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# Use of surgical and radiology checklists in Australian hospitals: uptake, barriers and enablers

AUSTRALIAN PATIENT

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SAFETY FOUNDATION

# Use of surgical and radiology checklists in Australian hospitals: uptake, barriers and enablers

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## Lay Summary

Surgical safety checklists are recommended for use in the operating theatre as a 'to-do list' and final check before an operation starts to ensure that the patient has the correct operation on the correct site, along with the identification of any other issues that may compromise patient safety (such as checking the surgical equipment, and plans for dealing with potential difficulties and handling specimens). International studies have shown that these checklists have reduced deaths and complications from surgery in a range of countries. Due to their success, they are now also used in radiology. The aim of this three-phase study was to investigate the current use of checklists across Australia and, in particular, investigate how well checklists are being used, including what helps or prevents their use. To do this, a survey of hospitals across Australia was undertaken. Additionally, researchers spent time observing checklist use in practice and conducting focus groups with surgical and radiological staff. We have shown that although checklists are being widely used and accepted throughout Australia, the observations of their use showed low compliance with completing checklists in surgery and radiology, in spite of the fact that boxes were often 'ticked' on checklists retrieved from medical records. Specific barriers to the use of these checklists have been found to be accountable for this, including, but not limited to, that completing the checklist is time consuming, is met with resistance from staff and requires a cultural change.

> **Focus group participant:** *I had a patient that I left on clopidogrel because it was such a high risk to take him off, for a colonoscopy…and I sort of forgotten that that's what I'd done and the anaesthetist said 'oh this is the guy you left on clopidogrel' oh that's right we can't do any biopsies and then halfway through the bloody procedure I said let's give me the biopsy forks and the nurse said 'no we can't' and I'd forgotten so it was a very good example of where the team time out, the checklist, actually prevented a mishap, and yet we were all behaving with the very best intent, but we nearly caused a significant bleed… I actually said 'thank goodness we did the checklist.'*

> **Focus group participant:** *I think that people just tick it without going through it. It's "Oh we're leaving. We need to tick it and send the patient out". I think that last bit is sort of an afterthought. You just tick it so you can get it out of the way and send the patient off.*

# Executive Summary

**Background**

Surgical safety checklists have been shown to reduce deaths and complications from surgery in a range of countries. Although their effectiveness has been studied extensively, little is known about their use and the barriers and enablers to their use in Australia.

**Aims**

The aims of this project were to investigate the use of safety checklists in surgery and radiology and understand what facilitates and what hinders their use in Australian hospitals.

**Methods**

A multi-method and phased research approach was designed to achieve these aims. Phase 1 consisted of a nationwide survey of the extent of checklist use. Phase 2 involved observations and medical record audit to determine compliance with checklist use, and included qualitative discussions with hospital staff to identify barriers and enablers to their use. Phase 3 included the conduct of two formal focus groups (one with radiologists and one with surgeons) to better understand why certain barriers occurred and identify potential areas for improvement.

**Results**

From the 1039 surveys sent out, 180 surveys were returned (a response rate of 17% in Phase 1). Checklists were in place in 91% of organisations. The majority (60%) were modified, paper checklists, and most respondents had a positive attitude to their use. The most prevalent barrier was 'time', whilst 'nursing staff', 'general staff involvement' and 'culture/commitment to patient safety' each rated equally as the highest enablers. Another important point to have come out of Phase 1 of the project is that incongruence exists between the actual usage of the safety checklist by hospitals compared to the WHO standard. This was further examined in Phase 2 of the project.
Eleven surgical departments participated in Phase 2. For these, overall average completion of the checklist was 27%. The checklist items most commonly addressed by the surgical staff were: correct patient (99%), site (37%) and procedure (97%), that the consent form has been signed (36%), whether the patient has any allergies (80%), and whether the instrument counts were correct (56%). From discussions with staff, 13 broad categories were identified that related to enabling factors and 17 to barriers. Four radiology departments participated in Phase 2. Checklist compliance ranged from 0-100% across the sample, with a mean of 38% completion. Checklist items most commonly addressed included correct patient and procedure (80% and 59%, respectively), and whether or not the patient had any allergies (61%). From discussions with staff, 12 broad categories were identified that related to enabling factors and six to barriers. There was no significant difference between surgery (M = 37, SD = 19) and radiology (M = 38, SD = 31) with respect to their completion of the safety checklist.

**Conclusion**

This project is the first national investigation conducted into the use of checklists throughout Australia. Although checklists have been received positively where they have been implemented, the completion of checklists appears to be low in both surgical and radiological settings. A number of barriers and enablers to the use of checklists were identified. There was a substantial gap between what was documented to have been done and what was actually done; this required policy change to ensure they are addressed.

## Introduction

There is compelling research evidence demonstrating that the use of a surgical safety checklist in operating theatres reduces postoperative morbidity and mortality. The surgical safety checklist has since been adapted for use in radiology. Although the use of these safety checklists (SCs), which involves the treating team answering a standard list of questions and ticking them off of the list, is known to improve patient safety and is supported by professional organisations, state health departments and national patient safety organisations, the extent of their use in Australian hospitals and the barriers to and enablers of their use are poorly understood.

Surgical SCs have been fertile research topics since the publication of two key research articles, that demonstrated their effectiveness in significantly reducing mortality and morbidity in both developed and developing countries(Haynes, Weiser et al. 2009; De Vries, Prins et al. 2010). Estimates from systematic reviews of surgical SC use suggest a reduced relative risk of death of 0.57 (0.42-0.76 95% CI) and of any complication of 0.63 (0.58-0.67 95% CI) (Borchard, Schwappach et al. 2012). Treadwell, Lucas and Tsou reported that improved patient outcomes from SC implementation were "generally impressive" (p. 302) in the 10 studies which had relevant data (Treadwell, Lucas et al. 2014). Other outcomes from SC use include: increased detection of potential safety hazards, improved communication among operating staff and improved safety attitudes, as well as efficiency benefits including ensuring all necessary equipment is available in the theatre or radiology room before the procedure commences (Haynes, Weiser et al. 2011; Treadwell, Lucas et al. 2014). Surgical SCs have subsequently been adapted for use in other areas such as radiology (The Royal College of Radiologists 2009; The Royal College of Radiologists 2013).

Three strategies for successful implementation of SCs have been highlighted:
- enlisting institutional leaders as local champions
- incorporating staff feedback for checklist modification
- avoiding redundancies or duplication between SCs and pre-existing data collection methods (Paull, Mazzia et al. 2009; Treadwell, Lucas et al. 2014).

Multidisciplinary engagement, training, clear communication about how and why implementation is required, and provision of staff empowerment opportunities have also been cited (Conley, Singer et al. 2011; Borchard, Schwappach et al. 2012). Use of multiple, potentially escalating strategies, such as persuasion, support, regulation and sanctions have been used by hospital administrators to implement SCs in Australian hospitals (Healy 2012).

Compliance with checklist use has been shown to be generally good overall (Borchard, Schwappach et al. 2012); but some studies have suggested some surgical SCs or their components are 'often neglected', or skipped (Sivathasan N 2010; Rydenfalt, Johansson et al. 2013). A prospective, observational study showed higher compliance with surgical SCs in a New Zealand hospital that used a strict protocol to guide their implementation compared with a hospital that lacked a comprehensive implementation program (Hannam, Glass et al. 2013).

The exact mechanism, or 'active ingredient', of SCs that leads to safety improvements is not fully understood. The actual items checked are not directly related to the improvements; these seem to be 'meta-effects' (De Vries, Prins et al. 2010). It appears that implementing the checklist can engender system changes and behaviour changes, including a better patient safety culture and improved teamwork. This may be a result of the better team practices such as introductions, briefings and debriefings that are built into the surgical checklist as part of the 'time out' component (Haynes, Weiser et al. 2009; De Vries, Prins et al. 2010).

Studies assessing implementation of SCs at a national level are uncommon, although Nugent identified compliance gaps and implementation barriers in a survey of Irish hospitals (Nugent,

Hseino et al. 2012). In Australia, the use of SCs has been strongly supported by professional organisations (e.g. Royal Australasian College of Surgeons), State Governments and the Australian Commission on Safety and Quality in Healthcare. Despite widespread support for the checklists, we are not aware of any published research on the implementation or success of either the surgical or radiology SCs in Australian hospitals.

## Aims

### Phase 1

The aims of Phase 1 were to:

    (i)       measure the extent of implementation and current use of safety checklists (SCs) in surgery and radiology across Australian hospitals, and

    (ii)      better understand attitudes to SCs and how they are used in practice.

### Phase 2

The aims of Phase 2 were to:

    (i)       evaluate how the SCs are used in practice in both the surgical and radiology settings,

    (ii)      better understand attitudes towards their use, and

    (iii)     identify enablers and barriers to their use.

### Phase 3

The aim of Phase 3 was to investigate why the barriers and enablers identified in Phase 2 existed and to discuss these in detail, including areas for improvement and whether these could be modified. The participants in Phase 3 were radiologists and surgeons who had ultimate responsibility over the checklist in their departments.

## Methodology

### Phase 1 Methods

#### *Questionnaire development*

The questionnaire comprised three sections:

Section A – 10 questions relating to checklist use and 26 Likert scale items measuring attitudes to checklists and their implementation. The Likert scale items were sourced from earlier studies, chiefly (Nugent, Hseino et al. 2012) 17 items and (Haynes, Weiser et al. 2011) one item, the remaining eight items and 10 questions were developed by the research team.

Section B – three demographics questions for the respondent, two for the facility.

Section C – three open ended questions investigating barriers and enablers to checklist use and implementation, and the purpose served by checklists.

The draft questionnaire was piloted on a sample of 10 radiologists, surgeons and nurses, across both publicly- and privately-funded settings. This resulted in minor changes to its wording. See appendix 1 for a copy of the Phase 1 survey.

#### *Questionnaire administration*

The questionnaire was posted to all 1039 hospitals listed as providing beds on a Department of Health and Ageing database, comprising 287 private hospitals and 752 public hospitals (http://www.myhospitals.gov.au/). Given differences in hospital structures, the recruitment methods varied slightly between the public and private settings. Public hospitals were sent two questionnaire packs, comprising an introductory letter, information sheet and the questionnaire, addressed to Heads of Surgery and Radiology, respectively. Private hospitals were posted one letter, including two questionnaire packs, addressed to the Chief Executive with a request to pass the questionnaire on to the hospital's theatres and providers of radiology. Reminder letters, including a link to a downloadable copy of the questionnaire, were sent after three weeks. The study was promoted through newsletter items and reminder emails delivered by professional organisations (Royal Australasian College of Surgeons, Royal Australian and New Zealand College of Radiologists, Royal Australasian College of Medical Administrators).

Because the hospital database did not identify whether surgical and/or radiological services were provided, a random sample of 10% of the hospitals was reviewed to obtain a better estimate of the true response rate. The websites of 102 hospitals were investigated; in cases where it was not clear from the website which services were provided, hospitals were contacted by telephone. This identified that 58 hospitals (57%) provided surgery (15/24 private hospitals, 43/78 public hospitals) and 59 hospitals (58%) provided radiology (13/24 private hospitals, 46/78 public hospitals). Based on these figures, we inferred that there were 594 eligible hospitals that provided surgical services, and 598 hospitals that provided radiological services, in the sample of 1039 hospitals.

#### *Data analysis*

#### Section A and B

We compared responses on the questionnaire between hospital funder (private and public) and setting (surgery and radiology). Chi-square and Fisher's exact test were used to compare categorical variables. The distribution of Likert scale data was highly skewed and resistant to transformation; responses were therefore conflated to 'agree' (combining 'agree' and 'strongly agree') and 'not agree' (comprising 'neutral', 'disagree' and 'strongly disagree'). Binary logistic regression was conducted on this data using funder and setting as predictors. Statistical analysis was conducted using SPSS (v 21).

## Section C

Open-ended responses were coded into themes and sub-themes by researcher (AD) using content analysis methods (Morgan 1993; Hsieh H-F 2005). The coding was reviewed for validity by another researcher (TS).

## Checklists

Participants were asked to submit copies of the SC used in their facility. These were reviewed to determine what proportion of the WHO Surgical SC items were included (World Health Organization 2009). Each item was coded as either a (i) direct match, (ii) partial match, or (iii) no match. A partial match encompassed items in which only some elements of the WHO surgical SC were included (for example, whether an item included all the elements of confirming identity, site, procedure and consent), or if multiple WHO items (e.g. 9 a (i) – (iii)) were conflated into a single item.

## Ethics

Ethics approval for the study was granted by the Low Risk Human Research Ethics Review Group (Faculty of Health Sciences, University of Adelaide), protocol HS-2013-011.

## Phase 2 Methods

### Recruitment and ethics

After responding to the Phase 1 questionnaire, participants were asked if they were interested in participating in future phases of the project and, if so, to provide their details and return them in a separate stamped self-addressed envelope, so that anonymity could be maintained. From the pool of respondents indicating interest in further participation in the project (n=73), 11 hospitals were selected across South Australia, Victoria, New South Wales and Queensland. These states were selected for inclusion due to their proximity to the location of the research team (i.e. Adelaide, South Australia) to ensure the costs associated with sending a member of research staff to collect data could be managed appropriately. A purposive sampling method was used to select the sample; specifically, hospitals were predominantly selected for inclusion on the basis of their geographical location relative to a major city and/or other participating hospitals. It was important that a number of regional hospitals were included in the sample; these were also selected based on their geographical location and proximity to other participating sites. Additionally, the Directors of Surgery and Radiology at all public and private hospitals in metropolitan South Australia were contacted directly with information about the project. Those interested in participating were first provided with the Phase 1 survey to complete and upon receipt of the completed survey they were eligible to participate in Phase 2 of the project. A further four South Australian hospitals, both metropolitan and regionally located, were added to the sample after employing this method of recruitment. This resulted in a total sample of 15 eligible hospitals.

After receiving signed consent from the Director of Surgery and/or Director of Radiology and the CEO at each participating hospital, a National Ethics Application Form (NEAF) was compiled and submitted for each of the four states in which the participating hospitals were located. One NEAF per state was required to apply for ethics approval for all participating public hospitals in each state. In addition to this, a site specific ethics application form was submitted to the local ethics committee of each participating publicly funded site following approval of the NEAF. State-wide approval using the NEAF application form was sought from the Royal Adelaide Hospital Human Research Ethics Committee in South Australia, the Eastern Health Human Research Ethics Committee in Victoria, the Sydney Children's Hospital Network Human Research Ethics Committee in New South Wales and the Metro South Health Human Research Ethics Committee in Queensland. The review of the application for this project by the ethics committee of any state hospital does not imply that the hospital, or any associated hospital participated in the project. The project was not permitted to proceed in any hospital until each had received both NEAF and site-specific ethics approval. The participating private hospitals only required a single site-specific ethics application for review by the local ethics committee and after approval of this single application, the project was provided with an ethics clearance to be conducted in these sites.

Prior to the conduct of any observations, written informed consent was obtained from all hospital staff present in the operating theatre and/or radiology room while the observations were being conducted. These staff were provided with an information sheet about the project and informed that they were free to withdraw from the project at any time and that there would be no consequences associated with doing this.

### Data Collection

Data was collected using a mixed-methods approach as this enabled more comprehensive data unobtainable by using solely quantitative or qualitative methodology (Morse 2003). During Phase 2, data was obtained using three different processes: direct observation, retrospective medical record audit and focus groups and/or interviews. Three researchers were trained in all three stages and communicated throughout, providing frequent feedback to one another throughout the entire data collection process in order to ensure data was being collected with consistency and reliability. To

assess inter-rater reliability of direct observations, all observers were present for a single surgical list. Their scores were then compared and inter-rater reliability assessed through the calculation of Cronbach's Alpha using an intraclass correlation coefficient.

## Observations

The observations of checklist use comprised the main component of Phase 2 and involved direct, non-participant, quantitative observation of the SC in use during two surgical and/or two radiology procedure lists at each participating site. The observer was required to be present in the operating theatre for the full duration of the two procedure lists, which were either a half or full day in duration, depending on the site. Information was recorded on three pre-established data collection forms; one of which was tailored to each individual site depending upon the SC in use there, while the other two were standard forms for use across the 15 participating sites. The observers recorded whether or not each item on the checklist was completed. The SC is typically divided into three sections: 'sign in', 'timeout' and 'sign out'. The 'sign in' section is usually completed with the patient as a participant, before they are anaesthetised. The 'timeout' is conducted with the surgical or radiological team standing around the anaesthetised patient. Finally, the 'sign out' section is conducted post-procedure, while the patient is still anaesthetised. See Appendix III for the two full forms and an example of the form tailored for each site, as well as for examples of the types of items contained in the three sections.

Checklist compliance was assessed in two ways. Firstly, compliance was assessed within the framework proposed by the World Health Organisation (WHO) for using their surgical SC. In completing the WHO Surgical SC, it is stipulated that each checklist item must be read aloud by a team member and the response provided by a different member of the team, regardless of whether it is relevant to the procedure (World Health Organization 2009). The WHO guidelines for use of the surgical SC were held as the gold standard for this research project (World Health Organization 2009). Secondly, the conduct of the checklist was also evaluated in relation to the guidelines for use of the specific checklist implemented at a given hospital. The individual hospital checklists and policies were considerably less stringent than those proposed by the WHO and did not always require verbal confirmation or even completion of all checklist items. To be marked as compliant with the hospital-specific checklist, items were typically required to be read aloud by a single member of the team without the confirmation of a second team member.

Throughout the conduct of observations, comprehensive notes were recorded by all observers in relation to instances where checklist compliance could not be marked as having occurred but when actions or confirmations related to the checklist items were carried out. For example, confirmation that the specimen was labelled correctly may not have occurred overtly, but discussions around the fact that the specimen was labelled were recorded. These notes were important to gain a clear picture of how the checklists were being used in practice; what items the team viewed as important, and which items were considered to have little utility.

## Retrospective Medical Record Audit

In addition to observations, a retrospective audit of the SCs in the medical record was conducted in order to measure compliance with documentation of their component items. The medical records department at each participating hospital was contacted and asked to provide a list of all patients who had undergone a surgical or radiology procedure 12 months prior to the observations (i.e. before any contact between the research team and the hospital). A random number generator was used to randomly sample 50 records from the pool of eligible surgery or radiology procedures. Following this selection, the random sample of records was requested, usually by the unit record number (URN) and retrieved by the medical records department. The retrieved records were typically in hard copy. Once all requested records were available, a member of the research team attended the medical records department and conducted the audit using a pre-prepared standard

data collection form (Appendix IV). The main outcome measure of the retrospective medical record audit was the percentage completion of the surgical and radiological SC component.

## Focus Groups and Interviews

Open-ended focus groups and interviews were conducted during Phase 2 to ascertain staff perceptions of barriers and enablers to the implementation and use of the SCs. Focus groups involved the participation of a small group of theatre or radiology nurses. Moderation of the focus groups was based on a focus group protocol and the Chatham House Rule (Appendix V). The Chatham House Rules stated that 'when a meeting is held under the Chatham House Rule, participants are free to use the information received, but neither the identity nor the affiliation of the speaker, nor that of any other participant, may be revealed.'(Chatham House 2012) The focus groups were scheduled to run for one hour and were scheduled for a time that was most convenient for the participants.

The interviews were conducted on an opportunistic basis with any member of theatre or radiology staff: nurses, surgeons, anaesthetists, radiologists and radiographers. Consented interview participants were given the option of being interviewed at the hospital, or over the telephone, at their earliest convenience. An interview schedule based on the focus group was used. All focus groups and interviews were recorded and transcribed verbatim by the moderator in order to optimise accurate transcription.

## *Data Analysis*

## Observations

Descriptive statistics including means, standard deviations and frequencies were calculated to summarise the: methods of recording checklists (i.e. hard copy or electronic); number of different types of procedures included in the study; number of items present per checklist; the percentage of items completed on the checklist and the number of staff present in the operating theatre or radiology room. Initially, frequencies were produced to describe different checklists and number of hospitals promoting checklist use. Percentage completion was calculated for the observational data in order to allow for homogeneous comparison between sites that use different checklists. Only data related to the 'time out' section of the checklist were able to be calculated for the radiology observations because, with the exception of one hospital for the 'sign in' section and one for the 'sign out' section, these were the only sections completed. Analyses were conducted on the basis of overall checklist completion, as well as in terms of completion of the three sections of the checklist. Additional analyses on a per item basis were also included in order to provide an understanding of which checklist items were being addressed and which were not.

Comparisons were drawn between State and types of surgical procedures being conducted, categorised according to the type of list being observed, and checklist completion using a Kruskal-Wallis one-way analysis of variance (ANOVA) for non-parametric data. In addition, a comparison was made between the percentage checklist completion of publicly- and privately-funded hospitals, using the Mann-Whitney U test. The Mann-Whitney U test was also used to compare percentage completion of the checklist between the participating surgery and radiology departments. It is important to note that due to a lack of data for the 'sign in' and 'sign out' sections of the checklist from the participating radiology departments, only the 'time out' section could be used for comparison. Finally, Spearman's rank correlation coefficient analyses were conducted in order to evaluate whether any relationships existed between the number of staff in the operating theatre or radiology room and the number of items on the checklist and checklist completion. Results were considered statistically significant if p was ≤0.05.

## Retrospective Medical Record Audit

The percentage of the SCs that had been completed in writing was calculated for the retrospective medical record audit. Although the hospitals used different SCs, comparisons were made between them in terms of the percentages of the various SCs that had been completed. Initially, comparison of the number of hospitals for which this audit was conducted, as well as how many had surgical and radiology departments and how many used electronic versus hard copy medical records. This was followed by analysis of the percentages of medical records in which SCs were present, as well as the percentage completion of the checklists in the records, for both surgical and radiological SCs.

## Focus Groups and Interviews

Each participant was assigned a number for data analysis, which was conducted using a qualitative content analysis approach (Sandelowski 2000). As the purpose of these focus groups and interviews was to determine perceptions regarding the use of the SCs and barriers and facilitators/enablers to their use, a pre-defined coding structure was used to group findings and form categories. The first phase of analysis involved the researchers immersing themselves in the data by reading and re-reading the transcriptions of the focus groups and interviews. During this process the researchers were able to identify the main findings from the data. The next stage of analysis included the grouping of findings into categories based on the similarity of meaning. Categories were finally presented under the pre-defined headings of barriers, facilitators and use of the checklist representing the perceptions of the participants.

## Phase 3 Methods

### Recruitment

Phase 3 of the project involved the conduct of two separate focus groups (involving surgeons and radiologists, respectively) to investigate in greater depth the barriers and facilitators associated with checklist implementation identified in previous phases. The aim was to investigate why the barriers and enablers identified in Phase 2 existed and to discuss these in detail, including whether they could be modified. The participants in Phase 3 were radiologists and surgeons who were active, practicing consultants in their departments. Both focus group samples were recruited using purposive sampling. The surgical focus group was recruited using word of mouth from a member of the research team who was also a surgeon at the South Australian hospital at which the focus group was conducted. Recruitment for the focus group with the radiologists was conducted by advertising with the Royal Australian and New Zealand College of Radiologists. The focus group for radiologists was conducted via a teleconference due to difficulties in recruiting participants to attend a face-to-face focus group, whereas the surgeons' focus group took place face-to-face.

### Data Collection

As with the Phase 2 focus groups, all participants provided informed consent. Both Phase 3 focus groups were moderated by a member of the project team, who followed a predetermined focus group protocol (Appendix VII). However, the moderator did allow the conversation to move away from the predetermined questions as long as it remained on the topic of barriers to implementation of the SC in surgery or radiology. These focus groups ran for an hour and were recorded for ease of transcription. The researcher who moderated the focus group also transcribed and analysed the data. Acting as moderator for the focus group, transcriber and analyst of the resulting data facilitated engagement and immersion in the data, which is considered one way to enhance the interpretive analysis (Knodel 1993).

### Data Analysis

The focus groups were recorded using a digital device and then transcribed verbatim by the moderator. Confidentiality was maintained throughout the focus group activities and participants were assigned a number in the transcription. Data analysis for the first focus group was conducted via a process of coding, categorising, and identifying themes, a process that has been used previously in focus group studies. (Webb and Kevern 2001) This was facilitated via the Joanna Briggs Institute online Thematic Analysis Package (JBI-TAP). The first phase of analysis involved the researchers immersing themselves in the data by reading and re-reading the transcriptions of the focus groups and interviews. During this process the researchers were able to identify the findings from the data. The next stage of analysis included the grouping of findings into categories based on similarities in meaning. Data was finally presented under thematic headings.

## Results

### Phase 1 Survey

From the 1039 surveys sent out, 180 were returned (17% response rate). There were significant differences across settings and providers which ranged from 9% for public radiology to 24% for private surgery (Table 1).

Table 1 Summary of response rate by funder and setting

| Setting | Surgery | | Radiology | |
|---|---|---|---|---|
| Funder | Responses/Number administered | Response rate % | Responses/Number administered | Response rate % |
| Private | 43/179 | 24 | 16/155 | 10 |
| Public | 80/415 | 19 | 41/443 | 9 |
| Contingency table ($\chi^2$ = 31.3, df=3, p < 0.001) | | | | |

Seventy-four of the respondents were nurses, 44 were administrators, 37 were surgeons, 28 were radiographers and 20 were radiologists (Table 2). In terms of experience, there was no difference between surgery and radiology: the mode response was 1-5 years (n=75), followed by 6-10 years (n=42) (Table 2). In terms of location, the majority of 59 private providers were based in major cities and there was no difference between settings (Fisher's exact test, p=0.47); whereas publicly-funded surgery had a greater number of responses from rural/remote locations than did publicly-funded radiology (Fisher's exact test, p=0.001) (Table 2).

Table 2 Summary of responders' demographics for privately funded surgery (n=43) and radiology (n=16), and publicly funded surgery (n=80) and radiology (n=41)

| | | | Surgery | | Radiology | | | |
|---|---|---|---|---|---|---|---|---|
| | | | n | % | n | % | $\chi^2$ | P |
| Profession* | | | | | | | | |
| | Private | Administrator | 17 | 40 | 3 | 19 | | |
| | | Anaesthetist | 0 | 0 | 0 | 0 | | |
| | | Nurse | 33 | 77 | 4 | 25 | | |
| | | Radiographer | 0 | 0 | 6 | 38 | | |
| | | Radiologist | 0 | 0 | 4 | 25 | | |
| | | Surgeon | 2 | 5 | 0 | 0 | | |
| | | Other | 3 | 7 | 1 | 6 | | NS |
| | | | | | | | | |
| | Public | Administrator | 15 | 19 | 9 | 22 | | |
| | | Anaesthetist | 1 | 1 | 0 | 0 | | |
| | | Nurse | 33 | 41 | 4 | 10 | | |
| | | Radiographer | 2 | 3 | 20 | 49 | | |
| | | Radiologist | 0 | 0 | 16 | 39 | | |
| | | Surgeon | 35 | 44 | 0 | 0 | | |
| | | Other | 4 | 5 | 2 | 5 | | NS |
| | | | | | | | | |
| Time in position | | | | | | | | |
| | Private | Less than 1 year | 3 | 7 | 1 | 6 | | |
| | | 1-5 years | 24 | 56 | 9 | 56 | | |
| | | 6-10 years | 10 | 23 | 4 | 25 | | |
| | | 11-15 years | 4 | 9 | 1 | 6 | | |
| | | 16-20 years | 1 | 2 | 1 | 6 | | |
| | | 21 years or more | 1 | 2 | 0 | 0 | | 0.99 |
| | | | | | | | | |
| | Public | Less than 1 year | 6 | 8 | 3 | 7 | | |
| | | 1-5 years | 29 | 36 | 13 | 32 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | 6-10 years | 18 | 23 | 10 | 24 | |
| | | 11-15 years | 9 | 11 | 7 | 17 | |
| | | 16-20 years | 7 | 9 | 0 | 0 | |
| | | 21 years or more | 9 | 11 | 8 | 20 | 0.95 |
| Location | | | | | | | |
| | Private | Major city | 23 | 54 | 11 | 69 | |
| | | Regional | 16 | 37 | 3 | 19 | |
| | | Rural/Remote | 4 | 9 | 2 | 13 | 0.47 |
| | | | | | | | |
| | Public | Major city | 16 | 20 | 22 | 54 | |
| | | Regional | 29 | 36 | 9 | 22 | |
| | | Rural/Remote | 34 | 43 | 10 | 24 | 0.001 |
| | | | | | | | |

\* Multiselect question; sum of percentages exceeds 100% and statistics not conducted

### *Safety checklist use in practice*

Most responses (88%) were received in hardcopy form (Table 3). Ninety one percent of respondents (164 of 180) had an SC policy in place, while nine organisations (5%) used SCs informally and seven organisations (4%) had neither a formal policy nor informal use. In public hospitals, radiology settings were less likely to have a checklist policy in place (Fisher's exact test, p=0.000). This difference was not apparent in private hospitals (Fisher's exact test, p=0.057) (Table 3). In both private and public settings radiology tended to have higher proportions of checklists developed 'from scratch' than surgery (Table 3). Conversely, in both private and public settings, a greater proportion of checklists were modified from pre-existing sources in surgery compared with radiology. Across settings (surgery and radiology) and funders (public and private), overall 60% of respondents used a modified checklist, 17% developed it 'from scratch' and 14% used an unmodified version of the WHO Surgical SC.

The more frequently used checklist format was paper, followed by electronic (Table 3). The total number of types of checklists in place did not vary between funders or specialties (F = 0.55, p = 0.65, 3 df), mean 1.3 ± 0.5 (n=172) (range 1-3). Most organisations kept a hardcopy in the patient records, although radiology departments tended to have a greater spread of responses (Table 3). Whereas only 11 of 122 surgery settings (all publicly-funded) kept an electronic copy, 18 of 51 radiology departments kept an electronic copy. Only 23 respondents (14%) did not identify use of an SC coordinator: 12/119 from surgery and 11/51 from radiology. There was no significant difference between practice settings and use of an SC coordinator ($\chi^2$ = 3.6, p=0.06); however, there was a difference between practice settings in the distribution of who fulfils the role. In surgery, nurses tended to fulfil the role of SC coordinator (approximately two thirds of cases), whereas in radiology a wider range of staff members were coordinators (Table 3).

