latitude), mind-set re policy and policy change, training, process design issues (time and resourcing issues) and the design of staff work contracts. Evidently, the system must be designed to facilitate and promote teamwork (i.e. time in process, training delivery, clarity/fairness re work contracts, attention to culture etc). For the SSC to work, these other elements must be in place. In this regard, there is a relationship between behaviour change (change in behaviour for theatre staff) and organisational change (changes to existing hospital processes, culture and so forth) to enable staff behaviour change.

Teamwork States

Observations indicate that processes/checks related to briefing and debriefing require improvement. Potentially, there is a lack of clarity across team members (1) in relation to the teamwork/communication states to be achieved (both individually and collectively) to support

patient safety, and (2) how this is enabled by the SSC. The ‘states’ can be defined in relation to two aspects of team cohesion (1) task cohesion and (2) social cohesion. For example, at the time-out stage, team states might include:

- The procedure and associated risk is understood by everybody in the team
- Open verbal communications between all staff (irrespective of rank/level of expertise)
- Senior team members supporting training of Junior team members

These states will need to be agreed with stakeholders and used as a basis for setting the ‘communication/teamwork’ goals for each stage of the SSC. For more information on teamwork states and the SSC, please see Appendix 3.

Vision for the Improved SCC

Compliance with the SSC is not the only teamwork/communication indicator. Moreover, compliance with the SSC is not the only indicator of patient safety. The SSC needs to be considered as one element of an overall safety management approach/system delivering patient safety. Other elements include open disclosure, the development of reporting systems (mandatory, confidential), the promotion of safety culture, routine monitoring of risk (predictive and reactive), the specification of communication/information sharing processes/procedures, the practice of briefing/debriefing and teamwork training. Such practices are typical of other safety critical systems (e.g. aviation and energy management).

The SSC should not simply be a tick-box exercise to demonstrate a ‘minimal’ level of teamwork. It should be used to promote a strong safety culture, characterized by open communications and disclosure, healthy disagreement, attention to patient risk and staff of all levels feeling free to speak up. One way of promoting this culture is to develop a corresponding step for this type of communication in the SSC (i.e. embed culture in checklist). For example, at the Time out stage, team members might be invited to ‘speak up’ (check item). At the ‘Sign Out’ stage, staff might confirm whether a report is required.

Critically, the redesign of the AMNCH SCC must be considered in the light of Safety 11 concepts. Safety 2 is not just about learning from adverse events, but also about learning from what was done well. Importantly, both the existing AMNCH SSC and the existing HSE standard (2015) do not sufficiently address Safety 11 concepts. Such concepts might be easily embedded in the SSS. For example, at the ‘Sign Out’ stage, a new check might be introduced to confirm that theatre staff have briefed about what went well and what might be improved.

SSC and Broader Hospital Information Flow Processes

Although redesign activities are necessarily focussed on delivering appropriate teamwork states in theatre (scope of SCC), they must take into account relevant team states and activities associated with wider processes and staff information sharing activities. The performance of the checklist follows from (and links to) various prior briefings (both formal and informal) undertaken by some similar and different roles, both earlier in the process (from admissions, to the start of the day/list team briefings) and later in the process (i.e. briefing in recovery). If something is skipped/not covered in detail, then these briefings provide a level of redundancy/resilience. Currently, the relationships between communication activities as part of the SSC and these wider briefing pathways/processes (both formal and informal) are not clear. This is particularly important in relation to the first (sign in) and last stage (sign out) of the checklist. Overall, the checklist redesign needs to be situated in the context of existing patient centred information flows from admissions to recovery. Potentially, the existing process design and level of technology support does not afford this. This warrants further research. Ideally, there might be a formal requirement for a start of day/list briefing for all team members involved in theatre activity.

Initial Redesign Recommendations (high level)

The following is a list of provisional redesign recommendations, which will be validated by relevant stakeholders in a future co-design workshop.

- Overall, the focus of the checklist should be on the teamwork dimensions which underpin patient safety (communication, speaking up/out, briefing, debriefing and reporting)
- The SSC should be designed (and used) from a verification perspective (i.e. confirming what has been done) as opposed to functioning as a guide
- Each stage/phase starts with a 'formal' check that team members are ready to commence (taking into account issues around courtesy and workload)
- Each stage/phase of the checklist is initiated by a designated person (leadership role for verification)
- Given resources issues (feasibility of all team members being in the room at the same time) – consider splitting certain phases into two stages (not everybody present for all)
- Surgeon (or representative from team) involved in the 'sign-in' stage
- All members debrief properly at the 'sign-out' stage (i.e. safety patient handover)
- Consider simplifying the level of reporting in relation to the use of the SSC in PIMS
- The SSC should be integrated with the Safety 2 approach (debriefing in sign-out stage)
- The SSC should be integrated with other staff information sharing processes from admissions to recovery
- There should be a formal requirement for a start of day/list briefing for all team members involved in theatre activity
- Some standardization is required in relation to HSE guidelines