Table 3 Summary of responses

| | | | Surgery | | Radiology | | | |
|---|---|---|---|---|---|---|---|---|
| | | | n | % | n | % | $\chi^2$ | P |
| Response method | | | | | | | | |
| | Private | Electronic emailed | 2 | 5 | 1 | 6 | | |
| | | Electronic posted | 1 | 2 | 2 | 13 | | |
| | | Hardcopy posted | 40 | 93 | 13 | 81 | | 0.33 |
| | | | | | | | | |
| | Public | Electronic emailed | 4 | 5 | 1 | 2 | | |
| | | Electronic posted | 9 | 11 | 2 | 5 | | |
| | | Hardcopy posted | 67 | 84 | 38 | 93 | | 0.50 |
| Checklist policy | | | | | | | | |
| | Private | In place | 42 | 98 | 13 | 81 | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Informal | 0 | 0 | 2 | 13 | | |
| | | No formal or informal use | 1 | 2 | 1 | 6 | | 0.057 |
| | | | | | | | | |
| | Public | In place | 78 | 98 | 31 | 76 | | |
| | | Informal | 2 | 3 | 5 | 12 | | |
| | | No formal or informal use | 0 | 0 | 5 | 12 | | 0.000 |
| | | | | | | | | |
| Surgical SC derivation | | | | | | | | |
| | Private | Modified from pre-existing | 29 | 69 | 5 | 33 | | |
| | | Unmodified from pre-existing | 3 | 7 | 0 | 0 | | |
| | | Developed "from scratch" | 9 | 21 | 7 | 47 | | |
| | | Unknown | 1 | 2 | 2 | 13 | | |
| | | Blank | 0 | 0 | 1 | 7 | | 0.033 |
| | | | | | | | | |
| | Public | Modified from pre-existing | 53 | 66 | 17 | 47 | | |
| | | Unmodified from pre-existing | 17 | 21 | 4 | 11 | | |
| | | Developed "from scratch" | 3 | 4 | 11 | 31 | | |
| | | Unknown | 2 | 3 | 4 | 11 | | |
| | | Blank | 5 | 6 | 0 | 0 | | 0.000 |
| Type of SC used* | | | | | | | | |
| | Private | Paper | 41 | 98 | 13 | 87 | | |
| | | Electronic | 2 | 5 | 5 | 33 | | |
| | | Whiteboard | 4 | 10 | 1 | 7 | | |
| | | Poster | 2 | 5 | 2 | 13 | | |
| | | Sliderboard | 0 | 0 | 0 | 0 | | |
| | | Other | 2 | 5 | 0 | 0 | | NS |
| | | | | | | | | |
| | Public | Paper | 69 | 87 | 33 | 92 | | |
| | | Electronic | 23 | 29 | 9 | 25 | | |
| | | Whiteboard | 5 | 6 | 1 | 3 | | |
| | | Poster | 5 | 6 | 3 | 8 | | |
| | | Sliderboard | 0 | 0 | 0 | 0 | | |
| | | Other | 1 | 1 | 1 | 3 | | NS |
| | | | | | | | | |
| Storage of completed SCs | | | | | | | | |
| | Private | No record kept | 0 | 0 | 0 | 0 | | |
| | | Hardcopy in patient records | 42 | 100 | 7 | 47 | | |
| | | Electronic copy | 0 | 0 | 6 | 40 | | |
| | | Other | 0 | 0 | 1 | 7 | | |
| | | Don't know | 0 | 0 | 1 | 7 | | 0.000 |
| | | | | | | | | |
| | Public | No record kept | 0 | 0 | 1 | 3 | | |
| | | Hardcopy in patient records | 58 | 73 | 17 | 47 | | |
| | | Electronic copy | 11 | 14 | 12 | 33 | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Other | 1 | 1 | 1 | 3 | | |
| | | Don't know | 10 | 13 | 5 | 14 | | 0.006 |
| Use of a SC coordinator | | | | | | | | |
| | Private | No | 5 | 12 | 4 | 27 | | |
| | | Yes – nursing | 33 | 79 | 4 | 27 | | |
| | | Yes – medical | 0 | 0 | 0 | 0 | | |
| | | Yes - various | 3 | 7 | 7 | 47 | | |
| | | Yes - other | 1 | 2 | 0 | 0 | | |
| | | No response | 0 | 0 | 0 | 0 | | 0.0007 |
| | | | | | | | | |
| | Public | No | 7 | 9 | 7 | 19 | | |
| | | Yes – nursing | 51 | 64 | 10 | 28 | | |
| | | Yes – medical | 7 | 9 | 5 | 14 | | |
| | | Yes - various | 11 | 14 | 9 | 25 | | |
| | | Yes - other | 1 | 1 | 5 | 14 | | |
| | | No response | 3 | 4 | 0 | 0 | | 0.001 |
| | | | | | | | | |

* Multiselect question; sum of percentages exceeds 100% and statistics not conducted

Private providers tended to have more elective surgical cases per month (641 ± 473 [mean ± 1 SD] compared with public providers (496 ± 1099) but slightly fewer radiology procedures (161 ± 134 versus 238 ± 728) (Table 4). Public providers had more emergency surgery cases per month (293 ± 778) compared with private providers (48 ± 81) (F=40.6, p=0.000) (data not shown in Table 4). There was no difference between funding type ($F_{1,143}$=0.62, p=0.43) and setting (surgery or radiology) ($F_{1,143}$=0.14, p=0.71) in terms of length of time the checklist was in place; the mean duration of checklist use was 41.1 ± 33.1 months. There was no difference between funder ($F_{1,143}$=2.7, p=0.103) and setting ($F_{1,143}$=0.84, p=0.36) in terms of the percentage of clinical staff using the SC. Overall, 92% ± 21 staff used the SC for all cases. Surgeons used the SC in more cases (99% ± 3%) than radiologists (91% ± 24%) ($F_{1,143}$=7.6, p=0.007). There was no difference between funders ($F_{1,143}$=2.1, p=0.158) in percent of cases in which the SC was used.

Table 4 Continuous data collected from the SC questionnaire presenting the sample size (n), mean and SD.

| | | Surgery | | | Radiology | | |
|---|---|---|---|---|---|---|---|
| | | n | mean | SD | n | mean | SD |
| | | | | | | | |
| Number of cases per month$ | | | | | | | |
| | Private | 42 | 641 | 473 | 15 | 161 | 134 |
| | Public | 74 | 496 | 1099 | 38 | 238 | 728 |
| Length of time SC has been in place (months) | | | | | | | |
| | Private | 37 | 43 | 35 | 13 | 47 | 37 |
| | Public | 69 | 39 | 32 | 28 | 41 | 35 |
| | | | | | | | |
| % of clinical staff using SCs | Private | 42 | 95 | 22 | 15 | 97 | 13 |
| | Public | 76 | 94 | 16 | 34 | 85 | 32 |
| | | | | | | | |
| % cases in which SCs are used | Private | 41 | 100 | 2 | 15 | 95 | 14 |
| | Public | 69 | 99 | 4 | 35 | 89 | 27 |
| | | | | | | | |

$ surgical cases are elective

## *Attitudes to safety checklists*

Responses to Likert scale items, dichotomised to either 'Agree' (agree or strongly agree) and 'Not agree' (neutral, disagree, or strongly disagree) are summarised in Table 5.

Examining combined results (across funder and setting), it is apparent that respondents were, in general, in agreement with the statements, suggesting a positive attitude to SCs. The average percentage agreement across all 26 items was 68% ± 20 (median 74, range 24-96) and there was less than 50% agreement in only four items:

- 12a – Its introduction and set-up in my hospital was not a difficult process* (36% agreement)
- 12e – The implementation and set up of the checklist has not been time consuming* (34% agreement)
- 13c – The surgical staff have not been resistant to the implementation of the checklist* (41% agreement)
- 14f – The use of the checklist has resulted in a flattening of the hierarchical structures (24% agreement)

The item which had the highest level of agreement (96%) was 11 d. 'If I were having an operation or procedure, I would want the checklist to be used'.

Differences between public and private hospitals were only apparent for two items. Public hospital practitioners were less likely to agree that the implementation of the checklist was adequately resourced (Q 12 c) and were more likely to agree that nursing staff were not resistant to the implementation of the checklist (Q 13 a).

Table 5 Summary of attitudes to checklists measured in four questions comprising 26 items in total. Data presented are numbers of responses: A - 'Agree' (comprising 'agree' and 'strongly agree'), N A 'Not agree' (comprising 'neutral', 'disagree' and 'strongly disagree'), separated into privately- and publicly-funded hospitals, and surgery and radiology settings. A 'combined' column presents the percentage agreement across both funding types and practice settings. Statistics presented include the significance of the interaction term, and the probability (P) of a difference between privately- and publicly-funded hospitals, and surgery and radiology settings. Significant differences (P<0.05) are highlighted in bold.

| | Private | | | | Public | | | | Combined | Interactn | Priv v Public | Surg vs Rad |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Surgery | | Radiology | | Surgery | | Radiology | | | | p | p |
| | A | N A | A | N A | A | N A | A | N A | % Agree | | | |
| Question 11 | | | | | | | | | | | | |
| Staff have been trained and educated in how to use the checklist | 42 | 0 | 14 | 1 | 73 | 7 | 31 | 5 | 92 | 0.999 | 0.082 | 0.210 |
| The extent to which the checklist is used is monitored, measured or audited | 40 | 2 | 5 | 9 | 75 | 5 | 30 | 6 | 87 | 0.026 | 0.136 | 0.002 |
| Patient outcomes relevant to the checklist are monitored or measured | 34 | 8 | 8 | 7 | 60 | 20 | 24 | 12 | 73 | 0.247 | 0.933 | 0.057 |
| If I were having an operation or procedure, I would want the checklist to be used | 41 | 1 | 14 | 1 | 76 | 4 | 35 | 1 | 96 | 0.360 | 0.800 | 0.947 |
| The checklist is well embedded in daily clinical practice | 41 | 1 | 15 | 0 | 76 | 4 | 32 | 4 | 95 | 0.999 | 0.195 | 0.355 |
| Barriers that prevented patients from receiving checklist interventions (eg timely and appropriate antibiotics or antiseptics) have been addressed | 34 | 8 | 9 | 5 | 62 | 18 | 22 | 12 | 75 | 0.779 | 0.062 | 0.729 |
| Question 12 | | | | | | | | | | | | |
| Its introduction and set-up in my hospital was not a difficult process* | 17 | 25 | 6 | 8 | 26 | 54 | 12 | 23 | 36 | 0.981 | 0.299 | 0.808 |
| It is not difficult on an on-going basis to implement the checklist that we use* | 30 | 12 | 12 | 3 | 62 | 18 | 27 | 9 | 76 | 0.483 | 0.666 | 0.899 |
| The implementation and set up of the checklist was adequately resourced | 33 | 9 | 11 | 4 | 40 | 40 | 16 | 20 | 58 | 0.936 | 0.000 | 0.493 |
| The implementation and set-up of the checklist has not been financially costly* | 16 | 10 | 8 | 3 | 29 | 29 | 15 | 13 | 55 | 0.687 | 0.158 | 0.546 |
| The implementation and set up of the checklist has not been time consuming* | 11 | 30 | 7 | 7 | 23 | 57 | 17 | 19 | 34 | 0.786 | 0.932 | 0.014 |
| I believe that the benefits of the checklist outweigh the costs of its implementation | 37 | 4 | 13 | 2 | 67 | 12 | 33 | 3 | 88 | 0.369 | 0.642 | 0.509 |
| I do not believe that the checklist is just another 'tick-box' exercise* | 32 | 9 | 12 | 3 | 67 | 12 | 30 | 6 | 82 | 0.805 | 0.352 | 0.947 |
| Question 13 | | | | | | | | | | | | |
| The nursing staff have not been resistant to the | 29 | 13 | 12 | 3 | 69 | 11 | 31 | 5 | 82 | 0.522 | 0.027 | 0.606 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| implementation of the checklist* | | | | | | | | | | | | |
| The anaesthetic staff have not been resistant to the implementation of the checklist* | 18 | 24 | 6 | 7 | 43 | 37 | 16 | 12 | 51 | 0.996 | 0.189 | 0.708 |
| The surgical staff have not been resistant to the implementation of the checklist* | 14 | 28 | 7 | 7 | 33 | 47 | 13 | 13 | 41 | 0.661 | 0.463 | 0.201 |
| The radiology staff have not been resistant to the implementation of the checklist* | 6 | 19 | 12 | 3 | 15 | 22 | 28 | 7 | 54 | 0.424 | 0.273 | 0.000 |
| The radiography staff have not been resistant to the implementation of the checklist* | 6 | 19 | 13 | 2 | 16 | 20 | 31 | 5 | 59 | 0.360 | 0.173 | 0.000 |
| Question 14 | | | | | | | | | | | | |
| The use of the checklist has resulted in positive change in team behaviour | 28 | 14 | 8 | 7 | 51 | 29 | 23 | 13 | 64 | 0.445 | 0.916 | 0.618 |
| The use of the checklist has resulted in an improvement in communication amongst staff | 31 | 11 | 13 | 2 | 59 | 20 | 29 | 7 | 77 | 0.610 | 0.876 | 0.258 |
| The use of the checklist has resulted in an improvement in the consistency of care a patient receives | 33 | 9 | 14 | 1 | 53 | 27 | 30 | 6 | 75 | 0.738 | 0.095 | 0.026 |
| The use of the checklist has resulted in a reduction of errors | 24 | 17 | 12 | 3 | 42 | 38 | 29 | 7 | 62 | 0.746 | 0.586 | 0.002 |
| The use of the checklist has resulted in a greater anticipation of adverse events | 28 | 14 | 10 | 5 | 52 | 28 | 22 | 14 | 65 | 0.826 | 0.722 | 0.736 |
| The use of the checklist has resulted in a flattening of the hierarchical structures | 7 | 35 | 2 | 13 | 20 | 59 | 12 | 24 | 24 | 0.502 | 0.090 | 0.525 |
| The use of the checklist has resulted in a positive culture of safety | 34 | 8 | 14 | 1 | 59 | 21 | 32 | 4 | 80 | 0.907 | 0.316 | 0.037 |
| After considering all the positive and negative aspects of the checklist it is overall a worthwhile tool | 39 | 3 | 14 | 1 | 73 | 7 | 34 | 2 | 92 | 0.776 | 0.842 | 0.594 |

* item was originally negatively worded in the questionnaire, but was re-worded and reverse-scored in this table such that agreement indicates a positive attitude

Table 6 Summary of themes and sub-themes that enable SC use as developed from content analysis of open-ended question

| Theme | Sub-theme | Surgery | | Radiology | | Combined | |
|---|---|---|---|---|---|---|---|
| | | n | % | n | % | n | % |
| Individual person factors | Nursing staff | 26 | 22 | 2 | 3 | 28 | 16 |
| | Staff involvement | 18 | 15 | 10 | 17 | 28 | 16 |
| | Leadership/Champion | 14 | 12 | 3 | 5 | 17 | 9 |
| | Communication | 12 | 10 | 4 | 7 | 16 | 9 |
| | Management involvement/support | 10 | 8 | 2 | 3 | 12 | 7 |
| | Surgeon involvement/support | 9 | 7 | 1 | 2 | 10 | 6 |
| | Staff motivation/energy/attitude | 3 | 3 | 2 | 3 | 5 | 3 |
| | Compliance | 4 | 3 | 0 | 0 | 4 | 2 |
| | Anaesthetists involvement | 1 | 1 | 1 | 2 | 2 | 1 |
| | Engage key stakeholders | 0 | 0 | 2 | 3 | 2 | 1 |
| | Accountability | 0 | 0 | 1 | 2 | 1 | 1 |
| | New medical staff | 0 | 0 | 1 | 2 | 1 | 1 |
| | Patient involvement | 1 | 1 | 0 | 0 | 1 | 1 |
| Hospital culture and past practice | Culture/Commitment to patient safety | 15 | 12 | 13 | 22 | 28 | 16 |
| | Historical experience | 6 | 5 | 1 | 2 | 7 | 4 |
| | Commitment to quality outcomes | 4 | 3 | 2 | 3 | 6 | 3 |
| | Positive workplace culture | 0 | 0 | 1 | 2 | 1 | 1 |
| Knowledge based | Education/Re-enforcement | 21 | 17 | 5 | 9 | 26 | 14 |
| | Knowing the benefits (evidence) | 14 | 12 | 5 | 9 | 19 | 11 |
| | Procedure preparation/understanding | 1 | 1 | 1 | 2 | 2 | 1 |
| Procedure/Process enhancement | Standard practice/Policy/Guideline | 17 | 14 | 6 | 10 | 23 | 13 |
| | Efficient implementation process | 2 | 2 | 2 | 3 | 4 | 2 |
| | Job performance enhancement (doing job easier or better) | 2 | 2 | 0 | 0 | 2 | 1 |
| | Task sharing | 2 | 2 | 0 | 0 | 2 | 1 |
| | Clear process | 1 | 1 | 0 | 0 | 1 | 1 |
| | Clear staff role identification | 1 | 1 | 0 | 0 | 1 | 1 |
| | Resourcing | 1 | 1 | 0 | 0 | 1 | 1 |
| Internal practice that reinforces checklist use | Audit/Performance reports | 16 | 13 | 6 | 10 | 22 | 12 |
| | Management of non-compliance | 1 | 1 | 0 | 0 | 1 | 1 |
| Documentation related | Ease of use | 9 | 7 | 6 | 10 | 15 | 8 |
| | Integrated to current systems | 4 | 3 | 2 | 3 | 6 | 3 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Accessible/Sufficient stock | 1 | 1 | 1 | 2 | 2 | 1 |
| | Adaptable | 1 | 1 | 1 | 2 | 2 | 1 |
| | Electronic access | 1 | 1 | 0 | 0 | 1 | 1 |
| Documentation related | Radiology specific | 0 | 0 | 1 | 2 | 1 | 1 |
| External bodies | State/National roll out | 3 | 3 | 2 | 3 | 5 | 3 |
| | Legal requirement | 3 | 3 | 1 | 2 | 4 | 2 |
| | Professional bodies involvement/support | 4 | 3 | 0 | 0 | 4 | 2 |
| | WHO website as a resource | 4 | 3 | 0 | 0 | 4 | 2 |

Table 7 Summary of themes and sub-themes that inhibited SC use (barriers) as developed from content analysis of open-ended question

| Themes | Sub-theme | Surgery | | Radiology | | Combined | |
|---|---|---|---|---|---|---|---|
| | | n | % | n | % | n | % |
| Time factor | Time factor | 31 | 26 | 16 | 27 | 47 | 26 |
| | Waste of Time | 11 | 9 | 0 | 0 | 11 | 6 |
| No barriers | No barriers | 20 | 17 | 19 | 32 | 39 | 22 |
| Staff factors | Surgeon Non-compliance/Non-commitment | 32 | 26 | 5 | 9 | 37 | 21 |
| | Tick and Flick | 6 | 5 | 0 | 0 | 6 | 3 |
| | Staff Non-compliance/Non-commitment | 3 | 3 | 3 | 5 | 6 | 3 |
| | Long term employees/Older staff | 3 | 3 | 2 | 3 | 5 | 3 |
| | Teamwork factor | 5 | 4 | 0 | 0 | 5 | 3 |
| | Anaesthetist Non-compliance/Non-commitment | 4 | 3 | 0 | 0 | 4 | 2 |
| | Laziness | 0 | 0 | 4 | 7 | 4 | 2 |
| | Confusion of when to use it | 1 | 1 | 1 | 2 | 2 | 1 |
| | Independent process initiated over team process | 2 | 2 | 0 | 0 | 2 | 1 |
| | Poor communication | 1 | 1 | 1 | 2 | 2 | 1 |
| | Forgetfulness | 0 | 0 | 1 | 2 | 1 | 1 |
| | Radiographer Non-compliance/Non-commitment | 0 | 0 | 1 | 2 | 1 | 1 |
| | Surgical ward staff Non-compliance/Non-commitment | 1 | 1 | 0 | 0 | 1 | 1 |
| | Taking short-cuts | 0 | 0 | 1 | 2 | 1 | 1 |
| Implementation-related | Resistance to change/Formalising process | 20 | 17 | 6 | 10 | 26 | 14 |
| | Lack of ownership | 8 | 7 | 2 | 3 | 10 | 6 |
| | Accountability | 1 | 1 | 0 | 0 | 1 | 1 |
| | Allocating Champion | 0 | 0 | 1 | 2 | 1 | 1 |
| | External referral | 1 | 1 | 0 | 0 | 1 | 1 |
| | Insistence on surgeon signature | 1 | 1 | 0 | 0 | 1 | 1 |
| | Interhospital/Department inconsistency | 0 | 0 | 1 | 2 | 1 | 1 |
| | Poor implementation | 1 | 1 | 0 | 0 | 1 | 1 |
| | Rigidity of process | 1 | 1 | 0 | 0 | 1 | 1 |
| | Unprecedented use | 0 | 0 | 1 | | 1 | 1 |
| Organisational factors | Workload/Staffing | 5 | 4 | 6 | 10 | 11 | 6 |
| | Failure to follow policy/procedure/guideline/standard | 0 | 0 | 1 | 2 | 1 | 1 |
| | Legal ramifications | 0 | 0 | 1 | 2 | 1 | 1 |

| | Overtime cost | 1 | 1 | 0 | 0 | 1 | 1 |
|---|---|---|---|---|---|---|---|
| Documentation-related | Repetitious | 8 | 7 | 2 | 3 | 10 | 6 |
| | Document content | 5 | 4 | 4 | 7 | 9 | 5 |
| | Abundance of paperwork | 1 | 1 | 1 | 2 | 2 | 1 |
| | Irrelevant steps/Not specific for purpose | 1 | 1 | 1 | 2 | 2 | 1 |
| | Missing documentation | 1 | 1 | 1 | 2 | 2 | 1 |
| Knowledge-based | Lack of Education/Information | 7 | 6 | 1 | 2 | 8 | 4 |
| | Lack of Understanding | 6 | 5 | 2 | 3 | 8 | 4 |
| Workflow | After hours/Emergency cases | 4 | 3 | 1 | 2 | 5 | 3 |
| | Workflow restrictions | 2 | 2 | 2 | 3 | 4 | 2 |
| | Change in list | 1 | 1 | 0 | 0 | 1 | 1 |
| Evidence | Lack of Audit/Evaluation | 3 | 3 | 1 | 2 | 4 | 2 |
| | Disregard for evidence | 1 | 1 | 0 | 0 | 1 | 1 |
| | Forensic audit tool perception | 1 | 1 | 0 | 0 | 1 | 1 |
| Patient factor | Language barriers | 0 | 0 | 2 | 3 | 2 | 1 |
| | Patient Non-compliance/Non-commitment | 0 | 0 | 2 | 3 | 2 | 1 |
| | Patient anaesthetised too early | 1 | 1 | 0 | 0 | 1 | 1 |

Table 8 Summary of 'purpose served' themes and sub-themes developed from content analysis of open-ended question

| Theme | Sub-theme | Surgery | | Radiology | | Combined | |
|---|---|---|---|---|---|---|---|
| | | n | % | n | % | n | % |
| Complication Minimisation | Patient safety/Incident minimisation | 56 | 46 | 27 | 46 | 83 | 46 |
| | Improves patient outcomes | 5 | 4 | 3 | 5 | 8 | 4 |
| | Reduce morbidity | 0 | 0 | 2 | 3 | 2 | 1 |
| | Reduces complications | 0 | 0 | 1 | 2 | 1 | 1 |
| Procedural Factors | Ensures nothing overlooked/Prompt | 45 | 37 | 11 | 19 | 56 | 31 |
| | Consistency | 1 | 1 | 1 | 2 | 2 | 1 |
| | Sedation/Anaesthesia management | 0 | 0 | 2 | 3 | 2 | 1 |
| | Emergency management alert | 1 | 1 | 0 | 0 | 1 | 1 |
| Safety and Quality | Ensures standards are met | 26 | 22 | 17 | 29 | 43 | 24 |
| | Auditing | 2 | 2 | 0 | 0 | 2 | 1 |
| | Accreditation | 1 | 1 | 0 | 0 | 1 | 1 |
| | Improved Clinical Governance | 1 | 1 | 0 | 0 | 1 | 1 |
| | Quality assurance | 1 | 1 | 0 | 0 | 1 | 1 |
| | Risk management tool | 1 | 1 | 0 | 0 | 1 | 1 |
| Staff Factor | Teamwork | 20 | 17 | 3 | 5 | 23 | 13 |
| | Communication | 18 | 15 | 3 | 5 | 21 | 12 |
| | Awareness/Accountability | 3 | 3 | 0 | 0 | 3 | 2 |
| | Provides calm prior to procedure | 2 | 2 | 1 | 2 | 3 | 2 |
| | Staff safety | 0 | 0 | 2 | 3 | 2 | 1 |
| | Adequate staffing | 0 | 0 | 1 | 2 | 1 | 1 |
| | Confirm staff roles | 1 | 1 | 0 | 0 | 1 | 1 |
| | Handover | 0 | 0 | 1 | 2 | 1 | 1 |
| | Responsibility awareness | 1 | 1 | 0 | 0 | 1 | 1 |
| Patient-related | Improves post-op care | 3 | 3 | 2 | 3 | 5 | 3 |
| | Patient confidence | 1 | 1 | 1 | 2 | 2 | 1 |
| | Patient involvement | 2 | 2 | 0 | 0 | 2 | 1 |
| | Informed consent | 1 | 1 | 0 | 0 | 1 | 1 |
| Legal | Legality awareness | 2 | 2 | 1 | 2 | 3 | 2 |
| | Evidence of care | 2 | 2 | 0 | 0 | 2 | 1 |
| Efficiency | Good system | 1 | 1 | 1 | 2 | 2 | 1 |
| | Improves efficiency/"Stream-lining" | 1 | 1 | 0 | 0 | 1 | 1 |

*Open-ended responses*

A total of 877 codes were allocated to the responses: 317 enablers, 282 barriers and 278 purpose served. Responses from operating theatre staff made up 71% of these codes (73% enablers, 9% barriers and 71% of 'purpose served'), similar to the overall proportion of responses received from radiological staff (68%).

## Enablers

Eight enabling themes and 39 sub-themes were identified (Table 6).Two 'Individual person factors' sub-themes and one 'hospital culture and past practice' sub-theme were identified as equal highest enablers for checklist use across both surgery and radiology combined (n=28; 16%). More specifically, 'nursing staff', 'general staff involvement' and 'culture/commitment to patient safety' each rated equally as the highest enabler for the checklist being used. Twenty-six theatre staff respondents (22%) indicated that nursing staff were a major enabler as opposed to n=2 (3%) radiology staff. In comparison, general staff involvement was identified as an enabler of the SC by 18 theatre staff (15%) and 10 radiology staff (17%). Culture/Commitment to patient safety was identified by 15 theatre staff (12%) and 13 radiology staff (22%).

The highest ranked enabler for each setting was 'nursing staff', by 22% (n=26) of theatre staff and 'culture/commitment to patient safety' by 22% (n=13) of radiology staff.

## Barriers

Eleven barrier themes and 47 sub-themes were identified (Table 7). The biggest barrier to checklist use was identified to be the time factor, with n=31 (26%) of responses from theatre staff and n=16 (27%) responses from radiological staff citing this barrier, with a combined rate of (26%) n=47. This was followed by 'no barriers identified' at a combined response rate of 22% or n=39 (surgery n=20; 17%, radiology n=19; 32%) and 'surgeon non-compliance/non-commitment' with a combined rate of n=37 or 21% (surgery n=32; 26%, radiology n=5; 9%). The highest ranked barrier for each individual department was 'doctor or surgeon non-compliance/non-commitment' for surgery at 26% (n=32). In radiology, the most common response was that no barriers exist at 32% (n=19).

## Purpose served

Seven 'purpose served' themes and 31 sub-themes were identified (Table 8). The main purpose of conducting a checklist was for 'patient safety/incident minimisation' with a combined total of n=83 (46%), made up of n=56 (46%) from surgery and n=27 (46%) from radiology. This was the highest ranked response for the purpose of the checklist in both surgery and radiology individually. The next most common response for the purpose of the checklist was identified to be a 'procedural factor' which 'ensures nothing overlooked/prompt' combined response of n=56 or 31%, with surgery indicating this at n=45 (37%) and radiology at n=11 (19%).

## Checklist review

Surgical (n=56) and radiology (n=17) checklists were compared against each item on the WHO surgical SC (Table 9).

### Surgery / operating theatres

Three SC items were matched on more than 80% of the checklists submitted:

- Item 2 'Is the site marked' (95% match)
- Item 5a 'Does the patient have a known allergy' (93% match)
- Item 7 'Confirm the patient's name, procedure, and where the incision will be made' (86% match) (Table 9).
- Items that were not matched on 40% or more of SCs reviewed were:
- Item 3 Is the anaesthesia machine and medication check complete (50% not matched)
- Item 4 Is the pulse oximeter on the patient and functioning (57% not matched)
- Item 5b Does the patient have a difficult airway or aspiration risk? (41% not matched)
- Item 9a (ii) Anticipated critical events : To Surgeon - How long will the case take (46% not matched)
- Item 9a (iii) Anticipated critical events : To Surgeon - What is the anticipated blood loss? (43% not matched)

The mean number of items (from a maximum of 22) matched per checklist was 12 ± 6.5. There were 6.6 ± 6.7 items not matched, and 3.3 ± 3.2 items partially matched. This indicates serious deviation from the WHO SC template beyond the subtle modifications expected in the process of tailoring it to suit individual departments.

Table 9 Review of 56 surgery checklists against each of the 15 item of the WHO Surgical SC, including number (n) and percent (%) of direct, partial and no matches.

| Checklist item | Direct match n (%) | Partial match n (%) | No match n (%) |
|---|---|---|---|
| Before induction of anaesthesia | | | |
| Q1 Has the patient confirmed his/her identity, site, procedure, & consent? | 32 (57) | 2 (4) | 22 (39) |
| Q2 Is the site marked? | 53 (95) | 2 (4) | 1 (2) |
| Q3 Is the anaesthesia machine and medication check complete? | 6 (11) | 22 (39) | 28 (50) |
| Q4 Is the pulse oximeter on the patient and functioning? | 20 (36) | 4 (7) | 32 (57) |
| Q5a Does the patient have a known allergy? | 52 (93) | 1 (2) | 3 (5) |
| Q5b Does the patient have a difficult airway or aspiration risk? | 26 (46) | 7 (13) | 23 (41) |
| Q5c Does the patient have a risk of >500ml blood loss (7ml/kg in children)? | 24 (43) | 13 (23) | 19 (34) |
| Before skin incision | | | |
| Q6 Confirm all team members have introduced themselves by name and role | 36 (64) | 2 (4) | 18 (32) |
| Q7 Confirm the patient's name, procedure, and where the incision will be made. | 48 (86) | 2 (4) | 6 (11) |
| Q8 Has antibiotic prophylaxis been given within the last 60 minutes? | 28 (50) | 21 (38) | 7 (13) |
| Q9a (i) Anticipated critical events : To Surgeon - What are the critical or non-routine steps? | 21 (38) | 16 (29) | 19 (34) |
| Q9a (ii) Anticipated critical events : To Surgeon - How long will the case take? | 16 (29) | 14 (25) | 26 (46) |
| Q9a (iii) Anticipated critical events : To Surgeon - What is the anticipated blood loss? | 18 (32) | 14(25) | 24 (43) |
| Q9b Anticipated critical events : To Anaesthetist - Are there any | 22 (39) | 16 (29) | 18 (32) |

| | | | |
|---|---|---|---|
| patient specific concerns? | | | |
| Q9c (i) Anticipated critical events : To Nursing Team - Has sterility (including indicator results) been confirmed? | 23 (41) | 12 (21) | 21 (38) |
| Q9c (ii) Anticipated critical events : To Nursing Team - Are there equipment issues or any concerns? | 25 (45) | 18 (32) | 18 (32) |
| Q10 Is essential imaging displayed? | 35 (63) | 5 (9) | 5 (9) |
| Before patient leaves operating room | | | |
| Q11 Nurse verbally confirms - The name of the procedure | 41 (73) | 14 (25) | 14 (25) |
| Q12 Nurse verbally confirms - Completion of instrument, sponge and needle counts | 42 (75) | 14 (25) | 14 (25) |
| Q13 Nurse verbally confirms - Specimen labelling (read specimen labels aloud, including patients name) | 41 (73) | 15 (27) | 15 (27) |
| Q14 Nurse verbally confirms - Whether there are any equipment problems to be addressed | 34 (61) | 19 (34) | 19 (34) |
| Q15 To surgeon, Anaesthetist and Nurse: What are the key concerns for recovery and management of this patient? | 34 (61) | 18 (32) | 18 (32) |
| | | | |

Additional elements of the SC (including capturing the three different phases of checklist procedure, use of a 'time out' terminology and a check for thromboprophylaxis) were all directly matched in 80% or more of the checklists that were reviewed (Table 10).

Table 10 Review of 56 surgery checklists against each of five elements of the WHO Surgical SC, including number (n) and percent (%) of direct, partial and no matches. Items in which more than 80% of checklists had a direct match are highlighted in bold.

| | Direct match n (%) | Partial match n (%) | No match n (%) |
|---|---|---|---|
| Does the checklist capture the 3 different phases of checklist procedures? | | | |
| Before Induction | 43 (77) | 1 (2) | 12 (21) |
| Before Incision | 46 (82) | 1 (2) | 9 (16) |
| Before pt leaves OR | 45 (80) | 0 (0) | 11 (20) |
| Is the term "Time Out" mentioned on the form? | 45 (80) | 0 (0) | 11 (20) |
| Has a question been asked about thromboprophylaxis? | 46 (82) | 4 (7) | 6 (11) |

### Radiology

None of the 28 items in the WHO radiology checklist (Appendix II) were directly matched in more than 80% of the 17 reviewed checklists. In fact, all but three items were not matched in 80% or more of the reviewed checklists (Table 11). On average, the mean number of items (from a maximum of 28) matched per checklist was only $1.3 \pm 1.2$. There were $24.3 \pm 1.8$ items not matched, and $2.4 \pm 1.0$ items partially matched. Similarly, none of four additional SC items were matched in 80% or more of the reviewed checklists, and most had no match at all (Table 12).

Table 11 Review of 17 radiology checklists against each of the 16 item of the WHO SC for radiology, including number (n) and percent (%) of direct, partial and no matches.

| | Direct match n (%) | Partial match n (%) | No match n (%) |
|---|---|---|---|
| SIGN IN – before giving anaesthetic | | | |
| Q1 Have all team members introduced themselves by name and role? | 2 (12) | 0 (0) | 15 (88) |
| Q2a All team members verbally confirm : What is the patient's name? | 1 (6) | 11 (65) | 5 (29) |
| Q2b All team members verbally confirm : What procedure, site and | 0 (0) | 16 (94) | 1 (6) |

| | | | |
|---|---|---|---|
| position is planned? | | | |
| Q3 Has the patient confirmed his/her identity, site, procedure and consent? | 3 (18) | 4 (24) | 10 (59) |
| Q4 Has essential imaging been reviewed? | 0 (0) | 3 (18) | 14 (82) |
| Q5 Are all IRMER requirements met? | 0 (0) | 0 (0) | 17 (100) |
| Q6 Is the procedural site marked? | 2 (12) | 0 (0) | 15 (88) |
| Q7 Is the anaesthesia machine/monitoring equipment and medication check complete? | 0 (0) | 0 (0) | 17 (100) |
| Q8a Does the patient have a known allergy? | 9 (53) | 2 (12) | 6 (35) |
| Q8b Does the patient have an anticipated risk of >500ml blood loss (7ml/kg in children)? | 0 (0) | 0 (0) | 17 (100) |
| Q9 Have any risk factors for bleeding and renal failure been checked? | 0 (0) | 0 (0) | 17 (100) |
| Q10a Has antibiotic prophylaxis been given? | 1 (6) | 1 (6) | 15 (88) |
| Q10b Has VTE prophylaxis been undertaken? | 0 (0) | 1 (6) | 16 (94) |
| Q11 Is the required equipment available and in date? | 1 (6) | 0 (0) | 16 (94) |
| Q12 Are there any critical or unexpected steps you want the team to know about? | 1 (6) | 0 (0) | 16 (94) |
| TIME OUT – before start of radiological intervention (only if general anaesthetic is given) | | | |
| Q13a Anticipated critical events : Anaesthetist - Is the anaesthetic machine check complete? | 0 (0) | 0 (0) | 17 (100) |
| Q13b Anticipated critical events : Anaesthetist - Does the patient have a difficult airway/aspiration risk? | 0 (0) | 0 (0) | 17 (100) |
| Q13c Anticipated critical events : Anaesthetist - Are there any patient specific concerns? | 0 (0) | 0 (0) | 17 (100) |
| Q13d Anticipated critical events : Anaesthetist - What is the patients ASA grade? | 0 (0) | 0 (0) | 17 (100) |
| Q13e Anticipated critical events : Anaesthetist - What monitoring equipment and other specific levels of support are required, for example blood? | 0 (0) | 0 (0) | 17 (100) |
| Q13f Anticipated critical events : Registered Practitioner/HCA - Are there any equipment issues or concerns? | 0 (0) | 0 (0) | 17 (100) |
| Q14 Has the surgical site infection (SSI) bundle been undertaken? | 0 (0) | 0 (0) | 17 (100) |
| Q15a Registered Practitioner/HCA verbally confirms with the team : Has the name and side of the procedure been recorded? | 1 (6) | 2 (12) | 14 (82) |
| Q15b Registered Practitioner/HCA verbally confirms with the team : Have all the pieces of invasive equipment used been accounted for? | 0 (0) | 0 (0) | 17 (100) |
| Q15c Registered Practitioner/HCA verbally confirms with the team : Have all implanted devices been recorded? | 0 (0) | 0 (0) | 17 (100) |
| Q15d Registered Practitioner/HCA verbally confirms with the team : Have the specimens been labelled (including with patients name)? | 0 (0) | 0 (0) | 17 (100) |
| Q15e Registered Practitioner/HCA verbally confirms with the team : Have any equipment problems been identified that need to be addressed? | 0 (0) | 0 (0) | 17 (100) |
| Q16 Radiologist, Anaesthetist and Registered Practitioner : Have the instructions for post-procedural care for this patient been agreed? | 1 (6) | 1 (6) | 15 (88) |
| | | | |

Table 12 Review of 17 radiology checklists against each of four additional elements of WHO SC, including number (n) and percentage (%) of direct, partial and no matches.

| Does the checklist capture the 3 different phases of checklist procedures? | Direct match n (%) | Partial match n (%) | No match n (%) |
|---|---|---|---|
| Sign In (before giving anaesthetic) | 2 (12) | 1 (6) | 14 (82) |
| Time Out (before start of radiological intervention eg needle to skin) | 2 (12) | 0 (0) | 15 (88) |
| Sign Out (before any member of the team leaves the room) | 1 (6) | 1 (6) | 15 (88) |
| Is the term "Time Out" mentioned on the form? | 7 (41) | 0 (0) | 10 (59) |

## Phase 2 Results

### *Observations*

Fifteen hospitals agreed to participate in Phase 2 of this project; however, due to time constraints and difficulties obtaining ethics approval, two sites were excluded from the sample prior to their participation in the study. Of the 13 participating hospitals, seven were located in South Australia, one in New South Wales, three in Victoria and two in Queensland, with nine being publicly funded. Ten hospitals were located in metropolitan areas and three in regional cities or country locations. The participating hospitals varied greatly in size, ranging from having fewer than 50 beds to more than 900. A total of 103 operations and 39 radiology procedures were observed across the 13 participating hospitals and 15 departments. The majority of the participating hospitals did not have any material promoting the use of the SC in their operating theatres or radiology rooms. See Table 13 for additional demographic details of the sample.

Table 13. Demographics of Participating Hospitals

| State | Location | Funding | Department | N Beds | N Procedures | Promotion |
|-------|----------|---------|------------|--------|--------------|-----------|
| SA | Metropolitan | Public | Surgery & Radiology | 311 | 7(S) / 10(R) | No(S) / No(R) |
| SA | Metropolitan | Private | Surgery | 50-100 | 9 | No |
| SA | Metropolitan | Private | Surgery | 68 | 14 | No |
| SA | Metropolitan | Public | Surgery | <50 | 16 | Yes |
| SA | Metropolitan | Public | Surgery | 82 | 10 | No |
| SA | Country | Public | Surgery | 67 | 7 | Yes |
| SA | Country | Public | Surgery | 72 | 5 | No |
| Vic | Metropolitan | Public | Surgery & Radiology | 621 | 9(S) / 7(R) | No(S) / Yes(R) |
| Vic | Metropolitan | Public | Radiology | 640 | 3 | No |
| Vic | Country | Private | Surgery | 121 | 9 | No |
| NSW | Metropolitan | Private | Surgery | 85 | 7 | No |
| QLD | Metropolitan | Public | Radiology | 676 | 19 | No |
| QLD | Metropolitan | Public | Surgery | 929 | 10 | *md |

*md= missing data. N Beds = number of beds in the entire hospital. N Procedures = number of procedures observed. Promotion = was checklist use promoted within the operating theatre or radiology room? (S) Surgery, (R) Radiology

Inter-rater reliability of the three observers used to collect data for the Phase 2 observations was assessed in the surgical setting, using Cronbach's alpha. This revealed high inter-rater reliability ($\alpha$=.926). It was therefore considered appropriate and acceptable for the purposes of this project to combine the data collected by three separate observers and analyse it as a single sample.

### Surgery

The 11 participating surgical departments were found to use one of three types of surgical SC: (1) the World Health Organisation (WHO) Surgical SC (n=1); (2) a modified version of the WHO surgical SC (n=3); or (3) a surgical SC developed by the hospital itself or in the case of public hospitals in South Australia, the State government (n=7). Five of the seven hospitals using their own surgical SC used the same checklist, as all public hospitals in South Australia are required to use the checklist developed and implemented by the state government. All except one of the participating surgical departments used paper-based surgical SCs, with the remaining site requiring staff to complete the checklist electronically on a computer.

A wide range of different operating lists were observed during this study, with numerous different lists being observed at a single hospital (Table 14). Specifically, the operating lists most commonly observed were obstetrics and gynaecology and general surgery (n=4 for each), orthopaedic theatre lists (n=3) and upper gastrointestinal surgery (n=2). Observations of a single dental; urology; ear, nose and throat and plastic theatre lists were made. Data relating to the type of list observed was missing for one of the participating hospitals (See Table 14).

Table 14. Surgical procedure lists observed

| List Type | N |
|---|---|
| Obstetrics and Gynaecology | 4 |
| General Surgery | 4 |
| Orthopaedic | 3 |
| Upper Gastro-intestinal | 2 |
| Dental | 1 |
| Urology | 1 |
| Ear, Nose and Throat | 1 |
| Plastic Surgery | 1 |

As can be seen in Table 15, there was low compliance with the SCs. However, the overall compliance of some hospitals was statistically significantly better than others; as revealed by independent samples Kruskal-Wallis analyses for the 'sign in' (H = 34.26, $p$ = .000), 'time out' (H = 34.77, $p$ = .000), and 'sign out' sections (H = 55.47, $p$ = .000), as well as for total checklist completion (H = 40.58, $p$ = .000). The checklist items most commonly addressed by the theatre staff include that they have the correct patient (addressed in 99% of cases), site (37% of observations) and procedure (97% of cases), that the consent form has been signed (36% of observations), whether the patient has any allergies (80% of observations), and whether the instrument counts are correct (56% of cases). Checklist items related to the following were commonly missed:

- whether the patient has received antibiotic prophylaxis and thrombo-prophylaxis (23% and 14% compliance, respectively)
- whether imaging is available (8% compliance)
- the expected duration of the procedure (8% compliance)
- whether blood loss is expected and blood is available (0% compliance)
- the surgeon, anaesthesia and nursing review (8%, 12% and 11% compliance, respectively)
- prosthesis check (1% compliance)
- recording of the procedure after its completion (18% compliance)
- confirmation that specimen correct (20% compliance)
- equipment problems (4% compliance)
- postoperative management (13% compliance).

Table 15. Descriptive statistics on checklist compliance

| % Completion | Min | Max | Mean | SD |
|---|---|---|---|---|
| 'Sign in' | 0.00 | 53.33 | 16.57 | 14.39 |
| 'Time out' | 0.00 | 90.00 | 36.65 | 18.48 |
| 'Sign out' | 0.00 | 100.00 | 21.33 | 22.75 |
| Total Checklist | 4.00 | 57.14 | 27.26 | 11.80 |

Min = minimum; Max = maximum, SD = standard deviation

It was questioned whether the number of people present within the operating theatre during the procedure would have an impact on checklist completion. The number of people present in the operating theatre varied between the participating sites (See Table 16 for descriptive statistics). Spearman's rank correlation coefficient analyses revealed that the number of people present in the operating theatre did have a significant impact on the percentage completion of the checklist (See Table 17). Significantly, the greater the number of people present in the operating theatre, regardless of profession, the poorer the completion of the 'sign in' and 'sign out' sections, as well as the checklist as a whole. However, more people present in the operating theatre was related to better completion of the 'time out' section of the checklist. This analysis was further broken down into the professions of people present in the operating theatre including nurses, surgeons,

anaesthetists and others. Having more nurses present in the operating theatre was found to be significantly related to poorer completion of the 'sign out' section of the checklist; however, no other statistically significant relationship was found between the number of nurses present and checklist completion. A greater number of fully qualified surgeons present in the operating theatre was significantly related to better checklist completion generally and more specifically, better completion of the 'time out' and 'sign out' sections. No statistically significant relationships existed between the number of anaesthetists present and checklist completion; however, a greater number of others present in the operating theatre was significantly related to poorer completion of the 'sign in' and 'sign out' sections of the checklist, as well as total checklist completion.

Table 16. Descriptive statistics for the number of people present in the operating theatre

|  | Min | Max | Mean | SD |
|---|---|---|---|---|
| Total in theatre | 4 | 11 | 6.76 | 1.65 |
| Nurses in theatre | 2 | 7 | 3.44 | 0.81 |
| Surgeons in theatre | 1 | 2 | 1.19 | 0.40 |
| Anaesthetists in theatre | 0 | 2 | 1.02 | 0.20 |
| Others in theatre | 0 | 4 | 0.99 | 1.11 |

Min = minimum; Max = maximum, SD = standard deviation

Table 17. Correlation matrix for the relationship between number of people present in the operating theatre and checklist completion

|  | Total people | | Nurses | | Surgeons | | Anaesthetists | | Others | |
|---|---|---|---|---|---|---|---|---|---|---|
| Completion | $r_s$ | $p$ | $r_s$ | $p$ | $r_s$ | $p$ | $r_s$ | $p$ | $r_s$ | $p$ |
| 'Sign in' | **-.304** | **.012** | -.112 | .365 | .001 | .993 | -0.43 | .726 | **-.390** | **.001** |
| 'Time out' | **.227** | **.034** | .032 | .769 | **.304** | **.004** | .103 | .343 | .122 | .262 |
| 'Sign out' | **-.234** | **.021** | **-.247** | **.015** | **.363** | **.000** | .097 | .348 | **-.234** | **.022** |
| Total checklist | **-.205** | **.042** | -.180 | .076 | **.379** | **.000** | .153 | .133 | **-.366** | **.000** |

Values in bold are statistically significant. $r_s$ = Spearman's Rho. $P$ = p-value, $p < 0.05$ indicates statistical significance

It was also hypothesised that the number of items on the checklist and within each of its sections would be related to checklist completion. The number of items in each of the three sections of the checklist varied widely between the participating sites (See Table 18 for descriptive statistics). A Spearman's rank correlation analysis was conducted in order to assess whether number of checklist items was significantly related to checklist completion. This revealed that the number of items in the 'sign in' and 'sign out' sections of the SC, as well as the total number of checklist items were significantly positively related to the percentage of the checklist completed (See Table 19). Across the 'sign in' and 'sign out' sections, as well as for the checklist as a whole, as the number of items to be addressed increased, so too did completion.

Table 18. Descriptive statistics for the number of items on the checklist

|  | Min | Max | Mean | SD |
|---|---|---|---|---|
| 'Sign in' items | 10 | 16 | 12.83 | 2.34 |
| 'Time out' items | 2 | 16 | 10.21 | 4.86 |
| 'Sign out' items | 3 | 7 | 4.89 | 1.15 |

Min = minimum; Max = maximum, SD = standard deviation

Table 19. Correlation matrix for the relationship between number of checklist items and checklist completion

| | 'Sign in' items | | 'Time out' items | | 'Sign out' items | | Total checklist items | |
|---|---|---|---|---|---|---|---|---|
| | $r_s$ | $p$ | $r_s$ | $p$ | $r_s$ | $p$ | $r_s$ | $p$ |
| 'Sign in' completion | **.362** | **.002** | - | - | - | - | - | - |
| 'Time out' completion | - | - | .166 | .116 | - | - | - | - |
| 'Sign out' completion | - | - | - | - | **.235** | **.019** | - | - |
| Total checklist completion | - | - | - | - | - | - | **.234** | **.018** |

Values in bold are statistically significant. $r_s$ = Spearman's Rho. $P$ = p-value, p <0.05 indicates statistical significance

An independent samples Kruskal-Wallis test was conducted in order to evaluate whether the type of operations being conducted, as defined by the list type, impacted upon the extent to which the surgical SC was completed. This was statistically significant for the 'sign in' (H = 19.136, $p$ = .002), 'time out' (H = 31.520, $p$ = .000) and 'sign out' sections of the checklist (H = 39.126, $p$ = .000), as well as for total checklist completion (H = 35.126, $p$ = .000), indicating that the type of operation being performed plays a role in the extent to which the SCs are completed. Post hoc pairwise comparisons allowed for further exploration of this finding. Specifically, there was a statistically significant difference in terms of completion of the 'sign in' section of the surgical SC when comparing urology procedures with obstetric / gynaecological procedures, with checklist completion being significantly better during the obstetric / gynaecological procedures. No other significant differences were found in relation to the type of procedure being performed for completion of 'sign in'. The type of operation being performed also, in some cases, had an impact on the extent to which the 'time out' section of the surgical SC was completed; with 'time out' completion being significantly better for urology procedures compared with dental, for obstetric / gynaecological procedures compared with general surgery and ear, nose and throat procedures, and for general surgery compared with ear, nose and throat and dental procedures. Similarly, completion of the 'sign out' section of the surgical SC was statistically significantly better for obstetrics / gynaecology procedures compared with urology procedures, general surgery compared with urology, ear, nose and throat and upper GI procedures, dental and plastics compared with urology procedures, and finally for plastics compared with ear, nose and throat procedures. Total checklist completion was significantly better for plastics, obstetrics / gynaecology and general surgical procedures compared with urology procedures, as well as for general surgery compared with ear, nose and throat procedures.

In order to assess whether differences in checklist completion were present in the sample on the basis of the State of Australia in which the hospital is located, a second independent samples Kruskal-Wallis test was conducted. This revealed statistically significant differences on the basis of State for the completion of the 'sign in' (H = 22.355, $p$ = .000) and 'sign out' sections of the checklist (H = 29.212, $p$ = .000), as well as for total checklist completion (H = 30.480, $p$ = .000). There was no difference between the States in terms of completion of the 'time out' section. For the 'sign in' section, post hoc analyses revealed significantly better checklist completion by South Australian hospitals compared with those in New South Wales and Victoria. Similarly, post hoc analyses revealed that for completion of 'sign out' and total checklist completion, statistically significant differences were found between Victoria and South Australia, with hospitals in South Australia demonstrating better rates of checklist completion.

Comparison of surgical SC completion in private and public hospitals in the sample was achieved via the conduct of the Mann-Whitney U test. This revealed no statistically significant difference between

the participating public and private hospitals in terms of completion of any of the three sections of the surgical SC, or total checklist completion.

## Radiology

Only four hospitals agreed to have their radiology department participate in this study, all of which were publicly funded. Of these, all four were using an SC that had either been developed by hospital staff themselves, or in the case of the Queensland site, by the state government. The items contained within these checklists were, in general, similar to one another. Additionally, three of the four participating radiology departments only used paper-based SCs and the fourth used a combination of paper-based and electronic methods for their SC completion, first completing the checklist by hand and then transferring it, also by hand, on to the computer following the procedure. During the radiology observations across the four participating sites, only angiography procedures were observed (n = 4). It is important to note that analyses could only be conducted for the 'time out' section of the SC for radiology, due to the fact that only one of the participating hospitals' checklists included the 'sign in' and 'sign out' sections.

For the radiology observations, checklist compliance was ascertained by the percentage of the 'time out' section completed during the procedure. Checklist compliance ranged from 0-100% across the sample, with a mean of 38% completion (SD = 30.65). However, an independent samples Kruskal-Wallis test indicated that the extent to which the checklist was completed differed significantly across the four sites being compared (H = 16.90, $p$ = .001). Post hoc analyses revealed that two of the four hospitals differed significantly in terms of checklist compliance from one of the participating sites. The individual checklist items most commonly addressed included that the correct patient was present for the correct procedure (addressed in 80% and 60% of observations, respectively), and whether or not the patient had any allergies (addressed in 61% of cases). Checklist items related to the following were often not addressed by radiology room staff:

- correct side (20% compliance)
- duration (0% compliance)
- consent (30.6% compliance)
- prosthesis (0% compliance)
- renal function (0% compliance)
- confirm patient not pregnant (0% compliance)
- blood loss expected and is blood available (0% compliance)
- patient on blood thinners (0% compliance)
- nursing, anaesthesia and radiologist review (0% compliance)
- anaesthetic consent (0% compliance)
- antibiotic prophylaxis and thrombo-prophylaxis provided (0% compliance for both)
- Confirm procedure, counts correct and specimen labelled (0% compliance for all three)
- Post-operative concerns (0% compliance)

Despite the similarities in the types of procedures being conducted, the number of people present in the radiology room differed widely between the participating sites (See Table 20). A Spearman's rank correlation coefficient analysis was conducted in order to assess whether a relationship exists between the number of people present in the radiology room and the extent to which the 'time out' section of the checklist is completed. This revealed that only the number of nurses present in the radiology room was significantly related to checklist completion; specifically with fewer nurses present being related to greater checklist completion. See Table 21 for all correlations produced by this analysis.

Table 20. Descriptive statistics for the number of people present in the radiology room

|  | Min | Max | Mean | SD |
|---|---|---|---|---|
| Total in RR | 3 | 11 | 5.72 | 2.08 |
| Nurses in RR | 1 | 6 | 2.87 | 1.30 |
| Radiologists in RR | 1 | 2 | 1.15 | 0.37 |
| Anaesthetists in RR | 0 | 2 | 0.10 | 0.38 |
| Radiographers in RR | 0 | 3 | 1.33 | 0.62 |
| Others in OR | 0 | 2 | 0.26 | 0.55 |

RR = radiology room; Min = minimum; Max = maximum, SD = standard deviation

Table 21. Correlations between the number of people present in the radiology room and 'time out' completion

|  | Total people | | Nurses | | Radiologists | | Anaesthetists | | Radiographers | | Others | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | $r_s$ | p | $r_s$ | p | $r_s$ | p | $r_s$ | p | $r_s$ | p | $r_s$ | p |
| 'Time out' Completion | -.276 | .089 | **-.369** | **.021** | .060 | .715 | -.032 | .846 | -.032 | .849 | -.285 | .079 |

Values in bold are statistically significant. $r_s$ = Spearman's Rho. $P$ = p-value, p <0.05 indicates statistical significance

The number of items in the 'time out' section of the SC varied widely across the four participating sites, with a mean of 9.97 items and a standard deviation (SD) of 6.11 items (minimum = 4, maximum = 20). A Spearman's rank correlation coefficient analysis was conducted to evaluate whether a relationship exists between the number of items in the 'time out' section of the SC and checklist completion. This revealed a statistically significant negative relationship between these two variables (R = -.594, $p$ = .000), indicating that completion of the checklist declines as the number of items to be completed increases.

An independent samples Kruskal-Wallis test was conducted in order to assess whether the state of Australia in which the radiology department was located impacted upon checklist completion, which showed a statistically significant difference (H = 11.13, $p$ = .004). Post hoc analyses revealed statistically significant differences in checklist completion between Queensland and South Australia and Victoria, with Queensland hospitals outperforming those in South Australia and Victoria in terms of rates of checklist completion.

## Surgery versus Radiology

A Mann-Whitney U test was conducted to assess whether checklist completion differed statistically between surgery and radiology. It is important to note that due to a lack of data for the 'sign in' and 'sign out' sections of the checklist; only percentage completion of the 'time out' section was compared. This revealed that there was no significant difference between surgery (M = 36.65, SD = 18.48) and radiology (M = 37.86, SD = 30.65) in terms of their completion of the SC (U = 1687.5, $p$ = 0.657).

## *Retrospective Medical Record Audit*

The audit of SCs for procedures completed a year prior to the conduct of the observations was completed for 12 of the 13 participating hospitals. One of the sites for which operations were observed was unable to provide access to their records because they were stored in an electronic format and consequently required a day's training on the software for a username and password to be issued. The sample therefore consisted of 10 sites for surgery and four for radiology. Access to medical records was obtained for all sites at which radiology procedures were observed. While it was intended that 50 records would be audited at each site, due to factors such as the size of the hospital or the rules set forth by the medical records department regarding access, this was not achievable for many of the participating sites. The number of records audited for each participating site ranged between 35 and 51 (with a mean of 44.5) for surgical procedure records and 16 and 51

(with a mean of 34.3) for radiology records. Only a single site, at which both surgery and radiology participated in this project, stored the records electronically. All other sites, nine surgery and three radiology, stored their records in a hard copy format.

## Surgery

Of the 445 surgical procedure records audited, 89% included the SC with just over half of these (57%) being 100% complete. The mean percentage completion of the SC was 86 (SD = 27) in the medical record audit.

## Radiology

For radiology, 137 records were audited across four sites and a SC was present in just over half of these (54%). The SC was recorded as being 100% complete in 28% of cases; hence the majority of SCs present in radiology records were incomplete. However, it is important to note that the mean percentage completion of the SC for radiology procedures across the sample was 64%; demonstrating a considerably higher rate of checklist completion than what was recorded during the observations (38%).

## Surgery versus Radiology

A Mann-Whitney U test revealed that the percentage of the SC completed was statistically significantly greater in the surgery sample compared to the radiology group (U = 8678, $p$ = .000). However, it is important to note that the discrepancy in percentage checklist completion between the observations and retrospective medical record audit was not as significant in radiology compared with surgery. Thus while checklist compliance is lower in radiology compared to surgery, the frequency with which staff use the 'tick and flick' method rather than formal protocol to complete the checklist is also lower in radiology compared with surgery.

*Thematic analysis of surgical focus group data*

For surgical settings, seven focus groups consisting of 27 health professionals in four departments were conducted. Additionally, three face to face interviews were conducted and three phone interviews. In total, there were 26 nurses, five surgeons and two anaesthetists who contributed to the collection of data during this phase.

The purpose of this phase was to identify barriers, enablers/facilitators, and the perception of participants on the use of the surgical SC. As such, data was analysed according to these three broad headings. Table 22 is the result of a content analysis and provides an overview of the most common barriers and facilitators mentioned during the focus groups.

Table 22. Summary of categories for barriers and facilitators in surgical settings

| Surgical Settings | | | |
|---|---|---|---|
| Facilitators | Findings | Barriers | Findings |
| Education | 18 | Requiring a change | 9 |
| Better with time | 26 | More paperwork/doubling up | 15 |
| Recognising its worth | 43 | Leading to friction between staff | 6 |
| Simple format | 13 | Medical/surgical resistance | 25 |
| Ability to modify the checklist | 7 | Anaesthetist resistance | 8 |
| Leaders | 18 | Lack of time | 17 |
| Part of the routine | 7 | Bringing people together | 8 |
| Patient Involvement | 17 | Lack of education | 19 |
| Surgical acceptance | 17 | Not recognising its worth | 7 |
| Anaesthetist acceptance | 2 | Who is responsible? | 9 |
| Communication and teamwork | 28 | Different versions of the checklist | 5 |
| Association support | 7 | Checklist format | 17 |
| Small groups | 1 | High turnover areas | 3 |
| | | Lack of strong personalities/leadership | 7 |
| | | Staff resourcing issues | 4 |
| | | Lack of disciplinary action/ repercussions | 3 |
| | | Private hospital environment | 7 |

Following is a summary of the full interpretive analysis of the data under the three broad headings of enablers, barriers and use of the checklist.

## Enablers

For enabling factors, 13 broad categories were identified from the data. These categories include:

- Education
- Better with time
- Recognising its worth
- Simple format
- Ability to modify the checklist
- Leaders
- Part of the routine
- Patient involvement
- Surgical acceptance
- Anaesthetist acceptance
- Communication and teamwork
- Association support
- Small groups

Each category is discussed in further detail below with exemplar findings (in italics) provided.

*Education*

There were 18 findings from across all settings relating to education as an important facilitator when implementing and using checklists. Many of the participants received training either prior to the implementation of the checklist, or early on during implementation, which assisted the checklist being successfully adopted.

*"So there was an orthopaedic surgeon that was, for whatever reason, a champion and he wasn't from this hospital but we got him to come and speak and he had a very good presentation which had some data in it and some anecdotal things as well. And I think that was useful."*

*"There was education with the medical staff. Education with the nursing staff. Often that took the form of in-services, workshops, a lot of emails and conversations, a lot of conversations on the run, training on the go. We did feedback and I collated all that feedback and took that back to the state wide group and we developed the state wide document to how it is now."*

*"I was introduced to it fairly early on in my training and you watched your Fellows, your senior colleagues, do it and so I picked it up and that's part of the way that I've been shown."*

Other people were wary of using the checklists; however, in these cases, education often helped.

*"That's what I thought too, oh God here we go, but then once you got the education I thought this actually is a good idea."*

It was also mentioned that the surgical SC was an educational tool in and of itself, particularly useful for new staff.

*"I think it educates the new nurses too though. I think it does because they sort of realize what's happening and know procedures better, and things like that. I think it is a good education tool for new staff."*

*Better with time*

There were 26 findings from across all settings relating to the use of the checklist improving with time. Participants often talked about initial resistance to the checklist which decreased over time.

*"I think a bit of reluctance. But it soon changed and then everyone was doing it and I got the feeling that the doctors had been told that you've got to actually do this, this was really important, that's the feeling that I got."*

*"I think people once they got used to it they started to embrace it a bit more and that sort of thing."*

*"I think the surgeons and anaesthetists are a bit more open to doing in then they were initially."*

As people became familiar with the checklist is became easier to use, which improved attitudes towards the checklist.

*"The more we do it the more familiar you become with the whole process."*

*"They're something we've had to grow with and as we've become more familiar with it, it's sort of boosted our confidence with it and our security that we're doing the right thing."*

Others mentioned that although there may still be misgivings regarding the use of checklists, with time resistance can turn into acceptance.

*"Now there's been probably acceptance that it has to be done. That question has been answered with our new standard - yes it has to be done. I don't think its affected people's attitudes towards it."*

*"They've just gotten used to it. They keep getting told enough times they'll end up doing it without getting told."*

In some cases, the checklist had become well accepted over time as an integral part of practice and the culture of the workplace.

*"Look, initially there was a bit of a barrier. The nurses took it on more and persisted with it, but now it's got to a point where people feel naked without it... I think now it's become culture….and that's good."*

*Recognising its worth*

There were 43 findings from across all settings relating to recognition of the importance of the checklist for facilitating patient safety. Participants talked of the checklist highlighting potential errors which may have been missed without its use.

*"So they're checking if there's any pre-op things that needed to be done beforehand as well, which has been good. So people are picking up things I think more."*

*"Sometimes you forget, sometimes you just forget, because you're absent minded a little bit some days. And they say 'the patient's allergic to betadine' and you'll get the betadine on and you'll go 'oh no it's allergic to the betadine.' That's happened a few times, but because it's verbalized, someone will go 'oh, they're allergic to betadine."*

*"Yeah, and they'll say anything special that you need? And usually you've got everything but sometimes things get overlooked or you've forgot, or, you know, it's just outside the door hopefully. Things like that, that's quite good."*

Others mentioned that it can provide a sense of assurance or confidence that they are doing the right thing by their patient, and protection from potential litigation.

*"It's very good that litigation and risk of the wrong patient or wrong procedure, you know it sort of assures us that we're doing the right thing, with the correct patient, the correct procedure."*

*"I mean, it makes sure now, you know, everybody knows what's happening, and the patient, the doctor, all the nurses, the anaesthetist even as well because they're there as well when you do the time out so they know, so really it makes sure that everyone knows. So you can't do it wrong"*

It was acknowledged that there was always the scope for human error to occur. However, the use of the checklist helped to minimise this risk.

*"Well there's always a chance something could happen, there's no 100% guarantee. It just increases everyone's knowledge, awareness of what's going on. There's always a chance of a mistake."*

*"I think it would minimize incidents, but it won't rule them out altogether, because mistakes do happen, no matter what. It just minimises it."*

The important of providing the best possible care for the patient was also a motivating factor, and one participant discussed that if it was themselves on the operating table, or their loved one, they would want the checklist to be used.

*"Yes, but I always think if something does happen, I always think I hope that I've done more, that we've done everything we could…because our patients are a bit vulnerable, they can't say, or they're not aware or, they don't even know us, these people, but they trust us, that's a huge thing. So I think, let's try and do the right thing or it will be us, or someone we love, or, do you know what I mean?"*

Other participants made mention of the body of evidence that supports the use of the checklist.

*"There's a lot of evidence to support that this checklist prevents mortality and it prevents morbidity."*

*Simple format*

There were 13 findings from across all settings related to the ease of use of the checklist due to its simple, self-explanatory and straightforward format.