Conclusions

Good teamwork/communication protects both staff and patients alike. A well-designed check list can improve team cohesion/communication and patient outcomes. However, to be effective, the checklist has to work from a functional perspective (i.e. deliver the right teamwork states in relation to task and social cohesion), it must be acceptable to staff (i.e. easy to use and not hamper work activity), staff must use it correctly (i.e. formal check not guide), staff must value it (i.e. safety culture/not just a 'tick-box' exercise) and it must be supported at an organisational level. Further, the checklist must comply with the agreed hospital policy and national/international standards. The root causes of non-compliance must be addressed. This will necessitate examining the broader organisational issues pertaining to current teamwork and SSC practices (process, training, culture). Behaviour change for theatre staff is dependent on broader organisational change. It is likely that this will involve a piece of research around policy specification and implementation, mind-set around policy, the design of work contracts, the provision of training and culture/attitudes. Further, compliance with the SSC is not the only teamwork/communication indicator. Also, compliance with the SSC is not the only indicator of patient safety. The SSC needs to be considered as one element of an overall patient safety approach. As such, redesign activities need to address necessary linkages between the SSC and wider safety management practices. This research indicates that Safety 11 concepts might be embedded in a future redesign of the SSC (specifically, in relation to debriefing). The SSC should be located in the context of both formal and informal planning/briefing practices involving different members of the multi-disciplinary team prior to the 'Sign in' stage and post 'sign-out' (i.e. recovery). Also, the SSC might focus more strongly on team briefing practices concerning patient risk factors at the sign in stage, and in the time out stage. One member of the

Surgery team should be present at the 'Sign-in'. Moreover, briefing in relation to the post-operative plan/safe handover might be improved.

This was an initial indicative audit (small number of interviews and observations). Additional audit activities might be undertaken. Further, all proposed redesign recommendations must be validated with key surgery functions (phase 2 research). As noted previously, future research needs to investigate what key states are required at each stage of the checklist, and how these might be enabled by the SSC. A future co-design workshop will focus on this. Also, a redesigned SSC has been advanced (including some new checks). The proposed checks for each stage of the checklist will need to be reviewed and validated by relevant surgery functions. It is anticipated that this will enhance the quality of the checklist design, along with addressing issues around staff buy-in and attitude to change.

References

- Cahill, J (2016). Preliminary Report to Hospital (Phase 1, Teamwork and the use of the Surgical Safety Checklist Audit), Trinity College Dublin, Dublin, Ireland.
- Francis, R. (2013). Executive summary: Report of the Mid Staffordshire NHS Foundation trust Public Inquiry. Accessed April 2015. Available at: <http://cdn.midstaffspublicinquiry.com/sites/default/files/report/Executive%20summary.pdf>
- Gawande, A. (2010). *The checklist manifesto: How to get things right*. New York: Metropolitan Books.
- Haynes AB, Weiser TG, Berry WR, Lipsitz SR, Breizat AH, Dellinger EP, Herbosa T, Joseph S, Kibatala PL, Lapitan MC, Merry AF, Moorthy K, Reznick RK, Taylor B, Gawande AA: A surgical safety checklist to reduce morbidity and mortality in a global population. *N Engl J Med*. 2009, **360**: 491-499. 10.1056/NEJMs0810119.
- Hackman JR (1990). *Groups That Work (and Those That Don't)—Creating Conditions for Effective Teamwork*. San Francisco: Jossey-Bass.
- Hollnagel, E. (2014). *Safety-I and Safety-II: The Past and Future of Safety Management*. Farnham, UK: Ashgate.
- Hollnagel E., Wears R.L. and Braithwaite J. (2015) From Safety-I to Safety-II: A White Paper. HSE Quality and Patient Safety Directorate (2015) National Policy and Procedure for Safe Surgery.
- HSE Quality and Patient Safety Directorate (2013). National Policy and Procedure for Safe Surgery.
- Kohn LT, Corrigan JM, Donaldson MS. *To Err Is Human*. Washington DC: National Academy Press; 1999.
- Madden (2008). Building a culture of patient safety: report of the Commission on Patient Safety and Quality Assurance.
- Medical Council (2010). Eight Domains of Good Professional Practice as devised by Medical Council.
- Moran (2012). *Sport and exercise psychology: a critical introduction*. UK: Routledge.
- O'Connor P, Reddin C, O'Sullivan M, O'Duffy F, Keogh I. Surgical checklists: the human factor. *Patient Saf Surg*. 2013;**7(1):14**.
- Salas (2011), Team Training Can Enhance Patient Safety—the Data, the Challenge Ahead, *The Joint Commission Journal on Quality and Patient Safety*, August 2011 **37:8**
- Tobin, C. (2013). Patient Identification Verification for Surgical/Invasive Procedures through the 'Surgical Safety Checklist', in the Operating Theatre of the Tallaght Hospital. AMNCH,

Dublin, Ireland.