*"I think they are straight forward."*

*"I think they just sort of, it was self-explanatory, the form was self-explanatory, it was just this is the time out, so, yea, and then (another private hospital) it was introduced, so, I already knew about time outs, and it just a form, it was self-explanatory."*

*"It's pretty straight forward. It's worded really clearly."*

The participants liked the fact it was a simple, one page form.

*"It's one page. It's one page. It's confined to one page, and three people sign off on that page. So that's the anaesthetic nurse, when she checks the patient off, in theatre, when we do the time out, and at the end, the scrub nurse completes the final. **Moderator**: So does that one page, does that mean it's nice and easy to do? **Participant**: It is. And it is just ticking boxes"*

*"It's just because another hospital they had theirs on two pages and I think if you've got it on one page it's easier for agency staff, it's just easier for everyone, isn't it? Everyone can see what's being done can't they?"*

*"I think it's pretty important to keep it to one page with so many things going on in your mind if you're the lead surgeon …. more than one page can be a pain in the neck"*

Even though the form was simple, the fact the items that were on it were important and relevant was also a facilitator.

*"Generally I think it's all pretty relevant such as first of all you want to confirm you've got the right patient, the right site kind of thing. I think that's all pretty relevant coming from a surgeon's point of view especially."*

### *Ability to modify the checklist and checklist processes*

There were seven findings relating to the ability to modify and tailor the checklist for their organisation as a facilitator. This may be to make the process more streamlined, or to ensure that staff had their own input into the form.

*"I think they were like videos, of what expectations were, what other people were doing, and we sort of looked at it and went 'no way' we haven't got that much time to go around and say who everybody is and all that sort of stuff so it was sort of like learning to refine it."*

*"We did a couple of forms hadn't we, so we made it, like we didn't like that one there or whatever so we had the change and because we are smaller we are allowed to put input into things, which is good. I mean you work in theatres, but we work every day with the forms so you can come up and say' this isn't working' so I think we all put in our input didn't we."*

### *Leaders*

There were 18 findings relating to the category of being a leader or having the confidence to initiate the surgical SC process. Often this would take the form of one of the nurses requiring the confidence to speak up.

*"**Participant 3:** A loud voice. **Participant 2 :** A loud voice, yeah that's me!"*

*"**Participant 4:** We try and make sure that the scrub person is listening because they're busy setting up. **Participant 2:** Usually before when I've been in there, (shouts) EVERYBODY LISTENING! **Participant 4**: That's because you're a bit more authoritative."*

It was mentioned that although some staff were confident enough to stand their ground to make sure the checklist was done, this may not always be the case.

*"I used to stand between the patient, when I got really grumpy with people…I would stand between the patient's bed and the operating table because they couldn't start the team time out without the patient on the operating table. But I'm strong enough to do that, and that's not fair to put nursing staff in that firing line of people who are much stronger willed and bigger personalities who can crush other people I don't think that's a nursing role but I was happy to do that but that's me"*

Others talked about the importance of leaders and setting the right example.

*"Since he's been onto it, he's now retired since, he really was the person that, he was the head of the unit, and I do a lot of orthopaedics, he was the one that was pushing. Since he done that video, and he's the one that always use to come in, that's when it sort of started taking off. That's when I noticed, what I observed."*

*"Strong leadership I think. Either the surgeons or the anaesthetists say "Right, this is what we are going to do""*

However, others also talked about everyone now being confident enough to instigate the checklist as it was part of routine practice and the culture.

*"Everyone's quite confident in instigating that, sort of go along as that's part of the checklist. So, you know no patient will come in, so it's been really good. I think staff got more confidence in initiating what the correct procedures are."*

*"Even though, the girls, because we're smaller, we do work with the same people, but it's been good for the scouts, to sort of have that, you know, so they have a bit more awareness, and speaking up, they're not so much scared to speak up, and take some responsibility, I think."*

## Part of the routine

There were seven findings from across all settings regarding the use of the checklist as being part of the routine and consistent practice. Once the checklist was adopted and implemented as part of routine practice it seemed to be taken up smoothly.

*"People have got into a routine, it's more routine."*

Eventually the routine practice became part of the culture, and conducting the checklist continually became a cultural norm.

*"**Participant 3:** just doing it all the time, the regularity…**Participant 4:** The consistency. **Participant 3:** That they know that you're going to do it anyway. **Participant 4:** So it becomes a cultural norm, that's what we need."*

*"Well I suspect it's now pretty engrained as culture."*

## Patient involvement

There were 17 findings across all settings regarding patient involvement and education as a facilitator for the successful use of the checklist. The participants spoke about the checklist allowing the patient to be more proactive in their care and for their voice to be heard.

*"I think it's good, I think it probably makes the patient feel more proactive in their own care… I think it's good for the patient to give your nursing staff a face and a voice which to them I think it has been positive."*

*"And it's also the patient listening, I think too when they say 'I'm not having that done' I might, you know, for whatever reason, yeah. So it sorts of initiates a few different things, with the patient listening, I think maybe they feel incorporated."*

The checklist was also an educational moment for the patient to make sure they were aware of the important of patient safety.

*"I think also the patients being obliging as well, just involving the patient and making them aware of why we are doing this and the importance of that as well, so that they have an understanding of why we're actually doing this because I mean they go through so many processes of checks here checks there checks there and then we always say to them and now just for the final check while we are all together and usually I say that while we are all together then someone's ears might prick up and they might think 'oh yes I think we're needed here' to help participate in this."*

*"We are looking at our patient, or looking at other patient's brochures, information brochures, which tell them about the ID and procedure matching type processes, and surgical SCs will be something that we pull into that so that patient education so that will assist with patients expectations and they'll go 'oh, that's why, that's what they're doing now,' that sort of thing."*

The checklist was also used as a method to put the patient at ease.

*"It often puts them at ease to because they are very tense and anxious and the anaesthetist just wants to get into them whereas if you ask them they just display there are a bit more calmer before they actually get into it."*

*"I think it's good sometimes like I don't know I use it personally to break the ice a bit sometimes with the patient, was it there birthday recently, or sometimes I say 'so that makes you a Leo' or whatever."*

*"I think too that they read a lot on the computer, so they google about things like wrong operations and that so I think that they are quite happy that you ask these sort of questions I reckon. Because they are more informed these days."*

*"That eases the patient's anxiety surely, doesn't it, being able to talk before they just get, you know, the mask on their face; night night sort of thing. It eases that nervousness for them to think that*

*right, they're totally focusing on me, it's all about me right now, they're focusing on me, they're asking me these, they're explaining to me why it's been done."*

## Surgical acceptance

There were 17 findings across all settings relating to the importance of surgical acceptance to ensure that the checklist was performed correctly. These surgeons were the top

*"Absolutely. Yep. You need it from the top. Always. If you're going to implement something you need it from the hierarchy, top of the chain."*

*"The acceptance by the surgeon. The surgeon and the anaesthetist because they dictate the pace I suppose"*

*"There were a few surgeons who were very keen on it so I guess the idea of having a few champions helped too."*

The personality of the surgeon as well could affect the checklist process.

*"I think the like how approachable a surgeon is or anaesthetist is as well helps I think you're more likely, if somebody is someone who flies off the handle all the time at little things you're less likely to approach them with sort of thing so if it's a more amenable team I suppose, it's easier to bring up these issues."*

*"And there's one particular surgeon I work with who does it particularly well. She makes everyone in the room stop. You can't talk. You can't keep opening things. So when people like that are around it certainly teaches other how to do it well."*

Some nursing staff commented that younger surgeons who had received training on the use of checklists often performed the checklist better in comparison with their older colleagues.

*"The younger one's do so, which is good, and it makes our job a lot easier because they're sort of instigating it as well as us."*

*"**Nurse 3** – The new generation will be used to it and they'll just get into it. **Nurse 2** – That's it! And the new generation of surgeons that are coming through. **Nurse 3** – They will be. **Nurse 2** – How long has the checklist been in? seven? eight years? So all these blokes that were surgical trainees and surgical interns at the time when it was introduced are now registrars and fellows, so yes, they are quite well aware of it."*

*"I think the younger surgeons, the registrars, having embraced it has made a huge difference. If they were still being reluctant it wouldn't have got off the ground. A lot of the old consultants still think it's a bit annoying and aren't really that interested."*

It was also mentioned that when the surgeon was running the checklist and accepted the importance of the checklist, other staff followed suit.

*"In fact, most of the time the surgeons lead it now which is amazing. And the surgeons will often say to the anaesthetist "Are the antibiotics in?" and the anaesthetists seem to be less irritated by the surgeons asking then they are by the nursing staff asking."*

## Anaesthetist acceptance

There were two findings from two settings relating to anaesthetist acceptance being an enabling factor to the successful use of the checklists.

*"There's a lot of anaesthetists that have embraced it and were talking about it before we formally implemented it."*

## Communication and teamwork

There were 28 findings across all settings that related to communication and teamwork regarding the use of the checklist. The checklist itself was found to improve communication.

*"It probably touches on improving communication in the theatre, and I would like it to do more."*

*"I think it's better, because you know you all know exactly what you're doing, you talk about it, you've discussed it so everyone's on the same level."*

*"One of the strong things about the surgical safety checklist is that it encourages team work and team communication."*

*"There's an old adage that I was taught many years ago which there can never be too much communication in surgery and that's just another tool that adds to it, I suppose"*

It also provided the opportunity or a safe space for people to speak up.

*"Yeah I think you are quite right that it does encourage other team members to speak up or give the opportunity to voice their concerns and buy in in this particular exercise."*

*"It's made the team more likely to listen when you ask questions if you incorporate your questions into this."*

*"It basically gives people permission to ask questions and challenge"*

In organisations with good teamwork and communication in place already the checklist was more likely to be successful.

*"I think at this place here we all seem to communicate very well a lot of us have been here a long time and we've all worked together for a long time and even the new people that have come have worked well together and sometimes we all know what the other person is thinking."*

However, even in these cases the checklist could still improve communication and bring the team closer together.

*"We all have our jobs and we all go about doing our jobs and I think at times the team time out at times has brought us a bit closer you know we all know we have to do it, the nursing staff know they have to do it, and so we just follow through with that as well."*

*"I think the girls have got a fairly good relationship anyway, but it just enhances it, I think, absolutely."*

Not all teams had members who knew one another, so the checklist also provided the opportunity for staff to introduce themselves to the team.

*"It is an opportunity, to say, to have a brief introduction to each other, particularly at this time of the year. Like for instance I've just had holidays, and we've had a whole new group of people, and I came in say this time yesterday, and I had to scrub straight away, and I looked at the surgeon and thought I know him but I can't, so it is nice to say 'I'm sorry I've forgotten your name I'm (name).' So I think it's all positive."*

*"I think it does, for me, because sometimes you don't know the surgeon, and it's a nice opportunity to say 'I'm sorry I've forgotten your name, I'm (Name)' or, so it does, yeah."*

*"And it does force everybody to make sure everyone knows who you are."*

*"I like the forcing function of people having to introduce themselves… we have a lot of visitors into the operating rooms. We have a lot of students. We have a lot of visiting medical officers. A lot of nursing students. And when you go around the room and introduce yourself and what your role is, I think that's very healthy for the team dynamics."*

### Association support

There were seven findings from two settings that discussed the importance of having association support to ensure the successful implementation and uptake of the surgical SC.

*"**Participant 1:** Also the Royal College of Surgeons, it was on the internet. **Participant 2:** But that sort of aided us in implementing it, would be the words, I think."*

*"I think as College of Surgeon trainees we've had it drummed into our heads that the surgical checklist is part and parcel of all our daily routines."*

*"The College produced a document in about 2008, I think, which also supported that approach. And that was helpful in that I could go to surgeons and say 'Well, you know, The College believes that that's important and hopefully you will be involved'."*

*"I think The College of Surgeons support. They're sort of seen as… an independent, well more independent body, in terms of safety and standards. So I think it was important that The College was in support of the process."*

*Small groups*

There was one finding from one setting relating to the checklist being able to be implemented successfully due to the small amount of staff involved in surgery at that location.

*"**Nurse**: We've only got about 15 of us around here isn't it? So it's quite a small, things get through quickly, filter information, so. **Moderator**: So has that helped too, having a small group? **Nurse**: Absolutely."*

## Barriers

For barriers, 17 broad categories that were identified from the data. These categories included:

- Requiring a change
- More paperwork/ doubling up
- Leading to friction between staff
- Medical/Surgical Resistance
- Anaesthetist resistance
- Lack of time
- Bringing people together
- Lack of education/support /guidance
- Not recognising it's worth
- Who is responsible?
- Different versions of the checklist
- Checklist format
- High turnover areas
- Lack of Strong Personalities/ leadership
- Staff Resourcing issues
- Lack of disciplinary action/repercussions for poor performance
- Private Hospital Environment

Each category is discussed in further detail below with exemplar findings (in italics) provided.

*Requiring a change*

There nine findings across four settings that discussed that requiring a change in current processes was a barrier to the implementation of the checklist. Participants highlighted that people often didn't like change which could then lead to resistance.

*"Well, as with any implementation of any change, you've always got a little resistance."*

*"Yeah, everyone hates change."*

*"It's human nature to grumble about these things."*

*"Yes, there were difficulties, I think, everywhere. There has been resistance as far as I'm aware to change. There's always resistance to change. I was sceptical. In my own practice I was already if you like following a system that ensured that I was minimising the risk of the adverse outcomes from it. And in the process of mandating change it changed everyone's system and there were a lot of us at our hospital that had their own systems, and in the changeover phase there was probably an increased likelihood of a problem rather than a decrease likelihood because we had set ways in place that were already working."*

This resistance to change often made it difficult for the change agents themselves.

*"And because it was a new process and there was a lot of obstruction it was difficult for the nursing staff who encountered a lot of the obstruction."*

*"I suppose that for me personally it was a bit disappointing that there the level of obstruction and non-engagement in the beginning and it has been seen as a nursing initiated change."*

*More paperwork/ doubling up*

There were 15 findings from across all settings regarding the requirement for more paperwork acting as a barrier to the successful implementation of the surgical SC.

*"The nurses had the attitude that it was another piece of paper that they have to fill out, do you know what I mean?"*

*"Frustration at more documentation."*

*"**Participant 2:** It's another thing. **Participant 3:** Another thing to add to the pile."*

There was also frustration that the checklist was doubling up or repeating previous checks and duplicating efforts.

*"See, as an anaesthetic nurse, we already do a checklist, so it's a little bit of double upping, because on our other checklist we already tick consent, you've got allergies you know so it' a little bit of double up for the anaesthetic nurse though, that's the only thing. SO you're signing one form and then you're going to turn over and sign another form, so, you've got when have they been fasting from on the other checklist, so it's a little bit of doubling up for us, it takes a little bit more time for us in between cases now, that's probably the only thing with us."*

*"The only thing, like you said, is doubling up on lots of things, some things."*

However, in some cases, this frustration subsided with time.

*"Yeah, but it took a while, I remember the first resistance was the extra paper work, we though 'oh here we go another piece of paper, we've got enough forms to fill in at the moment we do' but then it just became an extra thing that it wasn't that much of a transition to doing it you know and we got used to it."*

Others lamented the amount of information that was needed to be recorded.

*"Except it was too long. I've been doing my own checklists for 40 years, or 30 years at least, so I've been marking the limb and doing the checks and speaking to the patient before they go to sleep regularly for all this time so this was just putting it on paper but probably more information then was required."*

*"I just think it could be simplified. I'm not quite sure how it should be simplified but it should just be simplified."*

Others acknowledged the additional paperwork, but were more philosophical about the extra work.

*"Yes, there's more paperwork but that's just life."*

*Leading to friction between staff*

There were six findings across three settings relating to the checklist causing friction between staff. This friction was often between nursing and surgical staff.

*"**Participant 1:** I think sometimes it creates more barriers, because it creates tension, so if you go up to a surgeon and say we need to do a team time out, I need you to stop what you're doing so we can do it, you know there are surgeons where that is enough to make them go from being happy and bright and all good to be here to be, sort of, how dare you, how dare you make me stop and do this, you can do it, it has nothing to do with me. **Participant 4:** That's cost me two minutes (referring to surgeon's response)."*

*"The only thing that sticks in my mind is obviously when that particular nurse was not happy that it was done after the patient was asleep. To me, I, you know, it was sort of in a way you think 'oh that's a bit of overkill' because she had an argument with him, but then another way I thought that's a very good patient advocate because she was totally concerned that the patient you know, had gone to sleep and now the questions were being asked. Well, what if?"*

*Medical/Surgical Resistance*

There were 25 findings relating to medical/surgical resistance to the checklist which acted as a barrier to its successful implementation. Often this was because surgeons had their own 'system' for patient safety.

"We have a lot of surgeons who have their own systems and they all state 'well I have my own system and I've never had a wrong site surgery so I'm continuing with my own system' so well you have your own system, he has his own system, but we all work here on a daily basis or at other hospitals as well and this is a universal system that obviously WHO are trying to roll through to be a standard so we still have a lot of opposition to the pure, team time out aspect of it."

"We got lots of comments which would be everywhere, 'another nursing rubbish, 'who decided this'."
Participants lamented that surgical staff did not want to be a part of the process, even though it was being supported by the Royal Australian College of Surgeons and that the surgeons themselves were the ones who were responsible for the checklist.

"They basically didn't want to be a part of it to start with even though we said it was actually a directive through the college of surgeons."

"It should be driven by them, they didn't actually want to participate."
This resistance was displayed in various ways, from ignoring the checklist or outright hostility towards staff implementing it.

"Or they just completely ignore you, and keep talking. Or turn their back. Or go and scrub, or get on their phone, and they just don't participate in it at all as they don't deem it necessary, and you can pause as much as you like and ask for everyone's attention but if the assistant and the surgeon decide to have a conversation they will have a conversation, you can't stop it all the time."

"**(Nurse imitating attitude of surgeons)** It's time consuming, it's a waste of time, it's something you nurses made up, just to annoy me, virtually, really."

"Yes, well we have to make sure that people do listen. Often the surgeon is not listening, he's gone to the sink to scrub, because his idea is that 'well, I've consented the patient, I know the patient, and I know what they're having done' but we still need him in the theatre. The majority is probably the older surgeons who don't participate as much."
In some cases this meant that the checklist could not be performed as a true team process.

"In a negative light I think that I do it probably not 100% of the time, but I'd rather do it and not have people listening to me than not doing it at all. I don't think that follows WHO standards in terms of having a nurse initiate it and having people…….3 registrars in the corner chatting and not listening, but it's better than nothing. Which is not ideal, but realistic unfortunately."
In other cases this resistance completely stopped the checklist process as it wore down those responsible for implementing the change (often the nursing staff.)

"Well, we sort of had the mindset of 'if they're not going to bother then we won't bother.' Yeah, so, that was the mindset then, because we sort of think this is another thing, where we have to say, 'come on, come and do this,' and yeah, so we were sort of a little bit against it. We said if they don't want to do it we're not going to push them."
This resistance was often linked to staff not seeing the importance of the checklist, and that they themselves had a good track record and therefore did not need another patient safety measure.

"I know in two hospitals where surgeons have flatly refused to do them arguing that they had never operated on the wrong person and they weren't going to be told to fill it in."

"People were very, you know, I've never made a mistake. I don't need a piece of paper to prove that I'm not making mistakes."
Resistance wasn't necessarily the default setting of all medical staff, with many supporting the checklist implementation as well.

"It was challenging. We had a lot of medical support but we had a lot of medical obstruction."

### Anaesthetist resistance
There were eight findings from across two settings relating to anaesthetist resistance being a barrier to the use of the checklist. This could range from trying to hurry the process along to outright refusing to participate.

*"There's also the aspect of the anaesthetists who don't wait for anything either. You start asking the questions and as you're asking they're injecting and there just like 'come on we've got to get this done, gotta hurry come on come on."*

*"You still get resistance from certain anaesthetists who flatly refuse to participate in it – they've said no, I'm not going to be involved in this, and don't follow through on it, or won't stop and let you ask the questions before they start induction and things like that."*

Nurses reported that anaesthetist could be resistant to the checklist as they felt they were being overly scrutinised.

*"We have the antibiotic question, in phase 1 of the checklist, and we've had a lot of opposition, anaesthetists are saying 'well why are – that's my business, why are you checking on me' and we'll say that's part of antimicrobial stewardship in the standards, it's part of our – it's a prompt really, it's more of a prompt, it's not a questioning your practice type question, it's a prompt and we audit against it. That's probably one of the positions of the anaesthetists they didn't like being asked 'have you given the antibiotic'."*

Due to this resistance, the nurses often had to perform the checklist without involving the anaesthetist.

*"It's still something I think the nurses are trying to do without impacting on the doctors too much because we've had that resistance. They try and do it a little bit under the radar some of the questions, we'll go and check the anaesthetics notes rather than saying 'have you given the antibiotic' because we have had anaesthetists go like that (makes angry yelling face and moves hands) so some people try and it, you know, by stealth and go and check for themselves."*

### Lack of time

There were 17 findings from across all settings that mentioned the lack of time in surgical settings as a barrier to conducting the checklist.

*"**Participant 4:** So it adds just a little bit more time to our procedures between patients at times.*
***Participant 3:** And time is money – you can't do that!"*

*"But it's not like he won't do the check, he wants to do the check, he just wants to be quicker. He doesn't want to wait, he doesn't want to wait for the anaesthetic nurse to fix up the machine and then go down and check the patient."*

*"And then there's others that don't. If they're in a rush or have got time constraints they just won't do it."*

Some people mentioned that the way the checklist was run in educational materials (such as videos) was unrealistic in real world settings.

*"We definitely weren't going to do it like in the video and walk in and everybody stand there and everybody say 'I'm so and so' and then they go...we just haven't got time for that. So obviously we had to look at the way that we work and implement."*

Even after the checklist had been implemented this barrier did not necessarily disappear with continued use.

*"The time constraints are still there."*

### Bringing people together

There were eight findings from across two settings relating to the difficulty of getting all staff involved with the procedure in the room at the same time to conduct the checklist.

*"I think in that field everyone's so focused on what job they have to do, actually bringing everyone together at the one time and stopping to instigate something is what sort of was hard."*

*"I think one of the barriers from an anaesthetic point of view is when you don't get all the team involved, and that often happens with an anaesthetic team."*

*"I guess ideally surgeons and anaesthetists should be present in the room when you do that first one but that doesn't happen."*

When everyone was not in the room together when running through the checklist, it made it difficult to complete.

*"You know, checking the anaesthetic machine or whatever is not our roles so it's hard to tick that off when it has nothing to do with us and that persons not in the room with you when you are doing it."*

### Lack of education/support /guidance

There were 19 findings from across all settings relating to a lack of education, support and guidance as barriers to the successful use of the checklist. In some cases there was no education at all prior to the implementation of the checklist.

*"There was no education really, they just said we are bringing in this new thing because you have to do it because it's what's recommended, so just fill out the form, here it is. That's pretty much just how it went."*

*"Has someone gone through with you? No I haven't either. So it can only be open to my interpretation to what that question means. I don't really, I've not been explained what it means."*

*"Even if there was you know, like not a one on one person to talk to you but some sort of education email about it or something you know, to give information, you know why is this being done, what do these particular questions relate to, why is this important, what they could possibly mean, how do you interpret these questions to be and this is the answer to what we're looking for, something like that."*

*"I think the training could be better on the checklist. I'm actually someone who is quite interested in this sort of thing but it's hard to know exactly what this hospital wants in order to mandate it. It's hard to really know what we are meant to be doing and I think that that could be improved."*

Even though education was delivered in some settings, this was deemed insufficient by some participants, with additional step by step guidance required.

*"I think there's still a lot of education and I think something like this that needs to be, this is how we do it, this is how everyone's expected to do it, its step-by-step, everyone does the same, then everyone knows everyone else's expectations as to what's going to happen and they can pull each other up if you haven't done that part of it yet, you haven't done that part of it yet, we haven't done this part yet and remind each other that that needs to be an education process as well, which is very hard to enforce if you have anyone who is rebelling against doing it or taking it on board, but if you do get it exactly the same and have a complete step by step criteria of how to do it as well as the form to fill out then you should get the compliance. You say well we've got this here, if you're not sure of what you're doing this is how you do it we've got it written around it required."*

Participants often wanted more information on when to run the checklist.

*"There was that thing about timing, when do we do it. Do we do it at the beginning? Do we do it, because we were doing it that we were doing it that we were bringing the patient in, you know, while the patient was awake, identifying or introducing everybody but also talking about what they were having done, and it was sort of like making the patient wait there while we all talked about it so we sort of changed things as we changed the form. So you know, did the surgeon have to be in the theatre before the patient went to sleep, after they went to sleep, who was going to be involved, so, yeah."*

*"And there's still a misunderstanding to of as when actually it is to be done. Is it when you go into the operating theatre and the patient is awake and you involve the patient, or is it when the patient is asleep, and then, you know, do we also stop and then we do it. So I still don't have a clear understanding of that, you know when do we do it, when is the actual time."*

*"One thing I'm actually unsure about, and I'm presuming that surgical safety checklists should be done before a patient's put to sleep, is that correct? Well, quite a lot, it happens after they've gone to sleep, and people gather around while they're being anesthetized, and they'll do it then."*

Staff who worked across hospitals would have liked some orientation to the checklist process in each hospital due to the differences in forms used, as highlighted by this surgeon:

*"You know, in every hospital I've operated at I have never been orientated that way. So I don't know if it happens elsewhere, but when you first come to a place some form of checklist has always been used in every case that I've done at a hospital."*

### Not recognising it's worth

There were seven findings from across three settings relating to staff not viewing the checklist as important for patient safety which acted as a barrier to its successful use.

*"There were some doctors who just didn't believe the evidence that was presented to them and thought that the evidence was skewed irrespective of how many times I did present it to them."*
*"It was partly because they didn't believe in the evidence."*

Staff mentioned that they would like feedback to be able to determine whether or not the checklist had actually improved outcomes in their setting.

*"I'd like to know if there's been incidences, which I don't think there have because we haven't heard of it, where they've operated on the wrong side since we've been doing it; that would be interesting."*
*"What I have not yet seen in [State named], and you might be able to point me to it, is whether there has been a State-wide audit to see what the effects of implementation has been. If the evidence is true, if the papers are correct, we should be able to demonstrate the halving of morbidity and mortality. We have all implemented by mandate this policy because there is evidence it will do that. I am not aware that anyone has actually showed this to be the case in [State named], I guess."*

### Who is responsible?

There were nine findings across two settings regarding the lack of clarity regarding who was responsible for the checklist being a barrier to its use. Often, this presented in a lack of ownership of the checklist.

*"When they implemented it, they had a lot of problems with saying who would be responsible for it because sort of the scouts, the scrub scout would say we have enough paperwork to deal with, and the anaesthetics were like, but we shouldn't have to take responsibility for everything because we are doing the anaesthetics check in and then we are doing this, so, yeah, even when I left there was still arguments about who was supposed to be signing it, completing it."*
*"**Anaesthetist** : It's hard to know exactly who's meant to be doing what. **Surgeon**: Yeah.
**Anaesthetist**: It's like someone filling out the form half way through the procedure. **Surgeon**: Yeah.
**Anaesthetist**: Maybe that side of things needs to be looked into or maybe there should be like a help audit process. I don't know!"*

This issue led to conflict between professional groups, in this case, nurses and surgeons.

*"Frustration at more documentation, and that it comes down to the nurses when it actually has written on top of the checklist to be implemented by the medical, by the surgeon basically because that was supposed to be the way it was directed, they were supposed to say right. The first phase, definitely, there's a lot of nursing involvement, but it should be directed by the person in charge of the procedure, so I think the nurses were, it was imposed on the nurses to do, because it had to be done, and if the doctor wasn't going to do it, well it was up to us again, basically that was the thought. Then the doctors were obviously not informed about the process thought 'aw this is something the nurses have imposed on us' sort of thing so it looked like a nursing bureaucratic thing. When actually it's come through and been endorsed by the College of Surgeons, there has been medical endorsement of this, so I'm not sure about their education of the process. Certainly the public people who work publically have an understanding of it but the private fellows are the more difficult ones to get the message through to."*

### Different versions of the checklist

There were five findings from across two settings relating to having multiple versions of the checklist which caused problems for staff who worked across settings.

*"Interpretation of the checklist, I suppose because you could modify it for each organisation, I suppose that has caused a lot of implementation issues, because it's not a standard form, so the surgeons and staff that travel to various hospitals do find variances in the procedure. So if a form was put out, and that's what's going to be the form, it possibly would have been easier thing to implement."*

*"If it had of just stayed as this is the national form, this is the national procedure, this is how it needs to be done in every hospital, every doctors aware of it, everywhere they go they have the same thing happen with the same, whoever that person is, if it's all the same wherever they go, they are just used to it, and it becomes habit. Whereas because there's so many different modifications to it in every place you go to, it creates massive confusion."*

*"Nothing really comes to mind other than there's a whole number of different forms that need to be filled in during an episode of surgical care and sometimes being made aware of that when you go from one facility to another is easier in one place than another so depends on the facilities around really. When you first start operating somewhere you are prompted to use the different forms including the checklist."*

### Checklist format

There were 17 findings from across three settings regarding the checklist format itself being a barrier to its implementation.

*"I'm not a huge fan of the format, of the one that we've got here. I don't think it is clear in the sense of when each step is to be done as much as the WHO one is."*

There were also some concerns about moving to an electronic format for filling out the checklist.

*"Yeah, the electronic one is awkward because you are sitting at the computer and not facing the patient… it's completed just as fully but it's not as patient involving. I tend to yell it out and someone yells who's next to the patient cos there's some distance you see. Normally, with the paper version you would both be standing with the patient and I would be interacting with the patient saying hello and all this, but with the electronic version it's more distant."*

*"But you know we are going from paper based to electronic based everywhere and somehow that has to happen so things happen more automatically or it's easier to fill it in or there's less chance of mistakes. But you know there is a transition period everywhere, first of all the paper thing coming in and now bit by bit more electronic systems coming in."*

### High turnover areas

There were three findings across two settings relating to the use of the checklist in high volume or high turnover surgical settings. In these cases the checklist was not received well by staff.

*"We haven't rolled it out to our endoscopy department as yet, because of the quick turnover, it was not received at all there. But possibly we will have to implement it there as well, so that will be very hard to take that checklist into such a high turnover list, it will have to be modified, possibly, but I'm not sure if you'd want to have two different forms."*

### Lack of Strong Personalities/ leadership

There were seven findings across two settings relating to the lack of strong personalities or leadership that is often required to run the checklist smoothly. Participants spoke of the need for strong, confident nurses to stand up for the checklist, but acknowledged not all nurses were that confident.

*"You try but then there's people that are strong in theatre and I found I had a lot of anaesthetic staff who were quite quietly spoken and therefore felt like their voice wasn't heard and they'd be told 'we're not doing that' and depending on the personality of the anaesthetic person who was running it which is where I came from it either got done or it didn't and it depended on whether they could walk all over that person or not."*

*"And really, we outnumber everybody most of the time, so if we all band together, and are a true team, and all support one another, then nothing can continue without our okay. But it's very difficult to ask people to do that who aren't of those personalities but if they see everybody doing it and everybody acts by example then its enforced I guess."*

*"I think people were a bit more insecure about instigating it, weren't they."*

### Staff resourcing issues

There were four findings relating to resourcing issues from three settings. This was mainly due to staff who weren't primarily employed by the hospital or agency staff.

*"I mean because we, you know, theatre is operating half with staff who are not actually employees of the hospital, trying to force the use of it with staff who aren't employees is impossible more or less, so, I mean trying to get surgeons and anaesthetists and assistants to get on board with it when they have no incentive really to get on board with it apart from things they hear from medical committee."*

*"So I guess sometimes techs are a barrier because they want to be health professionals but they can't do those checks."*

*"For me it would probably be agency staff. That would be a few that didn't want to participate. It wasn't their job. It didn't matter how many times I said it to them this is the way we do it."*

*"I think there's still an issue with non-permanent staff. That's what I'd say. Permanent staff are fantastic, couple of casuals and couple of agencies, no matter how many times you say it, it doesn't sink through."*

### Lack of disciplinary action/repercussions for poor performance

There were three findings from across two settings relating to the lack of disciplinary action being taken when people refused to perform the checklist.

*"The director of that department he sent out an email to all the consultants and said "Make sure you do the WHO surgical safety checklist". And then I was working with one of the consultants and he was saying "Oh, who complained?" and he was sort of a bit put out by the fact that someone had complained that it hadn't been getting done properly. I still think they don't take it that seriously. Like they didn't think it was an issue that someone wasn't doing it."*

### Private Hospital Environment

There were seven findings across four settings relating to the private hospital environment being a barrier to the use of the checklist. This could be due to the lack of a clear directive to use the checklist.

*"I think because we are an independent, private hospital we don't have a directive. You see the public health directives come out and we take a good look at those and we sort of use them but because it doesn't actually apply to us at the time we are delayed in getting information, because we are fairly insulated in this environment."*

Once again the issue of staffing in the private hospital environment surfaced.

*"In public, because you get such a different workforce, I think it's very good for promoting team there, because the introduction is very valuable because you've got no idea who the person is you've never seen them before in your life, where in smaller privates it's more a consistent team, so I'm not sure the checklist has added too much."*

## The use of the checklist

For the use of the checklist, three broad categories were identified from the data. These categories include:

- Performed incorrectly or inconsistently
- Tick, tick, flick
- Responsibility issues

Each category is discussed in further detail below with exemplar findings (in italics) provided.

*Performed incorrectly or inconsistently*
There were 39 findings from across all settings where participants mentioned that the checklist was performed incorrectly or inconsistently in their setting. The issues ranged from the checklist not being performed at the correct time, with the right people, or not going through each question.
*"It is now the occasional patient I know slips through without a formal thing being done, but I'm also aware that the important parts of it have been done but informally."*
Participants mentioned certain sections weren't carried out as well as they could be.
*"I think generally the surgical concerns, anaesthetic concerns, nursing concerns, isn't done properly as it should, as it isn't really voiced… are there any nursing concerns, are there any surgical concerns, it's more of an assumed thing. So I think that's a big issue I've seen it's endemic in the private sector."*
Participants mentioned that the team time out was not always being performed correctly, as not everyone was necessarily stopping and paying attention at the required time.
*"**Participant 4:** And there lies the problem of not doing a pure team time out – because everyone should stop. **Participant 2:** we're not stopping."*
A common issue was when the checklist should be performed, and there was much confusion regarding whether it should be done when the patient is awake or not.
*"**Participant 3:** it should be done whilst the patient is awake. **Participant1:** Yep. It doesn't always happen. **Participant 4:** There's a lot of times it's not done while the patient's awake. **Participant3:** 50-50? **Participant1:** Easy, even more maybe.**Participant3:** 50-50."*
*"The majority of cases where they put to sleep and then done, only one case have I actually had someone speak up and say they're not happy with this. I haven't been involved, and it's quite common for the patient to be asleep and the checklist to then be done, but only one incident has someone spoke up about it when that's happened. It sort of just, you know, 'oh yes we've got the right patient, and yes we're checking the allergies off, yep, okay, fair enough, off you go start your surgery' not 'wait, and let's put the patient, you know, let's make this patient say yes that's me and read out their name' and everything to. Which is the best way to go about it."*
*"I don't know if they've changed their practice now….but they do the surgical safety checklist knife-to-skin, just before knife-to-skin. So then the patient has no involvement in this, the whole thing. At knife-to-skin it is basically the scout nurse who stands there holding the checklist and everybody will say "Ok, we all know everybody. Is there any problems?". Too late by now. The patient's already gone to sleep. "Is there any problems with imagery?" Too late patient's gone to sleep."*
*"Often the process will be starting when we are doing our most critical thing, putting people to sleep. So it should either be done before or after that in order to get buy in."*
It was stressed that even the way the questions are asked is important, but not necessarily always performed correctly. Ideally, patients should be asked for their names, not to confirm their name as read to them by staff.
*"I think, what about the thing, you know, the patient, you should, the patient they should say their own name. Often, we will go, 'we've got (name, number)' and the patients, you know, like us, they should be saying 'I'm (name, number).' I just think don't presume anything they should say, unless they're really sick or they've got other issues, they should, patient should say their own name. Sometimes they don't understand, they'll just say (first name) because it's time."*
One section that was frequently not filled out or performed correctly was the post-procedure section.
*"Definitely I've never seen anyone do the post-procedure thing properly, as it should be, I don't reckon."*
*"They might do like the first part of the form where they're checking off the patient but then there's another bit, checking, or have you, is the count correct, is, you know, they don't do that bottom bit sometimes, and then they leave, and it's too hard to go and get them."*
*"I think that the final step, the sign out, I think that's not well done."*

*Tick Tick Flick*

There were eight findings across all settings relating to the use of the checklist as a 'tick tick flick' process. Participants spoke of the perfunctory completion of the checklist without consideration of what it was trying to achieve.

*"So it was tick and flick again, because I remember unscrubbing you've got to sign this, and just sign it, instead of me actually going yep okay, I've ticked and checked."*

*"I think that people just tick it without going through it. It's "Oh we're leaving. We need to tick it and send the patient out". I think that last bit is sort of an afterthought. You just tick it so you can get it out of the way and send the patient off."*

*Responsibility*

There were 24 findings across all settings relating the category responsibility. Determining who was responsible and discussing ownership of the checklist process occurred frequently throughout the focus groups. Various roles were assigned responsibility, from the surgeon, the scout, or the whole team.

Often the person identified as responsible was the scout nurse.

*"The scout. The scout nurse drives the whole lot for the completion of the checklist."*

*"The scout does the whole lot? Because that was a contention where I've recently come from we segmented it into the three phases and got anaesthetic, scrub and scout to do it so that the whole team had to take ownership of the form so that it wasn't one person's responsibility to do, but then that brings in extra questions of 'well I'm not responsible for you know, the prosthesis, and I'm not responsible for this, but I'm putting my name there legally saying I've done that."*

*"Usually our scout nurse would sign it, as they are doing the documentation, peri-operatively – intraoperatively they're doing the documentation, so usually it does fall to the scout nurse, occasionally the anaesthetic nurse."*

Others mentioned it was the surgeon's responsibility, but that sometimes the nurse would still lead the process or prompt the surgeon.

*"**Nurse 4:** I'll put it in front of them. I'll remind them once. And if they don't fill it out then that's their problem. **Nurse 3:** I agree with that. Often they just look at me. **Nurse 1:** So you will find that there will be gaps in your audit here because it's not our responsibility even though we probably do check twice."*

*"Well I guess it's a multidisciplinary responsibility, but I say to the surgeons that they are responsible."*

*"**Surgeon:** From the lists I've done so far it will be the scrub nurse who's running the theatre or the anaesthetist who will bring it up. I've only just cottoned on now that it should be me that does it really so that process wasn't really explained to me; it was like this is what we do. And that's what I'm saying, some sort of orientation session for a surgeon who comes to a new facility, or a facility for the first time, is a good thing."*

*"Ultimately, the surgeon should take responsibility for their operation. If I do the wrong site operation it's my responsibility. If I get DVTs because I forget to put them on prophylaxis it's my responsibility. So I take responsibility but I don't see it.....I've seen it work very well with the nurses actually holding the paper and running through the questions with everyone listening."*

Others discussed that it was the full team's responsibility, that everyone was responsible and everyone had to play their role.

*"I think everyone's responsibility, as a team...but one person signs it, obviously."*

*"I think it's a group. I like to cover my, I try and do everything properly."*

*"It's a group thing, that's what I think. Rather than pointing fingers at each other."*

## *Thematic analysis of radiology group data*

In radiology, seven focus groups across three settings were conducted consisting of 19 health professionals. In total, there were 16 nurses, two radiographers and one radiologist who contributed to the collection of data during this phase.

The purpose of this phase was to identify barriers, enablers, and the perception of participants on the use of the SC in radiology. As such, data were analysed according to these three broad headings. Table 23 is the result of a content analysis and provides an overview of the most common barriers and facilitators mentioned during the focus groups.

Table 23. Summary of categories for barriers and facilitators in radiology

| Radiological Settings | | | |
|---|---|---|---|
| Facilitators | Findings | Barriers | Findings |
| Education | 4 | More paperwork/doubling up | 3 |
| Better with time | 3 | Not prepared | 7 |
| Recognising its worth | 22 | Lack of time | 5 |
| Easily understood format | 12 | Lack of education | 1 |
| Changing format to fit local needs | 9 | Checklist format | 13 |
| Confident staff | 2 | Staff issues | 1 |
| Strong culture | 5 | | |
| Mandated | 4 | | |
| Radiologist acceptance | 1 | | |
| Well-prepared | 1 | | |
| Improving communication/teamwork | 5 | | |
| Including the patient | 2 | | |

Following is a summary of the full interpretive analysis of the data under the headings of barriers, enablers and use of the checklist.

### Enablers

From discussions with staff working with checklists in radiological settings, 12 categories were identified that related to facilitating or enabling the use of the checklist. These were:

- Education
- Better with time
- Recognising its worth
- Easily understood format
- Changing format to fit local needs
- Confident staff
- Strong culture
- Mandated
- Radiologist acceptance
- Well-prepared
- Improving communication/ teamwork
- Including the patient

Each category is discussed below, with illustrative findings provided for each category.

### *Education*

There were four findings across two locations relating to education as an enabler. This was either formal education or education received when working as a supernumerary person being oriented to the role.

*"And she always gives us education. We've had a lot of education on it."*

*"**Nurse 1** – It's on the job. When you're learning the holding bay area you're supernumerary so you have a nurse with you all day and they go through everything with you. So, they would show it to you. They would do it through with you a couple of times probably, and then you'd be able to do it on your own with somebody making sure you have covered everything. So, during that orientation time."*

*"I wasn't given an in-service, but as part of our training program here, when you're in a procedural area you are supernumerary for seven to eight weeks so you are always working with a senior nurse during that time and that was the time when they would go through that with you. So if you needed any clarification or had any questions you would ask then. And the number of checklists that we do in this department that after seven or eight weeks of them being supernumerary you had a pretty good idea of what was needed on that piece of paper."*

It was important that this training was not just about the process, but why this was being done.

*" Most people would see someone training and give education on each of the points that they're checking as well so that they're not just ticking a yes/no box but going through what they're doing and why."*

### Better with time

There were three findings across two departments relating to the checklist improving with time. Participant's spoke of how it was difficult initially running through the checklist, but that with time and experience it became familiar and easier to run through.

*"We just needed time to get used to it."*

*"You start to learn all of the questions and then you just click, click, click, click, click and then you're done. But the first few times I remember doing it I just gave up. I had to read every single question but now you just know it."*

*"No, I know my way around it now. I know where I'm going to write certain information and tick certain place. You know…..I know what's relevant for my particular patient. Before it was very verbose but now it's….I think it's much better and you know you don't let your patient go before……time pressures or whatever, you know you've got to get it done. And you make sure that this is what you are doing."*

### Recognising it's worth

There were 22 findings across all settings relating the category of recognising its worth. The checklist was deemed useful as it resulted in staff checking the patient when this may not have necessarily occurred if the checklist wasn't in place.

*"I think it's a good idea because some people don't actually check that it's the right patient, right procedure so yeah its good like that."*

*"Yes because you do the checking of the patient and then there is no mistake of who they are, is it the right side we are doing, is it the right procedure for this patient."*

In general, the staff thought the use of the checklist resulted in a reduced risk for errors occurring and improved patient safety.

*"It decreases the risk of errors yeah."*

*"Because it makes sure we get everything right. We need to make sure that things are done properly."*

*"It re-iterates and reminds us what needs to be done for that procedure because if we didn't have the checklist then we might forget that this person actually needs IV antibiotics before a procedure."*

*"**Moderator -** So do you think the checklist is effective for patient safety? **Radiographer** – Yeah, I think so. **Radiologist** – Yeah!"*

Although it was generally viewed as important, in some procedures particularly staff stressed its usefulness and recognised its worth.

*"Especially, probably more for cardiac. Like cardiac is always a similar sort of procedure, like you make sure they know what they're having but with the radiology side of it it's like you left leg, your*

*right leg, you're double checking all of that as well. Which is always a little bit more important. Putting a tube in you know the right kidney instead of the left kidney , yeah."*

*"The other thing is that specific procedures require specific preparation so I like to know yep, that's all done!"*

### Easily understood format

There were 12 findings across two settings relating to the format being easily understood which acted as a facilitator in the use of the checklist. Participants spoke of how it was relevant to their setting.

*"I think this new checklist is quite specific to radiology but it has more categories in it that relate to the procedures we're doing and the patient preparation we need to do."*

Others spoke of the need for a checklist to be laid out simply and easy to read.

*"What I find is our current checklist compared with our old checklist, the old one was very easy to read and it was laid out quite simply. You could at a glance see what information you needed from that checklist. Whereas our checklist now, because we've added a few more things for patient safety and what not, it makes it a bit harder to read and find the information that you're after as well."*

*"I'm not long off my training, and yes, someone went through it with me. But it's self-explanatory. It's not as if you need someone to go though it with you."*

*"Which took a lot of time whereas this one has more of a 'tick and flick' feel to it and you can tick more boxes to indicate what variables are present rather than having to write them out in full so I think that even though there's more categories to check on this current checklist, it's faster in a way cos there's less long hand writing and there's still an area where we can write notes. So, yeah, personally with the current checklist I don't have any major problems with it at all."*

Other's mentioned that it was in a good format but there was still room for improvement.

*"Pretty straight forward. Other than what we've mentioned. Could be more straight forward."*

*"I think it should be just black and white … I think it should be quite clear... It used to be just a table with words and there was no blacked out bits and no extra bit to the right. You could just tick it off and write extra notes if you needed to, so it was quite clear that way."*

### Changing format to fit local needs

There were nine findings across two settings relating to the ability to tailor the format for local needs which acted as an enabler. This was often to make the checklist simpler and more straightforward.

*"We're working on that anyway; a more simplified version for some procedures."*

By being able to incorporate feedback and modify the checklist, participants were able to have some ownership of the checklist.

*"**Moderator** - And did you have any input into changes on the checklist? **Nurse 1** – They are always after feedback… and they took on the feedback so you had an opportunity to say "I like this and I don't like that"*

*"In this department what we try to do is if we identify a barrier we will try and fix it or make a change to it straight away. So in the time that I've been here, which is over 5yrs, we've changed the checklist three times. And each time they have tried to add more categories or refine it essentially so it suits our practice a little more. So it was always a radiology procedure checklist which has been honed as the years have gone on depending on our patients, their acuity, on the type of procedures we are doing and the sort of preparation needed for those procedures. So yes, I think that if we identify a barrier we usually try to fix it quickly. And when this most recent checklist was submitted for a trial as such, that's when we as nurses were able to say "Well look. This is working. This isn't working. We would like more room to write something. We don't think this column is appropriate". There was a bit of a consultation period and that was the time when they would go away, when I say they I mean (CNC) and she developed it, and she would go away and refine it. Even with this most recent checklist*

*developed over say the last four or five months, even that checklist has gone through a tweaking process as well."*

*" In radiology it tends to be nursing based changes so we decide. We have meetings a couple of times a month. It gets bought up at those meetings. We discuss it. People put forward their ideas about how it could be changed. They try it. We ask "what do you think of this?". This is what we thought…then people say "don't like that bit. Like this bit". Try it out. It gets printed up again and get everyone to look at it again and then we might start actually using it and then even when we start using it we might still change things."*

### Confident staff

There were two findings from one setting relating to the importance of confident staff in running the checklist. For example, the nurses may need to be able to speak up to ensure the checklist is completed.

*"The girls have never been afraid to speak their minds at all."*

### Strong culture

There were five findings from two settings relating to the pre-existing strong culture that enabled checklists to be successfully implemented.

*"We are very open to change."*

*"We're more accepting towards change."*

*"No, it's pretty good here actually. Like everyone embraces it."*

### Mandated

There were four findings across two settings relating to the importance of the checklist being mandated to make sure that it was completed.

*"We got told we had to do it."*

*"It's not a choice.*

*"I have no doubt that it's mandated by the hospital that any patient having a procedure in this hospital needs to have some sort of checklist done."*

Some participants spoke of the fact it had been taken too long to be approved and mandated.

*"I think the only thing I would say is it's been too long to get this approved as a legal document and put in the patient's chart. I think just purely from a safety point of view, how can we prove in radiology that we have actually checked this patient in for a procedure?"*

### Radiologist Acceptance

There was only one finding from one setting regarding the importance of radiologist acceptance. This finding wasn't necessarily related to radiologists leading the checklist, but rather allowing nurses to perform it.

*"If any other staff, apart from nursing staff, the radiographers or doctors can see you doing the checklist they will often just wait until you have finished and then step in a do whatever they want to do."*

### Well-prepared

There was only one finding from one setting regarding making sure that everyone was well-prepared to perform the checklists. In these cases, the checklist was much smoother.

*"**Nurse 1** - And they've got their own pre-radiology checklist which they have to complete. Would that be part of their clinical path? **Nurse 2** – Yeah, it contains things that we need for our procedure and I find that that is sometimes helpful. But that's the only one that I know of."*

### Improving communication/ teamwork

There were five findings from one setting regarding the checklist improving communication and teamwork. It acted as a prompt for critical discussions with other staff prior to the procedure and also amongst all staff.

*"And if we didn't have the checklist and we did go to the doctor and talk to them about something and we understand that yeah it's still ok for them to have that procedure, when the patient goes into the room, if there wasn't a checklist the nurse might pick it up again and go "Oh, maybe I should go and talk to the doctor about this" because the information might not have been relayed to them and the same conversation will be had again with the same doctor."*

*"And it certainly opens up nurse/nurse communication for sure. Because like (Nurse 2) said it prompts us to handover constantly."*

### Including the patient

There were two findings from one department regarding including the patient in the process which acted as a facilitator.

*"So I think it opens up patient/nurse communication beautifully because we are prompting the patient to answer questions. We are checking the chart with them. We are involved with them in the ID process."*

## Barriers

From discussions with staff working with checklists in radiology departments, six categories were identified that related to facilitating or enabling the use of the checklist. These were:

- More paperwork/ doubling up
- Not prepared
- Lack of time
- Lack of education/support /guidance
- Checklist format
- Staff

Each category is discussed below, with illustrative findings provided for each category.

### More paperwork/ doubling up

There were three findings from two settings relating to the checklist acting as an extra burden requiring additional paperwork to complete.

*"It just adds more like paperwork."*

*"Probably just remembering to fill out the paperwork, initially. Now it's just oh yep that extra bit of paper."*

One participant spoke of her excitement moving towards an electronic system which would eliminate some of the paperwork.

*"I think so. I'm a bit, not anti-paper work, but I cannot wait for electronic records. I can't wait. I'm so excited. Cos there are so many pieces of paper floating around this damn hospital."*

### Not prepared

There were seven findings from one setting regarding staff not being prepared to use the checklist, which acted as a barrier. Inadequate preparation of the patient or the procedure was a consistent issue.

*"A barrier would be that you don't have time to complete it because your patient's not ready. It's the wards responsibility to get the patient ready for us. That includes consent, cannulation, antibiotics, bloods….those sorts of things and usually you try and ascertain that that's all done before you bring them down… and when I get them down there's usually an issue, like the consent's not signed. So I sort of think I like how in theatre upstairs on their checklist it gets completed by the ward, and then the theatre nurse completes it as well when the patient arrives. We don't have that. And I think if we*

*had something where the ward had to complete it specific for that procedure, and then we check it when they come down, I think things would be a lot better. We've always got issues with patients not being ready, always, always, always, always!"*

*"I think doctors have a part in it because they are the ones that are meant to be ordering the bloods. And yes, nurses can try and chase them up all the time but they should be knowing what they need for a procedure and I think if they actually looked at the radiology manuals at what we wanted, or what we need for our procedures, then things would be a lot better and a lot smoother because then the nurses on the ward can get these things done."*

*"And it's their responsibility to make sure they have adequately prepared that patient for you. Which is our biggest source of delay in this hospital. It's inadequate preparation."*

*"**Radiologist** – Our problem is that usually we do the checklist down here and the patient is not aware of what's involved and aren't updated by the people up on the ward that don't understand what our job involves, I think is my biggest peeve or problem. And there are checklists for these guys to follow but I think it's pretty busy cos if they've got 30 patients to look after and there's, everyone understands what to do for surgery but when it comes to radiology they have no clue."*

### Lack of time

There were five findings from two settings regarding the lack of time to conduct or complete the checklist in the radiology department.

*"It just takes time."*

*"Yeah, sometimes the paperwork takes longer than the procedure."*

### Lack of education/support /guidance

There was only one finding from one setting regarding the lack of education or support.

*"We do have an online radiology manual which actually says everything that the patient needs but so many people never look at it or they don't know that it even exists."*

### Checklist format

There were 13 findings from three settings relating to the format of the checklist as a barrier to its successful use.

Some spoke about the difficult of using the electronic version of the checklist.

*"**Speaker 1**: It's not as user friendly than what it could be either. In terms of documenting everyone's names. Are you aware of the list we have on the computer?"*

*"You can't just type it in, it's not like on the other screens. You have to go through the whole list."*

In some cases the wording of the questions wasn't quite correct.

*"Some of the questions I remember were a bit funny and like it says you know is all the x-rays and stuff here you need and people would tick yes and then but maybe they're on the PACS system or something like we can't actually check the correct x-rays are here, we're just assuming they are because the doctor usually looks at them."*

*"Some people write not applicable or put a line through it, and I guess others leave it blank so I guess for the new RN that's not experienced that would be difficult for them because there's so much that they need to know. Yeah, it wouldn't be easy for them."*

*"**Radiologist** – Inappropriate things that are on them. A checklist needs to be relevant. It gets people to check things that are on it."*

Others criticised the format and presentation of the checklist.

*"I think it was cos it was so much more informative that it just took you longer to run your eyes over it to make sure that you are filling everything in properly, probably because the writing is smaller. That would be the only thing, just the writing being smaller. Our previous one the writing was a lot larger so it was easier to visualise."*

*"I think that when the writing is very small and there lots of writing, it's very hard to get to the point straight away, like you have to sort of search around, maybe it's just me. When there is too much*

*information to look at then it's easier to look at the chart rather than to look at that, but it just depends on what checklist you are actually looking at."*

### Staff

There was only one finding from one setting regarding staffing issues, particularly non-regular or agency staff.

*"Yeah! Sometimes you have people that, you know, are a bit "prickly", that come in here on the weekends and aren't our regulars. And they might not have filled in that form and you'd be there saying "Have you done the check in?" and it would be like "Oh that's right. You do that over here" and we'll go through the things and mightn't fill that form in but have actually done all that stuff, and you know you've checked what's been going on, checked the ID and some other things to make sure it's being done properly and then at the end you've got to say "sign this" sort of thing. But, I don't know, it's something that you do. They mightn't like it. And it might be a bit of a hassle "I've gotta go and fill that form in" but if you don't fill it in and it's not done, then it's sort of on you then…..Oh you didn't do that."*

## The use of the checklist

For the use of the checklist, two broad categories were identified from the data. These categories include:

- Performed incorrectly or inconsistently
- Responsibility issues

Each category is discussed in further detail below with exemplar findings (in italics) provided.

### Performed incorrectly/ inconsistently

There were five findings from one setting regarding the incorrect or inconsistent use of the checklist. Oftentimes items were missed or skipped.

*"Sometimes procedures don't need everything on that checklist so people might just skip ticking something there. So they might just leave that blank."*

*"No I think staff compliance is good. Sometimes the odd thing will be left out. Doesn't mean that someone's not bothered. It's probably they've just forgotten. Also some of our procedures require certain preparation and others don't so we also need to be aware of who needs what and that can also then change the way you do the checklist slightly. But yeah, not really."*

Often items were skipped due to performing a procedure where it was viewed that the checklist was not necessary.

*"Sometimes there's still the odd fluoro case where we are saying to each other "Do we need a checklist for this or not?" And I think so long as you can provide a rationale as to why you need it or why you don't need it, fine. And some staff members if they feel more comfortable will do one and maybe others wouldn't but then we are talking about pretty simple procedures that aren't all that invasive really."*

### Responsibility

There were 21 findings from across all settings relating to the issue of responsibility of the checklist. Nurses largely viewed the checklist as their responsibility and they were the leaders of the checklist.

*"Well the checklist was refined by our CNC and it was a nurse led checklist so this is a nursing led job which needs to be done when these patients comes in for their procedures. So it's not a checklist that is filled out by a doctor or a radiographer, it's a nursing role to do it."*

*"Also it is very much a nursing led aspect. In fact, I don't know if any doctors or radiographers would ever need to write on it."*

Even though the checklist was viewed as a nursing responsibility, this did not mean that radiologists were without responsibilities of their own.

*"And it's not that the doctors aren't taking responsibility but I think what they are doing is they are taking responsibility for the procedure that is happening under their hands right then. But as far as the patient care and safety is concerned, that's a nursing role."*

*" Well that's right. So, you could argue, officially the doctors and the hospital would probably say "Well, no. It's the doctor. They are responsible for the patient in the room at all times". But firstly I don't feel that's the case here. I think really the buck stops with the nurses and most nurses here would feel it's their responsibility…that they had a responsibility towards the patient at all times, and the whole running of the room and the set up and everything actually. I'm not answering this very well but yeah, I think it's very different here. Not that our doctors aren't very conscientious…"*

Others viewed it as the responsibility of the radiologist.

*"**Radiologist** –ultimately I'm the responsible one if I do something on someone and there's something I don't know. It's not really whether, if someone hasn't told me it would be disappointing and I would be disappointed that that had happened, but ultimately it's my job to know all that stuff I think. That's probably how it would pan out in most situations."*

*"**Radiologist** – Sometimes these things happen but it doesn't matter how many checklists you've got, if you've made a mistake, you've made a mistake, and it's not something you live with whether you've got 40 checklists and, you know, someone's delegated their own responsibility to  you or not it's ultimately,  made the mistake has to live with it. Doesn't matter how many checklists you've got."*

Others viewed the checklist as a team responsibility.

*"All of the nurses involved in the patient procedure, pre, during, post. As well as the radiographers. Like it's got what information they need to know. E.g. they are the ones administering contrast. Everyone. Doctors."*

*"**Radiologist** – Well I guess everyone's responsible. If there's a problem everyone is at fault."*

*"**Radiographer** – It's a shared responsibility."*

*"**Radiologist** – If there's too many things happening people just simply won't do it.  It just needs everyone to think. Think about the patient and making sure that they're happy to be a part of the jobs been done". That's everyone's roles. No-one can obligate that responsibility to anyone else."*

## Phase 3

The aim of this phase was to investigate why the barriers and enablers identified in Phase 2 existed and to discuss these in detail, including whether they could be modified and to identify areas for improvement. The participants in Phase 3 were radiologists and surgeons who had responsibility over the checklist in their departments. Data was analysed separately for the two focus groups and is presented below for radiologists and surgeons.

### Surgeon Focus Group

There were five surgeons of varying levels of experience who attended the Phase 3 focus group. Questions asked during the focus group followed a focus group schedule created a priori, however participants were encouraged to discuss any issue they felt of importance and to ask their colleagues questions as well if they required further information. The focus group lasted for approximately one hour. Surgeons within the focus groups had experience working in both public and private hospitals. During in-depth analysis of the transcribed data 12 themes emerged from a number of sub-themes. These overarching themes were:

- Whose responsibility? Being the leader
- Why do they work? Being on the same page
- Measuring success - thank God we did the checklist
- Why are they useful? Increasing safety and decreasing waste
- Implementing checklists: from resistance to acceptance
- Utilising Checklists: barriers
- Utilising Checklists: enablers
- Assurance not concern
- Routine practice – as fundamentally important as scrubbing
- Not perfect but better
- The best way to use a checklist

- Involving the patient

### Whose responsibility? Being the leader

This theme was comprised of three subthemes relating to issues of responsibility regarding the checklist and leadership in the theatre.

### Difficulty being the leader

Participants spoke that it was at times difficult for the main consultant to be the leader as they often weren't present at the start of the operation.

*"However the downside at times is that many times an extra staff member walks in during the surgery who is not introduced to everyone and most of the times that extra staff member is a consultant because they tend to come in sort of once the surgery has started and we have started doing a few things so I think that is a down side of the checklist that the main surgeon who is doing the main operation is not the same surgeon who does the checklist and their requirements may vary between the two."*

### Junior vs senior staff

Participants spoke of the most appropriate person to conduct the checklist, and mentioned it was a good learning opportunity for junior staff.

*"**Participant 5:** Another question is who should do the checklist? Who should run the checklist? Is it the most junior person, or the most senior person? If you let the junior person do it, then you are actually empowering the most junior person, like a nursing student or a medical student, so you are empowering them to run and express their… I think there are studies showing that if it is run by the most junior person you tend to pick up little things that might not be picked up by the senior people."*

*"**Participant 2:** But I mean we do, as with many tasks, delegate the task, but I guess it's our responsibility to make sure the person we delegate it to is up to doing it in an effective manner."*
*" I'm happy for my RMO or my fellow to do it with me there. I think it is a really good opportunity for them to take leadership, but I like to be there to hear it being done so that I agree with what's been done."*

### Ultimate responsibility

Finally, when discussing ultimate responsibility, all participants agreed that this rested with the surgeon.

*"**Participant 3:** The person doing the operation. **Participant 1:** I think that despite having wrestled with this in lots of ways I think it is the surgeon's responsibility. I think he or she should pull the team together. **Participant 2:** I was going to say the surgeon's responsible for every single little thing that happens in the theatre basically, except for I guess, the anaesthetic little bit, which is hardly trivial.*
*"**Participant 1:** Certainly to ensure that it is done in a conscientious fashion. And I mean that could be led by the RMO, it could be led even by the anaesthetist, I mean I don't actually think it matters who leads it, but to make sure it's done in a serious and conscientious fashion, I think that's all we have to do."*

## Why do they work? Being on the same page

This theme was comprised of three sub-themes, all addressing elements of the checklist that led to their effectiveness in practice.

### Time outs

The time out was viewed as a key factor leading to the effectiveness of the checklists.
*"but I suspect the benefit comes from just pausing for a moment and reflecting on what's coming up, and making sure that everyone has the same degree of knowledge that the three base members of the team have."*

### Communication

Others discussed the importance of creating a space for communication.
*"I think the benefit is probably is more than just checking through the list for facts…*
*it's about identifying everyone as members of a team, and it's about enabling communication, so if there is a problem, the nurses or whoever is part of the team, do not feel inhibited about expressing that concern to other members of the team. I think that's something to be honest more in the private hospitals I guess I've noted, that you do sort of because often the nurse is very intimidated because they're new, and you're, you know, 'the surgeon,' but if you actually take time to speak to them, what's your name, this is what we are going to do and explain it to them, it really helps."*

*"I must say I think that most of the time it's about being on the same page, what you're doing, why you're doing it, and what are the likely problems in this particular patient that, which when they are, you know."*
*"Everyone being sort of acclimatised with each other in the theatre makes it an easier theatre environment for everyone to work in in case you need something."*

### Reminders

Finally, checklists were effective as they acted as a reminder system.
*"I think that sometimes, really not that often but occasionally, you do suddenly remember that gosh, I do need a band retractor for this, or I do need a stent that I should have…and something brings it to your attention and that means you can either go and get it or send someone off because there is every chance you're going to need it in 20 minutes or an hour's time. So occasionally you do identify something that you just should have remembered and you forgot to do it…"*

## Measuring success – "thank God we did the checklist"
This theme was made up of two sub-themes, preventing mistakes and measuring benefits.