Tobin, C. (2015). Patient Identification Verification for Surgical/Invasive Procedures through the ‘Surgical Safety Checklist’, in the Operating Theatre of the Tallaght Hospital. AMNCH, Dublin, Ireland.

West MA (2012). *Effective Teamwork—Practical Lessons from Organizational Research*. 3rd Edn. Chichester: BPS Blackwell.

Weiser TG, Haynes AB, Dziekan G, Berry WR, Lipsitz SR, Gawande AA: Effect of a 19-item surgical safety checklist during urgent operations in a global patient population. *Ann Surg*. 2010, **251**: 976-980. 10.1097/SLA.0b013e3181d970e3.

World Health Organisation (2009). *Safe Surgery Saves Lives Implementation Manual Surgical Safety Checklist*. Geneva.

World Health Organisation (2009). *WHO Guidelines for Safety Surgery*. Geneva.

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Appendices

Appendix 1: Research Stages & Steps

Table 1 Research Stages and Steps

#	Stage	Step
1	Research planning and ethics	Initial research review – telephone and in person interviews Preliminary interview/observations to understand practice and issues Submit pro forma Submit TCD, School of Psychology Ethics Submit TCD, School of Medicine Ethics Submit AMNCH, Ethics
2	Literature review	Review WHO literature and best practice Review HSE literature Review of 10 SSC (publically available information) – including WHO and HSE guidelines Comparison of existing hospital checklist with above
3	Field research and initial analysis (phase 1)	Review of SSC implementation history and PIMS walk-through with Clinical Nurse Manager (Claire Dardis) Theatre observations (10 - involving theatres 1, 3, 4, 5, 9 and 11) Interviews with theatre staff (23 – comprising different functions: Clinical Nurse Managers, theatre nurses [scrub and circulating}, Surgeons and Anaesthesia team)

4	Initial analysis and report	Initial analysis of findings (conformance with SOP and recommendations for redesign) Redesign proposal: proposed checklist example Production of phase 1 intimal report Review of report with stakeholders
5	Report Review	Review with team
6	Further analysis	Comparison of findings with HSE guidelines (in reference to HSE audit instrument) SSC gap analysis (HSE, WHO and AMNCH) – at level of information units
7	Final Report (Phase 1)	Integration of review feedback Production of phase 1, version 2 report

Appendix 2: SSC and Process/Information Flows

Figure 1: Information flows linked to SSC

Appendix 3: Teamwork states and SSC

Table 2: Teamwork states and SSC

#	SSC Phase	Teamwork States
1	Sign-in	<p>Successful team formation (i.e. the group becomes a team)</p> <p>Patient at ease and understands procedure</p> <p>Relevant team members briefed re patient status, procedure and associated risks (Consultant Anaesthetist, Anaesthetist Dr Jr, Anaesthetist Nurse, Member of Surgery team etc)</p> <p>Surgeon has discussed procedure with patient - if required</p>
2	Time-out	<p>Successful team formation (i.e. the group becomes a team)</p> <p>The team understand their goals and how they will achieve this as a team</p> <p>Team members understand all members roles and functions</p> <p>The team acts as a cohesive unit (i.e. a team and not a group)</p> <p>The team have a common positive purpose (patient safety, teamwork)</p> <p>The procedure and associated risk is understood by everybody in the team</p> <p>All team members are briefed re procedure</p> <p>Team based situation assessment</p> <p>Predictive risk management</p> <p>Open verbal communications between all staff (irrespective of rank/level of expertise)</p> <p>Potential for healthy disagreement</p> <p>Understanding/agreement that reporting/speaking up is valued</p> <p>Professional latitude for all staff</p> <p>Senior team members supporting training of Junior team members</p> <p>Junior staff comfortable requesting support of senior staff if needed (particularly in situations when senior staff are not in theatre)</p>
3	Sign-out	<p>Surgery completed</p> <p>All team members have a clear risk picture re status of patient</p> <p>All team members are briefed re procedure performed and any issues arising</p> <p>Open verbal communications between all staff (irrespective of rank/level of expertise)</p> <p>Safe patient handover</p> <p>Team learn lessons – what went well, what might be improved</p> <p>Safety events reported</p>