### Preventing mistakes
Cases where the checklist had actively prevented a mistake were highlighted by participants.

*"A good example I had the other day was I had a patient that I left on clopidogrel because it was such a high risk to take him off, for a colonoscopy…and I sort of forgotten that that's what I'd done and the anaesthetist said 'oh this is the guy you left on clopidogrel ' oh that's right we can't do any biopsies and then halfway through the bloody procedure I said let's give me the biopsy forks and the nurse said 'no we can't' and I'd forgotten so it was a very good example of where the team time out, the checklist, actually prevented a mishap, and yet we were all behaving with the very best intent, but we nearly caused a significant bleed."*

*"I actually said 'thank goodness we did the checklist' and I actually meant it too, it was an example, we probably need to reflect, thank God we did this checklist because we wouldn't have had that stent available now or whatever it might be. I think, because one of the reasons the wrong site surgery largely failed as an initiative was because it actually happens, if you're unlucky it will happen once in your whole, practising life. So you're doing something, for which you never get any reward, in terms of a real of course, if you happen to get the reward, it's invaluable, but you'll do 10,000 operations, and you'll never have any benefit from that. But the checklist gives you benefit, I'd say once a week or once a fortnight, little things, but it makes a difference, and I think we should celebrate that a little bit more, and point out to people, that this has saved our bacon."*

*"To me, that's the reinforcement that keeps me going with it, I'm never, you know, touch wood I'll never operate on the wrong side, but I'm certainly going to have to wait 20-30 years to have one of those, whereas, I can get one of these every 20-30 cases."*

### Measuring benefits
The difficulty and importance of measuring benefits was discussed.

*"I mean to get back to your original question, it's a bit like saying how do you look at the benefits of safe driving? I mean it's the things that don't happen that you can't quantitate, I mean I don't, you know, I'm not sure how to answer your question, really."*

*"I think what we need to do more is highlight where the checklist saved us, I don't think we do that enough."*

*"I don't think there is any downside or any problems I think in doing it but just as a bit of a left of field comment I would say it is very difficult to see the benefit of doing it unless as you said as before we highlight every time the checklist has actually helped us avoiding this particular problem. Perhaps there should be a column on the checklist that during surgery this particular thing occurred and this was prevented by the use of the checklist. Maybe it's something we need to look at, improving that."*

## Why are they useful? Increasing safety and decreasing waste
This theme was made up of four sub-themes relating to the ease of use, the importance of checklists in increasing safety and their ability to decrease waste.
Quick and easy
Participants highlighted that performing the checklist was quick and easy, which was useful.

*"I think what we have is very structured and it doesn't take that long to do it as well…it takes about 15, 10, 15, what 30 seconds? To actually do it properly, and its easy, and it can be reproduced everywhere, every single case."*

*"The way I think the checklist is structured at the moment is probably optimally structured in terms of a single A4 page tickmark type checklist. The way it was structured in the paper, I've brought up a picture of that, there's about 30 different things to tick mark on one page, and then two to three such pages, and that would be very, very difficult I would say, to implement."*

### Increasing safety

The importance of the checklists in increasing safety was discussed.

*"In a public hospital environment where you might be operating on someone else's patient I think it really is good to go through the checklist to make sure you are doing the right operation the right site."*

*"I think you need to have a common sense approach don't we? You can't really educate people about each and everything that they need to say but anyone who finds that an important factor needs to come out, during a checklist, should come out. And that's where the checklist is beneficial as it removes the barrier for that factor to come out."*

### Decreasing waste

Not only do the checklists increase safety, they can also reduce waste.

*"Some items are opened but not used, so we did 30 patients in a trial using the checklist, and there's a question in the checklist 'prostheses and equipment', at that point the surgeon and the scrub nurse said 'alright we are going to open two 5 millimetre forks, and one 12 ml fork, and we won't open anything else' at that point, just by using the checklist, you are able to save a significant amount of money, so the checklist is useful for that thing, it may be useful to save money for the hospital."*

*"There was some very interesting information in it which could be widely applicable and potentially you're looking at saving hundreds of thousands of dollars per year just by this simple act."*

### Increased use

In some cases they lamented that there was not increased use of the checklist throughout their hospital.

*"I think anything that needs a written consent should have a checklist. We had an incident review panel to review an incident that could cause death on the ward, where if they actually done a checklist, and verified the correct side of a drain, they would have put it on the right hand side instead of the left, and potentially have prevented that person's death."*

## Implementing checklist: from resistance to acceptance

There were three sub-themes comprising this overarching theme. Participants discussed that there were initial problems implementing the checklist which improved with time, however some others saw no issue with the checklists being used.

### Teething problems

There were some problems initially with the checklist that were discussed by the surgeons.

*"I think, initially, the way, certainly in our hospital, the way that it was run was quite, it was difficult to run the checklist, and now it's become streamlined."*

*"I think when it initially came in I did see some of the junior staff they were reluctant initially to take it on because it's perceived as one extra bit of paperwork to do but now that its commonplace. I haven't seen any issues at all and they're often the ones the RMO on my unit is the one who'll take the lead on doing the checklist and I think that's fantastic."*

### Better with time

Checklist use improved over time as people adapted to the change.

*"I think that once medical students start to see this is what's happening, and once trainees see that this is what's happening, people will think, 'what's so remarkable?'"*

*"I think it's just people coming to terms with the change over a period of time, there is always going to be initial resistance to any kind of change that's implemented and, as we said before, if we try to tell surgeons who have a very high opinion about themselves to do certain things there will always be some resistance to do it. As time goes by and they realise it is actually a useful thing everyone comes around to do it. "*

*"It's as fundamentally important as scrubbing, before you operate, it's just basic care."*

Some participants found no issues with the checklist to begin with.

*"There is no downside to it, I cannot see a downside it, its 30 seconds and we waste hours doing other useless things, it's not a time issue, it doesn't take up a lot of paper, in fact it can be electronic anyway, I'm just at a loss to see where the problem is in doing it. "*

*"I don't think there has been any friction in the theatres I've been involved in but there's been a lot of friction and resistance from surgeons being asked to take it on so but actually when it's being adopted by people who wish to adopt it I've seen absolutely no resentment or concern in fact I think people find it quite a reassuring experience."*

## Utilising checklist: barriers

This theme consisted of five sub-themes relating to the use of checklists in practice and what factors acted as barriers.

### Not understanding its importance

It was felt by some members of the group that surgeons didn't understand the importance of the checklist, which acted as a barrier.

*"Because I think that surgeons don't understand what the real purpose of the checklist is."*

### Requiring a change

As discussed previously, even just the fact the checklist was a change in process was a barrier.

*"Well also its change, I mean although we like to think we are innovative, I mean some are of course many are not, they are very conservative, very fixed in there, sort of, what they've been trained to do, and change is always difficult."*

### Resisting direction

Others also spoke of surgeons resisting direction and that they could possibly see the directive of needing to perform a checklist insulting.

*"I agree with that 100% as surgeons we don't like to be told what needs to change and if there is another piece of administrative paper that needs to be filled up before surgery that will be looked upon by all surgeons that they are being told to do something which is possibly insulting to their intellect given what they do, so, I'm not surprised that surgeons are the barrier to utilising checklists, to be honest."*

### Time

Many participants mentioned that the time taken for the checklist and gathering everyone to conduct it acted as a barrier.

*"It could be seen as another delay to starting the operation, everyone has to get together and why aren't we starting the case, because we gotta do this checklist, so there is a delay, and that could be perceived as a (barrier)."*

*"I think there was some frustration in some theatres I was in because the scrub nurse was so busy initially at the very very beginning it was about sort of corralling all those people who were supposed to be involved and certain people thought that you needed x y and z as your team members so it became a bit tricky trying to get everyone interested I don't know if that was really friction, or more frustration, just trying to get because one person's saying oh we need so and so and then that so and so isn't there but it got done."*

### Redundancies

Checklist items that weren't relevant, were superfluous or redundant also acted as a barrier.

*"If you're doing a total thyroidectomy, you'd have to arrow the neck, you know the whole left side or right side or if it's a digit or but I found in my unit it was very pedantic initially which was a barrier in a way to embracing it."*

## Utilising checklists: enablers
There were three sub-themes regarding enablers for using checklists in surgical settings discussed by the participants.

### Leadership
The importance of leadership was highlighted by participants.
*"We are all leaders in the operating theatre so if you just take it on everyone else will follow suit."*

### 'Catching' culture
Similarly, participants said that culture is 'caught', and in this case junior staff drove senior staff to change.
*"And really I think, we talk about us being surgical leaders, I found that the junior staff really initially drove me because they were doing it and I was sitting there watching them and listening to them, because I had no choice, you know, that's what was happening, and I thought, oh that's interesting, and that's why I went and read the book, and realised what this was all about."*

### Reassuring experience
Others viewed it as a reassuring experience.
*"I've seen absolutely no resentment or concern in fact I think people find it quite a reassuring experience."*

## Better but not perfect
There were four sub-themes relating to the theme of 'better but not perfect,' where despite acknowledging the usefulness of checklists there were still some limitations.

### Process and equipment issues
The checklist did not necessarily reduce waste in terms of opening up equipment that is not required during surgery.

*"But many times the equipment is actually opened even before we get to the checklist stage of what we are going to do. Many times the theatre nurses will just go according to what you have on your card preference to open up things…and then really doing the checklist doesn't solve this problem at all."*

### Staff not present
There were the difficulties of making sure that all staff, including the consultant, were present during the checklist process.
*"However the downside at times is that many times an extra staff member walks in during the surgery who is not introduced to everyone and most of the times that extra staff member is a consultant because they tend to come in sort of once the surgery has started and we have started doing a few things so I think that is a down side of the checklist that the main surgeon who is doing the main operation is not the same surgeon doing the checklist and their requirements may vary between the two."*

### Not appropriate for all operations
Participants spoke about the checklist's applicability, particularly in emergency situations where it may not be feasible and the need to tailor it for some procedures.
*" I think checklists can be a bit of a block in managing very emergency situations where you need to respond so very quickly in terms of doing things… so if you've got a checklist to go by, it prevents people from panicking, and doing flicking all sorts of switches at the same time, but at the same time in medical emergencies, when you're doing something on the wards and there is a medical emergency you can't just run through a checklist or 1,2,3,4,5 things have to be done before you actually start treating someone."*

" I think, I guess that comment may come from that if it is too long that's an impediment to doing the checklist and if the checklist is not done you might run into problems."

" I think that that's absolutely correct but for an endoscopy list it may not be quite as extensive as for an operating list but you still need to make sure that you've got the right person, know what the allergies are, and you know are they on anticoagulants, I mean, that's just as important for an operating list."

### Human error

Finally, no matter how rigorous the checklist process was, there was still room for human error.

"*Participant 2: Mind you there was a wrong site at another hospital which occurred after the checklist had been done. Participant 3: even though it had been marked? Participant 2: the whole thing. And it was because they did the checklist, and then there was a phone call, or something happened and the surgeon moved away, and somehow or another ended up on the wrong side of the patient, and it all went bad from there. Participant 3: Oh wow. Participant 1: is that right? Participant 2: So it can still (happen), despite your best efforts*"

"*The other thing I'd like to bring out is that when we do the checklist there are a couple of things that say are there any special requirements from the anaesthetic side or special requirements form the surgical side it needs the person to say the right thing or right requirements.  For example, recently we've had a Jehovah's Witness whose had to go to theatre numerous times, unfortunately, and many times we went to theatre and no-one really highlighted the fact this person was a Jehovah's Witness and no blood transfusions were allowed during surgery, so it's probably worthwhile people actually knowing, what to respond to, when the question is asked. I would say is there a special requirement during surgery I would say yes no blood transfusion during surgery and that would go on the whiteboard saying Jehovah's witness no blood transfusion during surgery. It didn't happen, a couple of times, and I think there are going to be some drawbacks of the checklist that are probably again related to human error, in some instances.*"

## The best way to use a checklist

The participants discussed the best ways to use a checklist, and this consisted of four sub-themes.

### Concise

The importance of a concise checklist was highlighted.

"*(It) was quite (an) extensive checklist, it was like 150 different things that needed to be checked out before the patient was actually induced in theatre so I think what we use nowadays is a very concise checklist, a very short form of that checklist.*"

### Changing process/timing

Discussions were held about when it was best to perform he checklist. Points made included whether it should be done whilst the patient was awake, and whether it should be done prior to opening any equipment.

"*Participant 3: But that's the checklist that we have at the moment, that we're using, I guess it depends on how you if you change the checklist so it gets done before any piece equipment gets opened then that would change. Participant 5: Especially the disposable ones, that cost money, they can be opened later on.  You can open up the tray, the major tray or whatever but you can leave the rest for later on.*"

"*One of the difficulties with the way that the checklist is often administered, certainly in my experience, is that it can be administered after the patient is asleep and that can be a little bit of a problem. Because if there is a problem, with a device, or which side, or all of these issues that could come up, you've already subjected the patient to quite a risky part of the intervention (putting them to sleep), and you then have a very awkward situation, as our scenario showed. So, I still am not sure if the checklist should be done while the patient is still conscious.  I think it probably should.*"

*"I must say I think as a correct process they should be awake, and I think the way to be sure about that is to get them to give their name and then you."*

### Ensuring everyone is taking part
The importance of ensuring everyone is involved was stressed.

*"Normally I don't react terribly much at all (if people are not focusing on the checklist) as I try to be focused on what's happening there rather than what's going on over there but I have on occasion I think certainly I can remember one occasion where we just stopped and asked everyone to focus."*

*"I find it happens more here, because there are more people maybe? Whereas in private, everyone does this huddle, and, maybe they don't trust me, but you know everyone will come in around the patient, but the staff are very good, the scout, the scribe, the anaesthetic nurse, the anaesthetist and myself will come together – the assistant might be sitting in the tea room but that's fine they don't really do, they don't need to be involved, so, yeah. There is more of them here."*

*"I think all the time there are people talking in the background whilst the checklist is being done, that's true. But it's very important to have the right person around the bed doing the checklist all the time, if one of them is missing you better make sure that they are there, you need the scout nurse, the anaesthetist, the surgeon, surgical assistants, anaesthetic nurse, they have to be there. There's always going to be, especially when medical students are around, student nurses are around, there's going to be so many people in theatre, it's very difficult to keep everyone quiet."*

### Educating all staff
Ensuring all staff had education around all aspects of the checklist was vital.

*"I mean let's face it, the nurses often don't fully understand what we're planning to do, and therefore not wanting to arouse our displeasure, will open up everything and the kitchen sink, just in case, so if they understand that maybe they're not going to have a problem, if we just wait, it might be very helpful."*

### Involving the patient
This theme consisted of two sub-themes relating to the conflicting issues of patient involvement and patient resistance.

### Patient resistance
Participants spoke of the resistance that some patients displayed to the repeated checks that were carried out prior to surgery.

*"Of course from a patient's perspective they are completely bemused by all of this that's going on. By the time the last checklist is occurring they are looking at you as if you are stark raving mad."*

*"Participant 3: My patient said to me this morning I certainly hope you know what you are doing, and when she said her name and so on and so on."*

### Opportunity for patient involvement
Conversely, the checklist also offered an opportunity for the patient to be involved in their care.

*"**Participant 1:** I must say I think it works surprising well, in fact the other day in (a small rural town), because most of us or a number of us go up to (a small rural town to operate) we had a patient who was really quiet quietly spoken, and they made her actually shout, because the people couldn't hear* **Participant 5:** *empowering the patient.* **Participant 1:** *empowering the patient because the nurse was actually sort of over there doing the work the patient really had to project their voice and I thought that was a really good thing, it was well done."*

### Radiologist Focus Group

There were four radiologists of varying levels of experience who attended the Phase 3 focus group. Radiologists within the focus groups had experience working in both public and private hospitals. During in-depth analysis of the transcribed data eight themes emerged from a number of sub-themes. These overarching themes were:

- Incorrect use of the checklist
- Improving the use of checklists
- Cultural acceptance of checklists
- Different checklists for different purposes
- Responsibility for the checklist
- Focus on forms not safety
- Poor Implementation of the checklist
- The worth of the checklist

### Incorrect use of the checklist

This theme was formed from four sub-themes:

- Asking questions the right way
- The right time
- Checking the request not the patient
- Lack of teamwork

### Sub-themes

#### Asking questions the right way

'Asking questions the right way' refers to staff asking the patient to provide their own information, and not asking them to confirm the information provided to them by staff, as described in the following illustrations.

*"So they ask them who they are, themselves and they don't say 'are you so and so,' they ask them who they are, they ask them what test they are coming to do and what part of their body they are going to have it done on. And if there is any discrepancy in any of those then they obviously flag it. And they literally tick off the checklist on the back of the request form."*

*"how do we know for the radiographer type checks, or any one of these ones that are not done as a group, how we actually know the people asking the patient questions where they have to respond with a proper answer rather than a yes or no questions. How do we know they are asking 'please tell me your name, please tell me your date of birth, and why you are here' rather than asking them. It's something I constantly see when I accompany family members for some things, that they are very much asked 'is your name, is this your address, is this your date of birth' rather than the quick way of doing it. So how does everyone else know that it's done properly?"*

*"I mean just going to [Speaker 1] point, with the 3Cs one, we did a big promo with our staff on this about 6 months ago. The only way I know that they are doing it right, most of the time, is that I actually hear them as they walk a patient down the corridor as some of the offices that I sit in is within earshot. You are right, we have no other formal way of testing that, it's just purely the fact that often when they are walking past where the doctors sitting we hear it and I noticed one or two doing it the old way, which is they say 'Are you so and so' and then you sort of take that up with them and say 'aren't you meant to be doing it this way?"*

#### The right time

Conducting the checklist at the right time was also highlighted as important. The right time was seen as a time when the patient had an opportunity to participate in the consent and checklist process before being prepared.

*"There are many times I walk into the room and the patient is under the CT gantry with their head buried in the pillow and I am given the request slip saying lumbar epidural injection. There could be a cow lying on there, you know, I haven't interacted with the patient."*

*"you've got a patient on the table who is already in a position where they can't give you informed consent, because they are in a coerced position by already being changed somewhere where they are feeling they have to go ahead, they are already stressed, just asking questions without having someone else to cross check that you're getting the right answers, is likely to get answers that are unhelpful because they are so stressed already."*

### Checking the request not the patient

It was a cause of frustration that the patient wasn't involved in the checklist process, rather the request form was used to complete the checklist.

*"One person goes through and says 'yes, yes, yes, yes that's all correct.' Then ticks it off and then signs it. If they do it at all it gets scanned ... and that's it, it's done. Half the time they don't actually ask the patient the proper details, they just look at the form, and assume it's all correct.'*
*'it's more like an out of time than a time-out."*

### Lack of teamwork

Radiologists also talked about the lack of teamwork involved in the process, and how this was not in line with the vision or purpose of the checklist.

*"all of them, it's not done collegially, it's not done by the group as a whole, it's basically a tick and flick form, that may or may not be filled out. So it's really not fulfilling the requirements of a time out procedure."*

*"A lot of the times I will end up signing the paperwork after the procedure. The checklist, although it has to be signed off by the radiologist, the checklist has been checked by the nurse and it does not suit the radiologist running from room to room to room, and this is where it tends to get stuck. So this multiple duplications, so I will walk in, because there's been no formal time when I've been approached to take part in it, I've got into the habit of always asking the name, the blood thinners and all the rest myself so the then patient goes "you are the tenth person that's asking the same things" so there are inherent inefficiencies in the system, certainly in private radiology and I am interested in how to make it so that it is workable in a busy private practice."*

## Improving the use of checklists

This theme consisted of six sub-themes and related to strategies that could be used to improve the use of the checklist, or areas for improvement. The sub-themes are:

- Using a checklist coordinator
- Ensuring the right resources
- Checking everything is right
- Doing it as a team
- Practical teaching of the checklist
- Collegial support

### Using a checklist coordinator

The radiologists suggested that a checklist coordinator may be useful to ensure that it is carried out correctly. This position would be best filled by a professional who was not the radiologist as there was already enough responsibilities for the radiologist.

*"yes, I agree totally, the way I was thinking, it would work for me if the questions were done in my presence, but done by someone else whose formal task it is, they are the time-out supervisor, because if you are leaving it to the radiologist it will not get done properly because you are really multi-tasking all the time, your mind is already on the next procedure or the one who bled previously. We are just not in the mindset of taking that responsibility but I would like to be, so that just before*

*the procedure starts someone else looks me in the eye and says 'we are now going to go through this' and then ask the question in my presence of the patient."*

*"I don't think, even though the buck stops with us and we sign it off, I think there should be someone else who supervises that process just because I've been caught several times just not concentrating enough on what was being done, filling that form, so."*

*"I work at one place where there is as older nurse who is as tough as nails and she puts the foot down and nothing goes ahead until she's done it properly. Now, if every organisation, if you find one person in your organisation who will own it and is thick skinned enough to stand up to anybody and the organisation has to give that person the power. Once that person is given the power, everybody knows, this way you can stop every procedure until this man or whatever until the proper procedure has been performed. I'll be very happy with that because I would respect that person because I know that's her or his job so now if I have to do what that person has been giving me imprimatur. Speaker 1: I think it's fantastic to have someone like that in your department, who understands its importance and ensures that it's done."*

*"There are usually, there's usually someone who has the natural interest. It's when it's spread around to everybody, you've got to pick the appropriate people to be the safety people, you know the risk management people, there are people with the natural ability and it's almost impossible to convert everyone."*

### Ensuring the right resources

Ensuring the right resources were available in the room to do the checklist was another strategy that the radiologists used.

*"One of the physical ways I've tried to encourage to people to do it, just to make it easier is that every ultrasound room, every screening room has got a basic clipboard and when I walk into that room to do the procedure I want a clipboard with the request form, consent form and team time-outs form on it. I want you to hand it to me, or any of us, so that we have all the information there as we walk in, and that's sort of a very practical way I am trying to work out to make it happen, I admit I am sure it still doesn't happen all the time."*

### Checking everything is right

Radiologists lamented that not all items on the checklist were always checked during the process.

*"It's certainly not done like a timeout should be with the whole team stopping, making sure you are concentrating and checking everything together. When you're checking the patient you should also be checking that you've got the correct patient details in the ultrasound machine, the CT or the angio suite, so the images have the correct details as well and that's not done."*

*"What I'd like ideally is to have someone asking the patient the questions to be answered with full answers not yes and nos, at the same time someone's checking the details are correct on the ultrasound machine or whatever piece of equipment you are using, and someone's checking the paperwork is also correct, the consent form or the request forms and all those things have the correct details, so checking everything involved in that patient simultaneously, if correctly labelled and has the correct details on, because they are all steps where we can get the wrong information where you can get major problems."*

*"That's why it all needed to be checked at one time, not step by step and bit by bit. And the other thing I know from the surgical staff is that by having a more comprehensive list, it turns out that it actually has saved time, not just in complications but actually in the theatre.  Because that check also includes all the equipment you might need, so if you're doing an angiogram to have all the right catheters, wires available and all those other things… you can get into trouble if you run out of stock of something you needed, and I agree it's probably a bit late by the time you are about to start but at least you know you're about to do a more complex procedure, that you haven't got the kit there you're not going to go ahead you'll wait until you get it in somehow.'"*

*Doing it as a team*
The best way to perform the checklist was as a team.
*"the best way for this to work is for it to be two people, well the patient, you and somebody else. If you're in there and your nurse or your radiographer or someone else is helping you make sure you've gone through that properly, whether it's the whole team, and sometimes the whole team is only 3 people, actually doing that properly would be the most efficient way."*

*Practical teaching of the checklist*
One participant explained the importance of practical teaching.
*"If I was introducing into, if it was my practice, I would be pick the crack A-team checklist group. Which would be 1 doctor, 1 nurse, 1 radiographer, and I would then go and demonstrate the process in every room to every group involved, assuming that we have the evidences that it does make a difference, if we are going to introduce it, I would demonstrate the best possible outcomes or the best process to everybody involved in a practical way. Not in the classroom, I would just go and say this is how it works on the floor."*

*Collegial support*
Collegial support was viewed as important to ensure that the checklist would be used in practice.
*"The other thing is if the College, if it has been mandated by Government that the College must roll this out then that's that for the moment, I think it would be good rather than having the variations of checklists done across the practices, the College could formulate a sample list of, maybe two, a minor procedure checklist and a major procedure checklist which is simple, well-designed, easy to read and easy to tick or easy to sign or whatever that will be good because now I've been to multiple practices and seen multiple attempts to do the same thing which is even worse for someone who wanders between practice to practice."*

Cultural acceptance of checklists
This theme consisted of five sub-themes. The focus of this theme was the culture of radiology, and that this culture was not necessarily congruent with the principles of the SC.

- Focus on speed
- Requiring support from radiologists
- Culture is contagious
- Cultural Idiosyncrasies
- Improving the culture

*Focus on speed*
The participants spoke of a business mentality with a focus on speed and throughput, sometimes at the expense of patient care.
*"yes, the basic lessons which I think that the culture of speed are eroding."*
*"It's a selfish mentality, versus a patient care focus that is pushing us to do things in that way. Where we should actually be looking after the patient rather than trying to get through the numbers."*

*Requiring support from radiologists*
Radiologists did not always accept the checklist process, and if this was the case, it was unlikely to succeed. This could lead to friction or disharmony in the team.
*"I say it's as much culture as well. You can bring out a form and you say 'OK, this is going to be used' and we have 35 different radiologists that work for us and you say the nurses, the clerical staff, the techs and the nurses, 'OK we're going to be using this,' you will find there will be a certain number of doctors who will make it, take it on board and do it. And then there will be other doctors that just say "It doesn't matter about that. Don't worry about that" and so you need, if the doctors aren't interested in it than other people won't be as well. So you need everybody to actually be on board."*

*"The thing is if the radiologist is not on board and not a believer, and yet the other staff have been told "You must do this," it's not good. There's disharmony."*

Participants spoke about some radiologists who were not team players and could present a significant barriers to the use of the checklist.

*"Because they are obstructive sometimes, they're unreasonable, they're not team players, they are prima donnas some of them and they need a big whack the wrist to say, you know, this is a team effort with the patient's welfare at the bottom of it. There are some bad players out there. So, I don't know, why is that? Don't know, that's personality."*

*"Doctors can be very disruptive when they want to be, and it can be very had to get them to behave in a way to understand, it's still a very old fashioned culture that what the doctor says goes, and some doctors still believe that…they doesn't realise it's a team effort."*

*"My experience, the opponent has been the radiologist… they are white-anting it in the background."*

### Culture is contagious

Participants spoke of the importance of culture and how when you are exposed to a certain culture or working attitude, you may come to adopt that culture.

*"They have that influence because in most settings, if the radiologist says "this is what we are doing" then the nurse and the tech just sort of go along with it, rightly or wrongly, you know, unless they see something really bad happening"*

*"I don't know but it's the culture, if the organisation is not doing it properly, they'll just fall into the bad habits anyway (referring to new radiologists)."*

### Cultural idiosyncrasies

The disparities in checklist use and culture were discussed, with participants stating that these differences were idiosyncratic and often related to personalities.

*"I'd say its person specific.  And I would say some people do them all the time and some people never do it."*

*"It's idiosyncratic, it just depends on what part of the organisation you are working in, whether you just happen to have that sort of people who naturally accept it and who were believers  from the start and have taken it up."*

*"You're seen as being troublesome because you're taking too long to do things."*

### Improving the culture

Finally, participants spoke of the need for a cultural change to improve the culture of radiology with a shift to a team approach.

*"That's not going to work at the moment until we get a great culture change within radiology. And I also think just as in the operating theatre any staff should have the ability to say 'we're not going ahead until we've done all of this,' and to be able to call a stop until we've done it properly. Then again that needs a culture change in radiology."*

*"Yes, because when it works, when you actually pick something up, it's a great positive binding and motivating factor, that gives its meaning, it's just that those instances are uncommon in radiology so far. But, I think the potential could be much better, but yes, it's a unifying factor when it all works well. Anything when you do it in team, and when you've got everybody on board, it's always unifying because you are working together as a team."*

*"I think having a level playing field in the, I think a good team is one where there is no real hierarchy but people respect each other and their roles and responsibilities. I do agree that having a checklist where anyone can start it or initiate it or pick up something is a really useful thing for building that cohesion."*

### Different checklists for different purposes

This theme consisted of three sub-themes that reflect an in-depth discussion regarding the checklist formats, process and applicability across the various procedures conducted in radiological settings.

- Tiers of checklists
- Tailored for radiology
- Length of the checklist

### *Tiers of checklists*

Participants spoke of different checklists in use, particularly the tiered approach where simple procedures could use a shorter checklist whilst more complex procedures required a full checklist. Once again, the issue of support or guidance from the College was raised.

*"So I suppose it depends; we've got two kinds of tiers. I suppose if you've just got the General Patients coming in for their examinations, so an examination that doesn't involve any type of procedure, interventional procedure, then we have a 3C checklist which is a sticker that goes on the back of the request form and as the tech takes the patient down for their test, they have to ask them so they can sign off each of those 3Cs…if the patient is having a more of an interventional procedure, then we have a team time-out form which is filled out by either the, either, sort of a combination, the top half is usually filled out by the tech or the nurse and then there is a line and that's sort of just basic things about again you know the 3Cs, who the patient is, have they stopped their blood thinners, etc and then the bottom half is a checklist for the radiologist to sign saying they have checked for, let me think, correct patient, that they have read the request form, read the consent form, explained the procedure, I think there is one of the boxes I forgot at the bottom of that, and then the radiologist signs that preferably before the procedure is done."*

*"We do have the two types of check just as was described at first. We have the sticker, I think it is now part of our new form which is basically meant to be checking the patient's name, identity, and what they are having done, and for the other one we don't have a very comprehensive list, it's a very short A5 bit of paper with some of the questions with the time-out type check."*

*"I think it would be good rather than having the variations of checklists done across the practices, the college could formulate a sample list of, maybe two, a minor procedure checklist and a major procedure checklist which is simple, well-designed, easy to read and easy to tick or easy to sign or whatever that will be good because now I've been to multiple practices and seen multiple attempts to do the same thing which is even worse for someone who wanders between practice to practice."*

### *Tailored for radiology*

The importance of having a tailored checklist for radiology was stressed repeatedly, and participants did not view positively the use of the surgical checklist in radiological settings.

*"When I am in the public hospitals, they've been trialling the checklist prior to the procedure and that's sort of why I am calling in, it's a very extensive checklist, it doesn't seem to me to be done for radiology, it's done more for surgery. It takes a lot of time and it hasn't been a great success."*

*"One sheet, probably about 12 or 13 questions and the questions some of them have been obviously written by the people who, it's a thought bubble from the surgical side of things, not for ours…and look, when I am doing CT procedures there, you speak to the patients, you've got the things all lined up, it's not like the private sort of system when you go into inject a shoulder, there's a little bit of a time so I found it the thing to be superfluous, just another piece of paper to fill out among the many when you're doing the procedure."*

### *Length of the checklist*

The length of the checklist was debated amongst participants. Some viewed the checklist as being too extensive, whilst others questioned the benefit of having only a brief checklist.

*"The other problem you can have with the checklist is that it can be so brief that it doesn't add any value to the whole process. Our checklist is so miniscule I don't think it really helps, apart from the fact it's not done properly."*

*"I think that's key too, isn't it? It has to be the right number of questions that are pertinent to what you are doing, the minute they ask you about stuff that's irrelevant, you're far less likely to do it."*

*"There are certainly not many questions that need to be asked in radiology. So to have a superfluous, large list is ridiculous, and that will defeat, that will be the end of it."*

## Responsibility for the checklist

There were two sub-themes for the theme of responsibility. These themes discussed who was responsible overall for the checklist and who should be the one conducting the checklist. The viewpoints varied across participants.

- The radiologist as the senior person is responsible
- The radiologist shouldn't be responsible

### *The radiologist as the senior person is responsible*

Responsibility issues were discussed. It was the view of some that the radiologist was the person responsible for the checklist.

*"I won't sign a form that I haven't been a witness to it being completed. Because at the end of the day we carry the responsibility of that signature, if I haven't been involved I'm not prepared to do it."*

*"Personally I think it's ultimately a medico-legal responsibility of the senior person in the room to be responsible. "*

### *The radiologist shouldn't be responsible*

Others, however, thought that the checklist process would not work if a radiologist was leading it.

*"I don't think, even though the buck stops with us and we sign it off, I think there should be someone else who supervises that process just because I've been caught several times just not concentrating enough on what was being done, filling that form, so."*

*"For me, it should be a nurse, if you are working with nurses, because I think there's more natural affinity with that process than the radiographer or the radiologist. And then you team that as I said it before with one or two other people."*

## Focus on forms not safety

There were two sub-themes related to the overarching theme of focusing on forms and not safety.

- Tick and flick form
- Lack of understanding of importance

### *Tick and flick form*

The participants spoke about the form being a 'tick and flick' process which was to be completed in a rush and did not truly meet the requirements of a checklist procedure.

*"All of them, it's not done collegially, it's not done by the group as a whole, it's basically a tick and flick form, that may or may not be filled out. So it's really not fulfilling the requirements of a time out procedure."*

*"I couldn't agree with you more. It's another bit of tick and flick, another bit of 'whatever' paperwork, that's clogged up your day, that's how it's perceived, because we've not had the same training from our hospitals or our college that the surgeons did when they introduced the time-out, based on the WHO study."*

### *Lack of understanding of importance*

Users of the checklist often did not seem to understand its importance.

*"The focus seems to have fallen back on filling out paperwork and having it signed, rather than actually the intent of the paperwork which is to prevent a mistake being made."*

*"Yes, you're right, to the letter of the law that's correct. The problem here goes back to this culture. The culture has, because I don't think it's been the introduction of some of these forms, has been done with an indoctrination of the staff as to why we are doing it, how important this is. It has switched over to "here are these pieces of paper, we have to have them signed before we can go into*

*the next case", and it lost its meaning already. So, and I am working in a good private hospital, so I don't know."*

*"Yes, it has yet to have any real meaning, it's still process rather than, it's just what everyone said, just filling the form."*

## Poor implementation of the checklist

This theme was made up of two sub-themes, and largely discussed that unless implementation was well planned and supported, use of the checklists would not be optimal.

- Lack of education
- Lack of association support

### *Lack of education*

The lack of education regarding the checklist was a contributing factor to its poor implementation.
*"I tried to do it properly with the whole team stopping, and people just keep doing, they're not interested. It's because there has been no education, it's just another piece of paper work that's got to be filled in so it's tick and a flick and off we go."*
*"No education at all. Just given to us."*
*"It's been so badly implemented that it's just another bit of paperwork that people do. There's been no ongoing education, no in-services for the staff, anything like that to help people understand it."*

### *Lack of association support*

Participants spoke repeatedly of the need for formal association support for using the checklist from the Royal Australian and New Zealand College of Radiologists. They compared the lack of support from their college compared with the support and guidance provided by the Royal Australasian College of Surgeons (RACS).
*"Because it doesn't have the substance of our college behind it, it's not been something that we've taken up."*
*"I think also RACS got behind it very strongly and promoted it and had a version before time out they were pushing being aware of the troubles so they've been pushing it to the fellowship much more than we have."*

## The worth of the checklist

This theme was made up of the two conflicting subthemes that discussed the 'worth' of the checklist.

- Need for the checklist
- Superfluous paperwork

### *Need for the checklist*

Despite some of the challenges faced, it was the view of most of the participants that there was certainly a need for the checklist process.
*"There is definitely a need of a checklist because we are not necessarily always looking at the image. In running a procedural department, you are presented with a request slip, which you then sort of run into the room and then do the procedure, I mean we are talking about the minor procedure, the joint injections, that sort of thing, but they are prone to error, I mean I've injected the wrong joint, you know instead of the metatarsal I've done the geal, you this sort of stuff, it does happen."*
*"Certainly from some patient safety data that I've looked at, there is a significant number of wrong patients, wrong site events in that and that's only the ones people have bothered to put in, it's certainly not a comprehensive examination of the problem but it's something that a proper checklist would help to avoid."*

*Superfluous paperwork*

Others stated that the checklist was superfluous paperwork and that because it was not being performed correctly it was not of use.

*"Look, I can see the evidence clearly in surgery but I haven't seen any evidence in radiology as to whether that translates over to a huge benefit."*

*"So I found it the thing to be superfluous, just another piece of paper to fill out among the many when you're doing the procedure."*

*"For me, I need to see, I would like some data to scare people into the right practice of it and also the questions sort of designed around  that data as to what, there are certain things that might be a good idea to ask  on a checklist, you know things like anticoagulation and so on are very obvious but have a sort of 15 question checklist sort of hides the important things in amongst things that aren't going wrong, therefore there a little bit superfluous in an attempt to be all comprehensive, you actually hide the important bits in a long, another form to fill out."*

*"I've never had it used properly enough to see if it actually works."*

*"I use them for my procedures but I haven't yet come across one that has made a difference."*

# Discussion

## Phase 1

This is the first national evaluation of SC implementation in Australia, and, to the best of our knowledge, the first comparison at a national level of checklist use and attitudes between operating theatres and radiology. Uptake of an SC in practice was relatively high: 91% of respondents (164 of 180) had an SC policy in place, while 5% of organisations (nine) used SCs informally. Given that several years have passed since the 2010 Council of Australian Governments (COAG) call for SCs to be implemented in hospitals, seven organisations (4%) had neither a formal SC policy nor informal SC use.

The study found differential uptake of SCs between surgery and radiology. The response rate for radiology was approximately half that for surgery (10% and 21%, respectively); radiology was less likely to have implemented the SC (at least in public settings) and radiologists used the SC in fewer cases than surgeons (91 ± 24 vs 99 ± 3). We attribute these differences to the earlier introduction of SCs in operating theatres compared with radiology, and a greater focus on SCs by surgical professional organisations. The original studies of SC use took place in operating theatres, and subsequent reviews have also concentrated on this setting. Whilst the Royal Australasian College of Surgeons first released guidelines in 2009, and the Royal College of Radiologists (UK) also released similar guidelines in 2009 (both guidelines have recently been updated (Royal Australasian College of Surgeons 2009; The Royal College of Radiologists 2009)), the production of Australasian radiology guidelines for SC use has lagged somewhat. International efforts within radiology are, however, expanding rapidly and Australian guidelines for correctly identifying patients in radiology have now been promulgated by professional bodies (Australian Commission on Safety and Quality in Health Care 2008; Koetser, de Vries et al. 2012; Lee, Fanelli et al. 2012).

Although comparisons of current SC use focussed mainly on comparisons between settings, most of the findings were consistent across both private and public providers. For example, use of a nurse as SC coordinator was more prevalent in surgery than in radiology, and this was consistent across private and public hospitals. The importance of nursing staff in enabling the SC implementation in surgery, as opposed to radiology, was a strong finding of the open-ended questions and strengthens the case for enhanced participation of nurses in communication improvement initiatives (Robinson, Paull et al. 2010). Indeed, better uptake of the SC was shown at a hospital in which nurses led it's administration in comparison with a hospital with more multidisciplinary staff engagement (Hannam, Glass et al. 2013). Empowering nurses to halt operations until all checks are complete has also been trialled in some Australian hospitals, however, others were reluctant to "incur the wrath of surgeons" (p. 92) (Healy 2012).

Whereas other enablers in surgery comprised education, re-enforcement and the use of standard practice, policy and guidelines, in radiology the main enablers were related to culture and a commitment to patient safety and involvement of all staff (as opposed to specifically identifying nurses). These differences between the enablers and the roles of checklist coordinators between settings suggests that implementation strategies may require tailoring to local contexts, particularly for radiology in which comparatively little research has been undertaken and use of the checklist has not been mandated by the Royal Australian and New Zealand College of Radiologists.

We measured generally positive attitudes to checklists in our sample, with a mean percent agreement across 26 items of 68 ± 20 (median 74, range 24-96). Agreement was less than 50% for only four items, which were related to difficulty of, and time consumed by, the implementation of the SC, resistance by theatre staff and the inability to flatten hierarchies. Each of these items also had less than 50% agreement in the similar study of SC use by Irish hospitals (Healy 2012). The only

other item in which Nugent recorded less than 50% agreement related to resistance by anaesthetic staff (40% agreement); the present study just exceeded this (51% agreement) (Table 13). Comparison of results from our study in Australian hospitals with Nugent's study of Irish hospitals, shows broadly similar findings, with ratios generally close to 1.0.

Table 13 Comparison of attitudes (percent agreement) in Australian (present study) and Irish hospitals (Healy 2012)

| Statement | Australia (Present study) | Irish study[14] | Ratio: Aus/Ire |
|---|---|---|---|
| | % Agree | % Agree | |
| Q 12 a Its introduction and set-up in my hospital was not a difficult process* | 36 | 17 | 2.1 |
| Q 12 b It is not difficult on an on-going basis to implement the checklist that we use* | 76 | 43 | 1.8 |
| Q 12 d The implementation and set-up of the checklist has not been financially costly* | 55 | 71 | 0.8 |
| Q 12 e The implementation and set up of the checklist has not been time consuming* | 34 | 20 | 1.7 |
| Q 12 g I do not believe that the checklist is just another 'tick-box' exercise* | 82 | 85 | 1.0 |
| Q 13 a The nursing staff have not been resistant to the implementation of the checklist* | 82 | 91 | 0.9 |
| Q 13 b The anaesthetic staff have not been resistant to the implementation of the checklist* | 51 | 40 | 1.3 |
| Q 13 c The surgical staff have not been resistant to the implementation of the checklist* | 41 | 35 | 1.2 |
| Q 14 a The use of the checklist has resulted in positive change in team behaviour | 64 | 63 | 1.0 |
| Q 14 b The use of the checklist has resulted in an improvement in communication amongst staff | 77 | 72 | 1.1 |
| Q 14 c The use of the checklist has resulted in an improvement in the consistency of care a patient receives | 75 | 82 | 0.9 |
| Q 14 d The use of the checklist has resulted in a reduction of errors | 62 | 60 | 1.0 |
| Q 14 e The use of the checklist has resulted in a greater anticipation of adverse events | 65 | 63 | 1.0 |
| Q 14 f The use of the checklist has resulted in a flattening of the hierarchical structures | 24 | 18 | 1.3 |
| Q 14 g The use of the checklist has resulted in a positive culture of safety | 80 | 81 | 1.0 |
| Q 14 h After considering all the positive and negative aspects of the checklist it is overall a worthwhile tool | 92 | 97 | 0.9 |

* item was originally negatively worded in the questionnaire, but was re-worded and reverse-scored in this table such that agreement indicates a positive attitude

The WHO proposed that each of the three sections of the Surgical SC should take no longer than one minute to complete, so as not to compromise the flow of care; 'time' was the most frequently cited barrier to use of the SC and was mentioned by over a quarter of respondents who nominated a barrier. Another significant barrier identified by over a fifth of participants, particularly from operating theatre staff, was lack of commitment and compliance by surgeons. However, overall, over a fifth of participants could not identify a barrier to SC use, and this was particularly true for radiology, in which one third of participants did not identify a barrier.

The WHO advocates modification of the Surgical SC for local use: "*The Checklist should be modified to account for differences among facilities with respect to their processes, the culture of their operating rooms and the degree of familiarity each team member has with each other*" (p 13). Our study found that 60% of SCs were modified from the WHO template (World Health Organization 2009). Examination of the SCs in use for surgery (n=56) and radiology (n=17) indicated some deficiencies compared to the WHO templates. Items that checked the readiness of equipment (anaesthesia machine and medication check; pulse oximeter) and anticipated events for the anaesthetist (difficult airway or aspiration risk) and surgeon (duration of the case, anticipated blood loss) were not included in more than 40% of hospital surgery's SC. Radiology SCs varied more from the WHO templates, with 25 of 28 checklist items not included in more than 40% of the SCs that were reviewed.

The WHO accepts that many of the individual steps of the SCs are already incorporated into routine clinical practice and therefore advises that "each surgical department must practice with the checklist and examine how to sensibly integrate these essential safety steps into their normal operative workflow" (p. 6) (World Health Organization 2009). Nevertheless, the WHO strongly discourages removal of items from the SC, instead suggesting that implementing the SC should result in effective change to enhance compliance with each and every element of the SC. For this reason, identification of deficiencies in SCs that are in current practice calls into question whether the observed improvements in patient outcomes are likely to be met. This could potentially explain the lack of effect recently demonstrated in a population level evaluation of SC implementation (Urbach, Govindarajan et al. 2014).

The most commonly reported 'purpose served' by SCs was patient safety and incident minimisation, cited by about 46% of participants. This suggests that awareness of the benefits of SCs is relatively high among these Australian healthcare providers.

## Phase 2

### *Quantitative Findings*

Observations in both operating theatres and radiology departments revealed low compliance with the SC in practice (27% [total checklist] and 38% [timeout only] respectively). This is in contrast with the literature, particularly for surgical SCs, with a recent systematic review demonstrating a mean of 75% compliance with the checklist (Borchard, Schwappach et al. 2012). Checklist items including that the correct patient was in the operating theatre or radiology room and that the correct procedure was going to be performed (surgery and radiology) on the correct site (surgery only) were almost always addressed during the observations (99%, 97% and 37% respectively for surgery and 60% and 80% respectively for radiology). Also, checks that the consent form had been signed by the patient (surgery only) and whether the patient had any allergies (surgery and radiology), as well as confirmation of the instrument counts (surgery only) were also commonly completed (36%, 80% and 56% respectively for surgery and 61% for radiology). Many other important checklist items were, however, not discussed during the majority of the observations in both the operating theatre and radiology departments, such as the availability of blood if needed and whether antibiotic- and thrombo-prophylaxis had been administered.

Although checklists have been implemented widely and received positively amongst respondents, completion of checklists was poor; a similar study in Irish hospitals had similar findings (Healy 2012). A different study investigating surgical SC use found that some checklist items are addressed more frequently than others. Compliance with some items was in contrast with the present study; with correct procedure achieving >95% compliance (compared to 97% compliance in our study). Items related to surgical site, availability of blood products, implants and devices and antibiotic prophylaxis being addressed in 80-95% of observations (compared to 37%, 0%, 1% and 23% compliance, respectively in this study); and items related to patient identity, correct side, imaging availability, patient allergies and special consideration achieving <80% compliance (compared to 99%, 37%, 8%, 80% and 13% compliance, respectively in our study) (Poon, Zuckerman et al. 2013).This is problematic because the benefits and reduced risks of an adverse event occurring that have been found to be associated with SC use may not be realised where the checklists are being used in an incomplete and incorrect manner (Borchard, Schwappach et al. 2012).

Completion of the checklist in both the surgical and radiology settings was found to be associated with a number of factors. The first was the number of people present in the operating theatre or radiology room. In surgery, as the number of people present in the operating theatre increased, the percentage completion of the checklist as a whole, as well as the 'sign in' and 'sign out' sections decreased, possibly because of distraction leading to staff forgetting to perform elements of the

checklist not perceived to be essential to the surgical process. This was not the case with the 'timeout' section of the checklist as more people present in the operating theatre was associated with greater completion of this section. This is possibly because the 'timeout' section of the checklist is perceived to be the most important element. This is consistent with a recent systematic review, where compliance with the 'timeout' section of the checklist was 16% higher than compliance with the checklist more generally (Borchard, Schwappach et al. 2012). Only a greater number of surgeons present in the operating theatre was related to increased total checklist and 'timeout' completion, and possibly because using the checklist and, in particular the 'timeout' section of it, is supposed to be initiated and led by the surgeon.  In radiology, as was the case for the operating theatre, the greater the number of nurses in the radiology room, the less the checklist was completed, again, possibly because of more distractions.

The second factor found to be related to checklist completion was the number of items on the checklist. For surgery, as the number of items on the 'sign in' and 'sign out' sections of the checklist, as well as the total number of checklist items increased, so too did percentage completion of these sections. It is possible that those hospitals that used an SC with more items placed more emphasis on its use. However, this was not tested statistically.

The type of operations being performed was found to have an impact on checklist completion in operating theatres, for all three sections of the SC, as well as for total checklist completion. It is possible that this is a consequence of the perceived difficulty of the procedure and a subsequent need for staff to be thorough in their preparations, with which the SC assists, or an artefact of the different cultures among groups with different 'crafts'.

The State of Australia in which the hospital was based was also found to have an impact on the percentage completion of the checklist as a whole, as well as for the 'sign in' and 'sign out' sections for surgery and the 'timeout' section for radiology. This was not the case for the 'timeout' section of the checklist in surgery. For surgery, South Australian hospitals were found to outperform hospitals in Victoria and New South Wales in terms of total checklist completion and percentage completion of the 'sign in' and 'sign out' sections of the checklist. Similarly, in radiology, the hospitals in Queensland outperformed those in South Australia and Victoria in terms of checklist completion. It is possible that this is the case because many of the participating hospitals from South Australia for surgery and Queensland for radiology were public hospitals, all of which are required to use an SC designed and implemented by the respective State Governments' policies.

There was a marked discrepancy between the percentage of the checklist completed (close to 100% compliance) in the medical record and what was documented during the observations (completion less than 30%). This provides support for the notion that the SC is commonly 'ticked and flicked' by surgical staff (often by a single staff member), and not read aloud and performed by the whole team as intended, potentially compromising its benefit (Borchard, Schwappach et al. 2012).

### *Qualitative Findings*

There are currently only a handful of studies evaluating the use of checklists using qualitative methodologies, but these studies were not performed in Australia (Conley, Singer et al. 2011; Aveling, McCulloch et al. 2013; Russ, Sevdalis et al. 2014). The results are in line with the findings of our qualitative analysis, which highlighted the enabling factors such as the importance of implementation leaders, modifying the checklist and education are highlighted, and barriers such as surgeon resistance. It can thus be inferred that barriers and enablers of the checklists are similar across the globe and the results of this study may be relevant to other settings.

There are a number of 'good practice' points that emerged during the collection of qualitative data. It would appear that for checklists to be implemented successfully, the following are addressed:

- Education: detailed education on how to perform the checklist process correctly as well as on the 'why and how' of the importance of the checklist for patient safety.
- Leaders/Champions: leaders to ensure that the checklists are being implemented and properly used.
- Clear mandates: use of checklists needs to be clearly mandated by hospital administrators, professional associations and health departments.
- Checklist format: health professionals should collectively be able to modify the checklists for local use. However, vital 'core' elements should be identified and retained.

## Limitations

The low response rate (15%) places some questions over the validity of the findings, as more motivated people with stronger attitudes towards SCs may have been more likely to respond. This is likely to result in an apparently higher uptake of and correct us e of checklists than would be found in all hospital had been assessed.

Phase 2 of this study also encountered sampling problems. Initially, the study proposal indicated that the surgery and radiology departments of 15 hospitals across South Australia, Victoria and New South Wales would be recruited and two lists at each observed over the course of an 18-month period. This was not possible for a number of reasons. Firstly, it was very difficult to recruit sites for the radiology stream of the project because radiology procedures across Australia are conducted by privately run organisations that are contracted to provide radiology services to hospitals; all of which were contacted, but either failed to respond or refused to participate. As a consequence, recruitment was widened to include Queensland, but still only four radiology sites were able to be included. Recruitment of surgical departments into this study was also difficult, with many sites refusing entry of an external observer into their operating theatre. For these reasons, the final sample included hospitals with a participating surgical and / or radiology department, but not necessarily both.

The conduct of the project was severely constrained by the time taken to obtain the necessary approvals and consents. Signed consent forms were required from the Directors of Surgery and / or Radiology from each participating department. Acquiring these signatures often took months of ongoing contact that was not accounted for in the project timeline. Additionally, full ethics approval was required in each state, as well as site specific approval at each hospital. The process for obtaining ethics approval was long and required signatures from numerous people from each participating department, which generally took many months to acquire. Ethics approval was not obtained for all participating hospitals until long after the initial deadlines had passed because of the difficulties in obtaining signatures and meeting the demands of all of the ethics committees.

A further limitation in terms of data collection was that the staff in the operating theatres and radiology departments were aware of why the observer was present and what they were observing. This can be problematic as it can lead to the Hawthorne Effect, whereby the study participants modify their behaviour so as to appear more favourable in front of the observer (Eckmanns, Bessert et al. 2006). This effect usually dissipates after an hour of being observed. Nevertheless, poor compliance with SC completion was still observed.

Another limitation of this study is that the data produced by it were not normally distributed and therefore had to be analysed using non-parametric tests. The problem with this is that these tests tend to be more likely to be subject to Type II error, i.e. failing to detect an effect when there

actually is one. It is therefore important that this be taken into consideration when interpreting the results of this study.

The major limitation of Phase 3 of this project is that as a consequence of the difficulties involved in recruiting participants into the focus groups, it is likely that the samples obtained were biased towards use of the checklist. This is problematic as it is not only possible, but also likely that responses received during the focus group present a more favourable view of use of the checklist compared to the common perception of most surgery and radiology staff. In addition, the final limitation of Phase 3 was that the focus group run with the surgeons was conducted in a face to face format, whereas the focus group conducted with the radiologists was run via teleconference. It is possible that conducting the focus groups in these two different formats led to differences in the extent to which participants were willing to disclose information in the focus group setting.

A strength of this study is that it employed both quantitative and qualitative data collection techniques. Multiple approaches during data collection leads to triangulation, thereby providing a deeper understanding and a more full and rounded picture of the construct under investigation as it is viewed through a number of lenses and different datasets (Webb 1989). By utilising a number of different data collection methods, the credibility (and therefore trustworthiness)(Murphy and Yielder 2010) of the research can be improved by offsetting the limitations of one stated method with the strengths of another (Hart and Bond 1995). The data that arose during the focus groups and interviews provides a rich description of the use, barriers and enablers to the use of checklists in both surgical and radiological settings. In some cases the data from the focus groups and interviews was in line with that collected during the survey and observations. Phase 1 found that respondents were, in general, supportive of checklists. This seemed to be the case from the focus groups as well. Many of the issues that were highlighted Phase 1 (such as surgeon resistance, difficulty implementing checklists, time consuming) were reflected in Phases 2 and 3. The biggest discrepancy between the findings of the phases was the poor completion of checklists identified during the observation phase emphasising the importance of not relying on what people say they have done, but what they actually do.

## Conclusion

This study provides an in-depth investigation into the uptake, barriers and enablers regarding the use of checklists in radiological and surgical settings across Australia; 15% of eligible departments responded to our national survey. Although checklists have been implemented widely and received positively amongst respondents, completion of checklists was poor. Our study has demonstrated both the perceptions and realities that surround SC use in surgery and radiology across Australia, but low compliance with SCs was documented, along with high rates of apparent compliance in the retrospective medical record audit. It is important that hospitals take action to address the large discrepancy between what actually happens in the operating theatre or radiology room and what is filed in the patients' medical records. The barriers and enablers to SC implementation and use should be carefully considered and action taken to optimise checklist use. Finally, the limitations of this study may be of use in informing the design of future projects in this area of research.

# References

Australian Commission on Safety and Quality in Health Care (2008). Ensuring Correct Patient, Correct Site, Correct Procedure Protocol for Surgery: Review of implementation and proposals for action. Sydney, Australian Commission on Safety and Quality in Health Care**:** 26.

Aveling, E. L., P. McCulloch, et al. (2013). "A qualitative study comparing experiences of the surgical safety checklist in hospitals in high-income and low-income countries." BMJ Open **3**(8): e003039.

Borchard, A., D. L. Schwappach, et al. (2012). "A systematic review of the effectiveness, compliance, and critical factors for implementation of safety checklists in surgery." Ann Surg **256**(6): 925-933.

Chatham House. (2012). "Chatham House Rule."   Retrieved 24 September, 2012, from http://www.chathamhouse.org/about-us/chathamhouserule.

Conley, D. M., S. J. Singer, et al. (2011). "Effective surgical safety checklist implementation." J Am Coll Surg **212**(5): 873-879.

Conley, D. M., S. J. Singer, et al. (2011). "Effective surgical safety checklist implementation." Journal of the American College of Surgeons **212**(5): 873-879.

De Vries, E. N., H. A. Prins, et al. (2010). "Effect of a comprehensive surgical safety system on patient outcomes." New England Journal of Medicine **363**(20): 1928-1937.

Eckmanns, T., J. Bessert, et al. (2006). "Compliance with antiseptic hand rub use in intensive care units: the Hawthorne Effect." Infection Control and Hospital Epidemiology **27**(9): 931-934.

Hannam, J. A., L. Glass, et al. (2013). "A prospective, observational study of the effects of implementation strategy on compliance with a surgical safety checklist." BMJ quality & safety **22**: 940-947.

Hart, E. and M. Bond (1995). Action research for health and social care: a guide to practice. Buckingham, Open University Press.

Haynes, A. B., T. G. Weiser, et al. (2011). "Changes in safety attitude and relationship to decreased postoperative morbidity and mortality following implementation of a checklist-based surgical safety intervention." BMJ Quality & Safety **20**(1): 102-107.

Haynes, A. B., T. G. Weiser, et al. (2009). "A surgical safety checklist to reduce morbidity and mortality in a global population." New England Journal of Medicine **360**(5): 491-499.

Healy, J. M. (2012). "How hospital leaders implemented a safe surgery protocol in Australian hospitals." International Journal for Quality in Health Care **24**(1): 88-94.

Hsieh H-F, S. S. (2005). "Three approaches to qualitative content analysis." Qual Health Res **15**(9): 1277-1288.

Knodel, J. (1993). The design and analysis of focus group studies. Successful Focus Groups. D. L. Morgan. Newbury Park, SAGE.

Koetser, I. C. J., E. N. de Vries, et al. (2012). "A Checklist to Improve Patient Safety in Interventional Radiology." CardioVascular and Interventional Radiology: 1-8.

Lee, M. J., F. Fanelli, et al. (2012). "Patient safety in Interventional radiology: A CIRSE IR Checklist." CardioVascular and Interventional Radiology **35**(2): 244-246.

Morgan, D. (1993). "Qualitative Content Analysis: A guide to Paths not Taken." Qual Health Res **3**(1): 112-121.

Morse, J. M. (2003). Principles of mixed methods and multimethod research design. Mixed methods in social and behavioural research. A. Tashakkori and C. Teddlie. Thousand Oaks, Sage Publications, Inc.**:** 189-208.

Murphy, F. and J. Yielder (2010). "Establishing rigour in qualitative radiography research." Radiography **16**: 62-67.

Nugent, E., H. Hseino, et al. (2012). "The surgical safety checklist survey: a national perspective on patient safety." Irish Journal of Medical Science: 1-6.

Paull, D. E., L. M. Mazzia, et al. (2009). "Predictors of successful implementation of preoperative briefings and postoperative debriefings after medical team training." <u>The American Journal of Surgery</u> **198**(5): 675-678.

Poon, S. J., S. L. Zuckerman, et al. (2013). "Methodology and bias in assessing compliance with a surgical safety checklist." <u>Joint Commission Journal on Quality and Patient Safety</u> **39**(2): 77-82.

Robinson, L. D., D. E. Paull, et al. (2010). "The role of the operating room nurse manager in the successful implementation of preoperative briefings and postoperative debriefings in the VHA Medical Team Training Program." <u>J Perianesth Nurs</u> **25**(5): 302-306.

Royal Australasian College of Surgeons (2009). Guidelines For Ensuring Correct Patient, Correct Procedure, Correct Side And Correct Site Surgery, Royal Australasian College of Surgeons**:** 3.

Russ, S. J., N. Sevdalis, et al. (2014). "A Qualitative Evaluation of the Barriers and Facilitators Toward Implementation of the WHO Surgical Safety Checklist Across Hospitals in England: Lessons From the "Surgical Checklist Implementation Project"." <u>Ann Surg</u>.

Rydenfalt, C., G. Johansson, et al. (2013). "Compliance with the WHO Surgical Safety Checklist: deviations and possible improvements." <u>International Journal for Quality in Health Care</u> **25**(2): 182-187.

Sandelowski, M. (2000). "Whatever happened to qualitative description?" <u>Research in Nursing and Health</u> **23**: 334-340.

Sivathasan N, R. K., Robertson BFM, Vijayarajan L (2010). "The World Health Organization's "Surgical Safety Checklist": should evidence-based initiatives be enforced in hospital policy?" <u>JRSM Short Rep</u> **1**(5): 40.

The Royal College of Radiologists (2009). Guidelines for radiologists in implementing the NPSA Safe Surgery requirement.

The Royal College of Radiologists (2013). <u>Guidance for Fellows in implementing surgical safety checklists for radiological procedures</u>, London, The Royal College of Radiologists.

Treadwell, J. R., S. Lucas, et al. (2014). "Surgical checklists: a systematic review of impacts and implementation." <u>BMJ quality & safety</u> **23**: 299-318.

Urbach, D. R., A. Govindarajan, et al. (2014). "Introduction of surgical safety checklists in Ontario, Canada." <u>The New England Journal of Medicine</u> **370**: 1029-1038.

Webb, C. (1989). "Action research: Philosophy, methods and personal experiences. ." <u>Journal of Advanced Nursing</u> **14**: 403-410.

Webb, C. and J. Kevern (2001). "Focus groups as a research method: a critique of some aspects of their use in nursing research." <u>J Adv Nurs</u> **33**(6): 798-805.

World Health Organization (2009). Implementation Manual WHO Surgical Safety Checklist 2009. Geneva, World Health Organization.

# Appendix I

## Phase 1 survey sent to all hospitals across Australia

Surgical and interventional radiology[1] safety checklist[2] use in Australian hospitals
Thank-you for your involvement in this important research, which is a national study examining the use of safety checklists in Australian hospitals. The aims of this phase of the study are to:

   (i)     measure the extent of implementation of surgical and interventional radiology checklists across Australian hospitals,
   (ii)    better understand how checklists are used in practice, and
   (iii)   identify enablers and barriers to checklist implementation.

The questionnaire has three sections:

   • Section A – Checklist use in your hospital
   • Section B – About you and your hospital
   • Section C – Open ended questions

In public hospitals, the questionnaire is being provided to Directors of Surgery and Directors of Radiology. In smaller hospitals that do not have either of these positions, Hospital CEOs are invited to complete the questionnaire. Hospital CEOs should address checklist use in either surgery or interventional radiology, whichever has been implemented for the longer time period.
In private hospitals, two questionnaires are being sent to **Hospital CEOs**, one each for surgery and radiology. Hospital CEOs are being requested to send the questionnaire to the most suitable surgical and radiological contact in the hospital. This may be the Chair of the Medical Advisory Committee (or similar group). Alternatively, it may be the Clinical Nurse Consultant (Theatres) or Director of Nursing, and for radiology it may be the Head of Imaging, Chief Radiologist, or a senior partner of the private radiology provider. In small hospitals with no such persons and roles, CEOs are being asked to complete one copy of the questionnaire for the specialty that has been using checklists for the longer time.
*We are also interested in reviewing actual checklists that are used in your hospital.* **Can you please provide a copy of any checklists that are in use?**
The questionnaire should take no more than 10-15 minutes to complete.

---

[1] *Interventional radiology is a subspecialty of radiology, in which minimally invasive procedures are performed using image guidance and includes all procedures that break the patient's skin with anything more invasive than a cannula*" (Adapted from World Alliance for Patient Safety (2008) Safe Surgery Saves Lives).

[2] Surgical safety checklists are defined as "*instruments that are completed or marked preoperatively or during the operation from one or more responsible persons with the aim of increasing the safety of surgical interventions. They consist of a verbal verification by operating teams in terms of implementing the basic steps ensuring the safe delivery of anaesthesia, effective teamwork, and other substantial steps or practices within the range of surgical interventions, which pass a well-defined process*" (World Alliance for Patient Safety (2008)). Health Ministers called for the WHO Checklist to be implemented by 1 July 2011. This study relates to the WHO checklist, initially developed for surgery and subsequently adapted for interventional radiology.

## Section A – Surgical safety checklist[3] use in your hospital

1.  This study is examining surgical safety checklist use in operating theatres and radiology rooms. Please nominate which of these settings you are referring to in your responses. (Tick <u>one</u> only):

    ○ a.  Operating theatres only **(→ go to question 2)**
    ○ b   Radiology rooms only **(→ go to question 3)**

2.  (For operating theatres only). What are the approximate number of surgical cases (ie cases conducted in operating theatres or dedicated facilities excluding radiology rooms) conducted per month?

    a.  Emergency cases

    b.  Elective cases:

    **Now, please go to Question 4.**

3.  (For radiology rooms only). What are the approximate number of interventional radiology procedures (ie procedures conducted in radiology rooms) conducted per month?

4.  Which is the most accurate response to the statement "My hospital has a policy on using checklists in its operating theatres / radiology rooms" (tick one only):

    ○ a.  Yes. Please specify how many months the policy has been in place _____
    ○ b   No, but checklists are used informally
    ○ c.  No policy and no checklists used **(go to section B, page 5)**
    ○ d.  Don't know **(go to section B, page 5)**

---

[3] Please note that this study is specifically addressing safety checklists that are based on the <u>WHO Surgical Safety Checklist</u>. See the following resources for more information:

De Vries, E. N., Prins, H. A., Crolla, R. M. P. H., Den Outer, A. J., Van Andel, G., Van Helden, S. H., et al. (2010). Effect of a comprehensive surgical safety system on patient outcomes. *New England Journal of Medicine, 363*(20), 1928-1937.

Koetser, I. C. J., de Vries, E. N., van Delden, O. M., Smorenburg, S. M., Boermeester, M. A., & van Lienden, K. P. (2012). A Checklist to Improve Patient Safety in Interventional Radiology. *CardioVascular and Interventional Radiology*, 1-8.

World Health Organization. Safe Surgery Saves Lives - The Second Global Patient Safety Challenge. from http://www.who.int/patientsafety/safesurgery/en/

5.  Is your hospital's checklist: (Tick <u>one</u> only):

○ a.  modified from a pre-existing checklist (please specify its name or origins if known)
        _____

○ b.  an unmodified version of a pre-existing checklist (please specify its name or origins if known)
        _____

○ c.  developed "from scratch" by the hospital

○ d.  of unknown origin

6.  Approximately what percent of surgeons / interventional radiologists in your hospital currently use a checklist for all cases?

_____%

7.  Overall, in approximately what percent of cases in your hospital's operating theatres / interventional radiology rooms is a checklist used?

_____%

8.  Which type of checklists are used in your hospital's operating theatres / interventional radiology rooms? (Tick <u>as many</u> as are relevant):

☐ a.  Paper              ☐ d.  Poster
☐ b.  Electronic        ☐ e.  Sliderboard
☐ c.  Whiteboard      ☐ f.  Other (please specify)

9.  Is a formal record of the completed checklist kept? (Tick <u>one</u> only):

○ a.  No
○ b   Yes – hardcopy in patient records
○ c.  Yes – electronic copy in records
○ d.  Other, please specify_____
○ e.  Don't know

10. Is there a checklist coordinator responsible for completing the checklist? (Tick <u>one</u> only):

○ a.  No

○ b   Yes – Nursing. Please specify role: _____

○ c.  Yes – Medical. Please specify specialty: _____

○ d.  Yes – Various professions. Please specify: _____

○ e.  Yes – Other. Please specify: _____

11. Thinking about the checklist primarily used in your operating theatres / radiology rooms:

| Thinking about the checklist primarily used… | Strongly Agree ▼ | Agree ▼ | Neither ▼ | Disagree ▼ | Strongly Disagree ▼ |
|---|---|---|---|---|---|
| a. Staff have been trained and educated in how to use the checklist | ① | ② | ③ | ④ | ⑤ |
| b. The extent to which the checklist is used is monitored, measured or audited | ① | ② | ③ | ④ | ⑤ |
| c. Patient outcomes relevant to the checklist are monitored or measured | ① | ② | ③ | ④ | ⑤ |
| d. If I were having an operation or procedure, I would want the checklist to be used | ① | ② | ③ | ④ | ⑤ |
| e. The checklist is well embedded in daily clinical practice | ① | ② | ③ | ④ | ⑤ |
| f. Barriers that prevented patients from receiving checklist interventions (eg timely and appropriate antibiotics or antiseptics) have been addressed | ① | ② | ③ | ④ | ⑤ |

12. Please indicate your level of agreement with each of the following statements about the practicalities of implementing the checklist in your hospital's operating theatres / radiology rooms.

| Thinking about your checklist… | Strongly Agree ▼ | Agree ▼ | Neither ▼ | Disagree ▼ | Strongly Disagree ▼ |
|---|---|---|---|---|---|
| a. Its introduction and set-up in my hospital was a difficult process | ① | ② | ③ | ④ | ⑤ |
| b. It is difficult on an on-going basis to implement the checklist that we use | ① | ② | ③ | ④ | ⑤ |
| c. The implementation and set up of the checklist was adequately resourced | ① | ② | ③ | ④ | ⑤ |
| d. The implementation and set-up of the checklist has been financially costly | ① | ② | ③ | ④ | ⑤ |
| e. The implementation and set up of the checklist has been time consuming | ① | ② | ③ | ④ | ⑤ |
| f. I believe that the benefits of the checklist outweigh the costs of its implementation | ① | ② | ③ | ④ | ⑤ |
| g. I believe that the checklist is just another 'tick-box' exercise | ① | ② | ③ | ④ | ⑤ |

13. Please indicate your level of agreement with each of the following statements about the attitudes of staff to the implementation of the checklist in your hospital's operating theatres / radiology rooms.

| Thinking about the staff in your hospital… | Strongly Agree ▼ | Agree ▼ | Neither ▼ | Disagree ▼ | Strongly Disagree ▼ |
|---|---|---|---|---|---|
| a. The nursing staff have been resistant to the implementation of the checklist | ① | ② | ③ | ④ | ⑤ |
| b. The anaesthetic staff have been resistant to the implementation of the checklist | ① | ② | ③ | ④ | ⑤ |
| c. The surgical staff have been resistant to the implementation of the checklist | ① | ② | ③ | ④ | ⑤ |
| d. The radiology staff have been resistant to the implementation of the checklist | ① | ② | ③ | ④ | ⑤ |
| e. The radiography staff have been resistant to the implementation of the checklist | ① | ② | ③ | ④ | ⑤ |

14. Please indicate your level of agreement with each of the following statements about the impact of checklists in your hospital's operating theatres / radiology rooms.

| Thinking about your checklist… | Strongly Agree ▼ | Agree ▼ | Neither ▼ | Disagree ▼ | Strongly Disagree ▼ |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| a. The use of the checklist has resulted in positive change in team behaviour | ① | ② | ③ | ④ | ⑤ |
| b. The use of the checklist has resulted in an improvement in communication amongst staff | ① | ② | ③ | ④ | ⑤ |
| c. The use of the checklist has resulted in an improvement in the consistency of care a patient receives | ① | ② | ③ | ④ | ⑤ |
| d. The use of the checklist has resulted in a reduction of errors | ① | ② | ③ | ④ | ⑤ |
| e. The use of the checklist has resulted in a greater anticipation of adverse events | ① | ② | ③ | ④ | ⑤ |
| f. The use of the checklist has resulted in a flattening of the hierarchical structures | ① | ② | ③ | ④ | ⑤ |
| g. The use of the checklist has resulted in a positive culture of safety | ① | ② | ③ | ④ | ⑤ |
| h. After considering all the positive and negative aspects of the checklist it is overall a worthwhile tool | ① | ② | ③ | ④ | ⑤ |

## Section B: You and your hospital
This information will help in the analysis of the survey results.

15. What is your profession? Tick as many as relevant

    ☐  a. Administrator      ☐  d. Radiographer      ☐  g. Other, please specify
    ☐  b. Anaesthetist       ☐  e. Radiologist
    ☐  c. Nurse           ☐  f. Surgeon

16. What is your position?

_____

17. How long have you worked in this <u>position</u>? (Optional, tick <u>one</u> only)
    ○  a. Less than 1 year      ○  d. 11 to 15 years
    ○  b. 1 to 5 years         ○  e. 16 to 20 years
    ○  c. 6 to 10 years      ○  f. 21 years or more

18. Is your facility? (Tick <u>one</u> only)

    ○  a. Private overnight      ○  d. Public same-day
    ○  b. Private same-day     ○  e. Stand-alone radiology
    ○  c. Public overnight      ○  f. Other, please specify _____

19. What best describes your facility's location? (tick one only)

    ○  a. Major city
    ○  b. Regional
    ○  c. Rural / Remote
    ○  d. Other, please specify

## Section C – Open ended questions
Lastly, we would value your response to three open-ended questions that relate to your experiences or perceptions of implementing checklists in hospitals.

20. What are the main <u>enablers</u> to checklist use and implementation?

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

21. What are the main <u>barriers</u> to checklist use and implementation?

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

22. What purpose, if any, do checklists serve?

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

## Qualitative component (phase 2 and 3) of 'Surgical and interventional radiology safety checklist use in Australian hospitals'

In phase 2 of the project, following site-specific ethics approval and consent, we are proposing to investigate in more detail the implementation of checklists in a number of Australian hospitals, by:

- Conducting focus group interviews with hospital staff (radiologists, surgeons, anaesthetists, nurses) about their experiences of using checklists in hospitals
- Conducting audits of medical records to assess compliance with checklist use
- Conducting observations on how checklists are used in practice

Phase 2 will be conducted by trained researchers visiting your facility for 3-5 days.
Phase 3 of the project involves interviewing staff in hospitals where checklists are not currently used, or where significant barriers have impacted on implementation. It is anticipated that interviews would take 30-60 minutes.
**Please <u>detach</u> and fill out this form if you are prepared for your hospital / facility to be involved in phase 2 or 3 of the project.**

✂ — — — — — — ✂ — — — — — — ✂ — — — — — — ✂ — — — — — — ✂

**I agree to be contacted to discuss potential involvement in phase 2 or phase 3 of the checklist implementation project: Yes / No**

Your name:_____

Your position:_____

Your hospital / facility name:_____

Your preferred method of contact: email / phone

Email / phone number:_____

**THANK-YOU FOR COMPLETING THIS QUESTIONNAIRE**
**Please post it to: APSF, Mailbox CEA-20, University of South Australia, North Tce, Adelaide SA 5000; or email to admin@apsf.net.au.**
**Don't forget – we would be grateful if you could provide a copy of your hospital's checklist. Thanks again!**

## Appendix II

### WHO Surgical Safety Checklist used to review safety checklists submitted by participating hospitals



**Surgical Safety Checklist**

World Health Organization | Patient Safety
A World Alliance for Safer Health Care

"Time Out"

**Before induction of anaesthesia** → **Before skin incision** → **Before patient leaves operating room**

(with at least nurse and anaesthetist)  (with nurse, anaesthetist and surgeon)  (with nurse, anaesthetist and surgeon)

1. Has the patient confirmed his/her identity, site, procedure, and consent?
   ☐ Yes
2. Is the site marked?
   ☐ Yes
   ☐ Not applicable
3. Is the anaesthesia machine and medication check complete?
   ☐ Yes
4. Is the pulse oximeter on the patient and functioning?
   ☐ Yes
5. Does the patient have a:
a) Known allergy?
   ☐ No
   ☐ Yes
b) Difficult airway or aspiration risk?
   ☐ No
   ☐ Yes, and equipment/assistance available
c) Risk of >500ml blood loss (7ml/kg in children)?
   ☐ No
   ☐ Yes, and two IVs/central access and fluids planned

6. ☐ Confirm all team members have introduced themselves by name and role.
7. ☐ Confirm the patient's name, procedure, and where the incision will be made.
8. Has antibiotic prophylaxis been given within the last 60 minutes?
   ☐ Yes
   ☐ Not applicable
9. **Anticipated Critical Events**
a) To Surgeon:
   i. ☐ What are the critical or non-routine steps?
   ii. ☐ How long will the case take?
   iii. ☐ What is the anticipated blood loss?
b) To Anaesthetist:
   ☐ Are there any patient-specific concerns?
c) To Nursing Team:
   i. ☐ Has sterility (including indicator results) been confirmed?
   ii. ☐ Are there equipment issues or any concerns?
10. Is essential imaging displayed?
   ☐ Yes
   ☐ Not applicable

**Nurse Verbally Confirms:**
11. ☐ The name of the procedure
12. ☐ Completion of instrument, sponge and needle counts
13. ☐ Specimen labelling (read specimen labels aloud, including patient name)
14. ☐ Whether there are any equipment problems to be addressed

**To Surgeon, Anaesthetist and Nurse:**
15. ☐ What are the key concerns for recovery and management of this patient?

## Appendix III

### WHO Safety Checklist used to review safety checklists submitted by participating hospitals



WHO Surgical Safety Checklist:
for Radiological Interventions ONLY
(adapted from the WHO Surgical Safety Checklist)

THE ROYAL COLLEGE OF RADIOLOGISTS

**NHS**
National Patient Safety Agency
National Reporting and Learning Service

**SIGN IN** (To be read out loud)

Before giving anaesthetic (local or general)

1. Have all team members introduced themselves by name and role?
   ☐ Yes

2. All team members verbally confirm:
   ☐ What is the patient's name?
   ☐ What procedure, site and position are planned?
   *If general anaesthetic given the two questions above should be moved to the beginning of TIME OUT*

3. Has the patient confirmed his/her identity, site, procedure and consent?
   ☐ Yes

4. Has essential imaging been reviewed?
   ☐ Yes     ☐ N/A

5. Are all IRMER requirements met?
   ☐ Yes

6. Is the procedural site marked?
   ☐ Yes     ☐ N/A

7. Is the anaesthesia machine/monitoring equipment and medication check complete?
   ☐ Yes     ☐ N/A

8. Does the patient have a:
   known allergy?
   ☐ No     ☐ Yes

9. anticipated risk of >500ml blood loss (7ml/kg in children)?
   ☐ No     ☐ Yes (and adequate IV access/fluids planned)

   Have risk factors for bleeding and renal failure been checked?
   ☐ Yes     ☐ N/A

10a. Has Antibiotic prophylaxis been given?
   ☐ Yes     ☐ N/A

b) Has VTE prophylaxis been undertaken?
   ☐ Yes     ☐ N/A

11. Is the required equipment available and in date?
   ☐ Yes

12. Are there any critical or unexpected steps you want the team to know about?
   ☐ Yes     ☐ N/A

**ONLY IF GENERAL ANAESTHETIC IS GIVEN**

**TIME OUT** (To be read out loud)

Before start of radiological intervention
(for example needle to skin)

**Anticipated critical events**

Anaesthetist (if present):
☐ Is the anaesthetic machine check complete?

Does the patient have a difficult airway/aspiration risk?
☐ Yes     ☐ N/A

☐ Are there any patient-specific concerns?
☐ What is the patient's ASA grade?
☐ What monitoring equipment and other specific levels of support are required, for example blood?

Registered practitioner/HCA:
☐ Are there any equipment issues or concerns?

Has the surgical site infection (SSI) bundle been undertaken?
☐ Yes     ☐ N/A
   • Antibiotic prophylaxis
   • Patient warming
   • Hair removal
   • Glycaemic control

**The checklist is for Radiology Interventions ONLY**
This modified checklist must not be used for other surgical procedures.

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**SIGN OUT** (To be read out loud)

Before any member of the team leaves the room

Registered Practitioner/HCA verbally confirms with the team:
☐ Has the name and side of the procedure been recorded?
☐ Have all pieces of invasive equipment used been accounted for?
☐ Have any implanted devices been recorded?
☐ Have the specimens been labelled (including with patient's name)?
☐ Have any equipment problems been identified that need to be addressed?

Radiologist, Anaesthetist and Registered Practitioner:
☐ Have the instructions for post procedural care for this patient been agreed?

Remember to scan onto CRIS
or record checklist has been undertaken

**PATIENT DETAILS**

Last name:
First name:
Date of birth:
NHS Number:
Date of Procedure:

www.nrls.npsa.nhs.uk

## Appendix IV

### Observation data collection forms

Safety Checklists Study
Observer Protocol – Procedure List
*Fill in this page only once for each surgical / interventional radiology list observed*
<Insert Hospital Name>
Name of Observer: ……………………………..                    Date: …./…./……
In which department was the observation made?
Circle one:                    Surgery            or        Int. Radiology
Name of Safety Checklist: ……………………………..
Which types of safety checklists appear to be in use? (tick as many as are relevant):
☐        a.        Paper            ☐        d.        Poster
☐        b.        Electronic       ☐        e.        Other (please specify)………………………..
☐        c.        Whiteboard

Is there anything in the operating / procedure room promoting safety checklist use?
Circle one:                    Yes        or        No
COMMENT:

Safety Checklists Study
Observer Protocol - Procedure
<INSERT HOSPITAL NAME>
*Fill in this page only once for each surgical / interventional radiology procedure observed*

Date: ..../..../........

Procedure start time (when patient arrives in the operating room): ....................
Procedure completion time (when patient leaves operating room): .....................
Name of Procedure: ...................................
Is the procedure:
Circle one:                    Emergency      /        Urgent  /         Elective
COMMENT:

```
┌─────────────────────────────────────────────────────────────────────────┐
│                                                                           │
│                                                                           │
│                                                                           │
│                                                                           │
└─────────────────────────────────────────────────────────────────────────┘
```

How many people are present in the operating/radiology room?
Total (highest number of staff present at any time during procedure): ...........
Please insert numbers in the relevant boxes:
Nurses ........... Surgeons ..................... Anaesthetists ............... Radiologists ...................
Radiographers/sonographers ................. Other ...............
COMMENT:

```
┌─────────────────────────────────────────────────────────────────────────┐
│                                                                           │
│                                                                           │
│                                                                           │
│                                                                           │
└─────────────────────────────────────────────────────────────────────────┘
```

Follow the checklist procedure in full with the team under observation. Mark each item off the checklist as it is performed by the surgical/radiological team using the 'observer checklist' form.

**Surgical Safety Checklists Study**
**Observer Checklist**

\* This will be adapted to suit the checklist used by each individual hospital

| **Pre-Incision** | | **Post-Procedure** | |
|---|---|---|---|
| Checklist Item | Completed (Y / N / Unclear) | Checklist Item | Completed (Y / N / Unclear) |
| Confirm all team members name and role is displayed on whiteboard or they have been introduced | | Nurse verbally confirms with the team: The name of the procedure recorded | |
| Correct patient? | | That instrument, sponge, needle and other counts are correct | |
| Correct site (check site marking)? | | Specimen is labelled correctly (including patient's name) | |
| Correct procedure? | | Are there any equipment problems to be addressed? If yes, provide detail. | |
| Is the consent signed? | | Are there any unusual or specific concerns regarding recovery postop management? If yes, provide detail. | |
| Does patient have an allergy? If yes, provide detail | | | |
| Antibiotic prophylaxis | | | |
| Has thrombo-prophylaxis been arranged? If yes, circle type: Stockings/ LMW/ Heparin/ Compression devices | | | |
| Is essential imaging available? | | | |
| Surgeon review: Are there any critical/ unusual steps? If yes provide detail | | | |
| What is the expected duration? | | | |
| Is there likely to be blood loss requiring transfusion? | | | |
| If the answer above is yes, is blood available? | | | |
| Anaesthesia review: Are there any patient-specific concerns? | | | |
| Nursing review: Are there any equipment or other issues? | | | |
| Has any prosthesis (or special equipment) to be used in theatre been checked and confirmed? | | | |

## Appendix V

### Retrospective Medical Record Audit Data Collection Form

Surgical Safety Checklist Study
Protocol for the Retrospective Medical Record Audit
<INSERT HOSPITAL NAME>
Name of Observer: _____            Date: ..../..../........
1. How has the record been stored?
Circle one:            Electronically    or        Hard Copy


2. From which department did the record come?
Circle one:            Surgery or        Radiology


3. Is there a surgical safety checklist in the record?
Circle one:            Yes      or        No


*Answer the following questions ONLY if there IS a copy of the surgical safety checklist in the record.*


4. Is the surgical safety checklist complete?
Circle one:            Yes      or      No      or        Unclear


Total number of items on the surgical safety checklist ...........................
Total number of items addressed on the surgical safety checklist .......................


5. Is the surgical safety checklist in the record the standard surgical safety checklist for that hospital (provided for use with observer protocol)?
Circle one:            Yes      or        No


If not, what modifications / differences appear to have been made to the standard surgical safety checklist?

|  |
|--|
|  |


6. Is the surgical safety checklist dated?
Circle one:            Yes      or        No
If so, what date was the surgical safety checklist completed? _____


7. Is the surgical safety checklist signed?
Circle one:            Yes      or        No


8. If so, is the profession of the person who signed the surgical safety checklist clear?
Circle one:            Yes      or        No

## Appendix VI
## Phase 2 Focus Group Schedule

Surgical safety checklist use in
Australian hospitals – Focus group guide
Introduction.
Introduce yourself and the project

There is compelling research evidence that supports the use of a surgical safety checklist in operating theatres to reduce deaths and complications following surgery. The surgical safety checklist has since been adapted for use in interventional and diagnostic radiology. Although the use of these surgical safety checklists, which involves doctors and nurses ticking answers to a standard list of questions, is known to improve patient safety and is supported by professional organisations, State Health Departments and national patient safety organisations, the extent of surgical safety checklist use in Australian hospitals, the barriers to, and enablers of, using the surgical safety checklists are poorly known. ***The purpose of this focus group is to discuss the use of checklists, and the barriers and enablers to their use.***

Thank participants for giving up an hour of their time

Establish ground rules:

Focus groups are used to explore people's knowledge and experiences, and explore and clarify views, in a group dynamic. There is a structured list of questions to work through, but feel free to speak of anything of importance to you, and we can veer off from the structured question guide. This discussion is being recorded, purely for ease of analysis and also to ensure accurate recall of everything said.  This recording will be stored on a computer which can only be accessed with a password.  Confidentiality of the recording will be maintained and the only people who will listen to the audio are the researchers involved in the project, and when transcribed confidentiality will be maintained.

The Chatham House rule is a rule used during meetings or focus groups, which states that '*when a meeting is held under the Chatham House Rule, participants are free to use the information received, but neither the identity nor the affiliation of the speaker, nor that of any other participant, may be revealed*.'  The Chatham House Rule applies to this discussion.

Although you all work together, and bearing in mind (iii), it is hoped you will all speak freely today. Please do not feel pressured to answer any questions you do not wish to, and please know that you can withdraw from this group at any time.

Amongst you there may be a variety of perspectives and opinions.  It is absolutely fine to disagree with others but please do so in a respectful way. I will try as much as possible to ensure there is a balanced level of input from everyone here, so by the end, we all feel there has been a fair opportunity for input from everyone around the table.

As we are recording this discussion, please avoid speaking over one another.  Raise your hand if you feel you are being missed and I will come to you at the next break in discussion. We are aiming for a group discussion, so please feel free to talk to one another, and do not feel you need to address me. You may like to ask each other questions.

We do have a lot to discuss, in only one hour – so a large part of my role as moderator will be to keep us on time and progressing forward through the topic list.

Helpful Tips for Today:

Please speak up so we all can hear you.

Everyone gets a chance to talk.

There are no wrong answers; all comments are important.

Relax, open up, think deeply, and don't be afraid to consider or offer alternative opinions.

Please let me know if you have any questions

Purpose and goals
To gain a better understanding of surgical safety checklist use in Australian hospitals.

When did you first hear of surgical safety checklists? When were they first implemented?
When first implemented, how did staff respond to the use of surgical safety checklists?
Were there any teething difficulties in the initial stages?
What were some of the issues you faced at this time?
What were some of the barriers to surgical safety checklist use that you encountered when the surgical safety checklist was first implemented here?
Do these barriers exist still now?
Have any new barriers presented during the time of using the checklists?

Overall, would you say that there has been a successful implementation of surgical safety checklists in your setting?
If successful, why do think this is?
When first implemented, what (if any) factors led to their successful uptake?
Have these factors changed over time?
Have you had to make modifications of the surgical safety checklist to make it more relevant for your setting? If so, what were these?

Do you have any stories of staff embracing implementation of the surgical safety checklist?

Was staff training and education provided prior to implementation of the surgical safety checklist?
If not, why?
If yes, how?
 How did you feel this prepared you to adequately utilise the surgical safety checklist?

In your opinion, how important are surgical safety checklists in your setting?
Are surgical safety checklists more important for some procedures as compared with others?

Do you believe that surgical safety checklist use has led to an improvement in team communication?
If so, why? If not, why not?

In your opinion, has surgical safety checklist use led to an improvement in patient safety?
If so, why? If not, why not?

Do you think surgical safety checklist use has improved the quality of care provided in your hospital?
If so, why? If not, why not?

Do you know if your hospital collects information about whether surgical safety checklists are being used?
If so, how, if at all, is this information fed back to you?
Are you kept up-to-date with data on patient outcomes that have been shown to be related to surgical safety checklist use (e.g. surgical site infection rates)?
How does this occur?
Did it occur before surgical safety checklist implementation?

Are there any other issues surrounding the use of surgical safety checklists in surgery and/or radiology that you would like to mention that have not yet previously been addressed?

Thank you all sincerely for your time, I believe this discussion has been very informative and brought up some very important points related to  surgical safety checklist use in surgery and interventional radiology. If you feel like you didn't have a chance to say something today, please feel free to email me any issues or points we may have missed, and this will of course once again be treated as confidential.

## Appendix VII

### Phase 2 Interview Schedule

Surgical Safety Checklists Study
Semi-Structured Interview Schedule

Surgical safety checklist use in Australian hospitals – semi-structured interview guide
Introduction.
Introduce yourself and the project
There is compelling research evidence that supports the use of a surgical safety checklist in operating theatres to reduce deaths and complications following surgery. The surgical safety checklist has since been adapted for use in interventional and diagnostic radiology. We are investigating the extent of surgical safety checklist use in Australian hospitals, the barriers to, and enablers of, using the surgical safety checklists are poorly known.
Thank participant(s) for giving up 10 -20 minutes of their time
Establish ground rules:
This discussion is being recorded, purely for ease of analysis and also to ensure accurate recall of everything said.  This recording will be stored on a computer which can only be accessed with a password.  Confidentiality of the recording will be maintained and the only people who will listen to the audio are the researchers involved in the project, and when transcribed confidentiality will be maintained.
Please do not feel pressured to answer any questions you do not wish to, and please know that you can withdraw from this interview at any time.
Helpful Tips for Today:
Please speak up.
There are no wrong answers; all comments are important.
Relax, open up, and think deeply.
Please let me know if you have any questions.

How did you respond to the use of surgical safety checklists? Were there any teething difficulties in the initial stages?
Can you think of any barriers to surgical safety checklist use that you encountered when the surgical safety checklist was first implemented here?
Have you found any barriers to or difficulties with surgical safety checklist use that have persisted with time, or have arisen following implementation?


 Would you say that there has been a successful implementation of surgical safety checklists in your setting?
Can you think of any factors that helped to embed surgical safety checklists when they were first implemented here?
Have these factors changed over time?
Do you have any stories of staff embracing implementation of the surgical safety checklist?
Have you had to make modifications of the surgical safety checklist to make it more relevant for your setting? If so, what were these?

Was staff training and education provided prior to implementation of the surgical safety checklist?

If not, why?
If yes, how?
 How did you feel this prepared you to adequately utilise the surgical safety checklist?

In your opinion, how important are surgical safety checklists in your setting?
Are surgical safety checklists more important for some procedures as compared with others?

Do you believe that surgical safety checklist use has led to an improvement in team communication? If so, why? If not, why not?

In your opinion, has surgical safety checklist use led to an improvement in patient safety? If so, why? If not, why not?

Thank you sincerely for your time, I believe this discussion has been very informative and brought up some very important points related to surgical safety checklist use in surgery and interventional radiology.

## Appendix VIII

### Phase 3 Focus Group Schedule

Surgical safety checklist use in Australian hospitals – Focus group                    guide
Introduction.
Introduce yourself and the project
The Joanna Briggs Institute, STHS, HCF grants
There is compelling research evidence that supports the use of a surgical safety checklist in operating theatres to reduce deaths and complications following surgery. The surgical safety checklist has since been adapted for use in interventional and diagnostic radiology. Although the use of these surgical safety checklists, which involves doctors and nurses ticking answers to a standard list of questions, is known to improve patient safety and is supported by professional organisations, State Health Departments and national patient safety organisations, the extent of surgical safety checklist use in Australian hospitals, the barriers to, and enablers of, using the surgical safety checklists are poorly known. The purpose of this focus group is to discuss the use of checklists amongst surgeons, and these barriers and enablers to their use.
Thank participants for giving up an hour of their time
Establish ground rules:
Focus groups are used to explore people's knowledge and experiences, and explore and clarify views, in a group dynamic. There is a structured list of questions to work through, but feel free to speak of anything of importance to you, and we can veer off from the structured question guide. This discussion is being recorded, purely for ease of analysis and also to ensure accurate recall of everything said.  This recording will be stored on a computer which can only be accessed with a password.  Confidentiality of the recording will be maintained and the only people who will listen to the audio are the researchers involved in the project, and when transcribed confidentiality will be maintained.
The Chatham House rule is a rule used during meetings or focus groups, which states that '*when a meeting is held under the Chatham House Rule, participants are free to use the information received, but neither the identity nor the affiliation of the speaker, nor that of any other participant, may be revealed*.'  The Chatham House Rule applies to this discussion.
Although you all work together, and bearing in mind (iii), it is hoped you will all speak freely today. Please do not feel pressured to answer any questions you do not wish to, and please know that you can withdraw from this group at any time.
Amongst you there may be a variety of perspectives and opinions.  It is absolutely fine to disagree with others but please do so in a respectful way. I will try as much as possible to ensure there is a balanced level of input from everyone here, so by the end, we all feel there has been a fair opportunity for input from everyone around the table.
As we are recording this discussion, please avoid speaking over one another.  Raise your hand if you feel you are being missed and I will come to you at the next break in discussion. We are aiming for a group discussion, so please feel free to talk to one another, and do not feel you need to address me. You may like to ask each other questions.
We do have a lot to discuss, in only one hour – so a large part of my role as moderator will be to keep us on time and progressing forward through the topic list.
Helpful Tips for Today:
Please speak up so we all can hear you.
Everyone gets a chance to talk.
There are no wrong answers; all comments are important.

Relax, open up, think deeply, and don't be afraid to consider or offer alternative opinions.
Please let me know if you have any questions

Purpose and goals
To gain a better understanding of surgical safety checklist use in Australian hospitals.
There is a large body of high quality evidence showing that the use of surgical safety checklists do result in a significant decrease in mortality and morbidity following surgery. Do you accept this evidence?
Why do you think there is such a benefit – is it from the areas covered off in the checklist, or is it from something else?
Have you had an instance where the checklist has prevented an error –wrong site, wrong patient, wrong procedure, etc?

Phase 1 of our study identified surgeons were sometimes identified both as a "barrier" when resistant and an 'enabler' when supportive to the use of checklists. What do you think it is that surgeons are perceived this way?

Some responders in our survey did not believe checklists were useful for patient safety. What is it about the use of a surgical safety checklist that you do not feel is advancing patient safety and minimising the potential for error in the operating theatre?

One of the comments in our survey stated that checklists aren't needed for settings with a stable workforce, highly skilled staff and only one or a small amount of OTs– and that checklists only improve patient safety where this isn't the case.  What are your thoughts on this? Do you agree or disagree with this statement?
Follow up with - When is a checklist useful, and when is it a hindrance?

One response in our survey was that too many checklists may decease safety, and it is more important to have relevant and simple processes that are practical to OR. What are your thoughts on this?  Do you agree or disagree with this statement?

Some of our survey responses indicated that there was a change in feelings towards the use of checklists over time, with resistance initially becoming acceptance.  Has this been the case for any of you? If so, why do you think there was resistance? What has led to acceptance of the process?

The checklist was mentioned as a potential cause for friction between staff.  Why do you think this is?

Whose responsibility do you think it is to conduct the surgical safety checklist and why?
Who in the team do you think is the main opponent of the surgical safety checklist?
How do they show their opposition?
Have they always been in opposed to using the checklist?
Why do you think this is?

What do you think the surgeon's role is in the conduct of the surgical safety checklist?
Thank you all sincerely for your time, I believe this discussion has been very informative and brought up some very important points related to surgical safety checklist use. If you feel like you didn't have a chance to say something today, please feel free to email me any issues or points we may have missed, and this will of course once again be treated as confidential.