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# Does a novel method of delivering the safe surgical checklist improve compliance? A closed loop audit

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## HIGHLIGHTS

- This is an innovative concept rather like “mind the gap” on underground trains (London tube).
- This study reveals that cultural aspects may underpin the process of SSC that need further study.
- The delivery of the SSC and completeness of the SSC clearly improved with the audio delivery of the SSC.

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## ABSTRACT

*Background:* In February 2010, the UK National Patient Safety Agency set a mandate that the World Health Organisation's Surgical Safety Checklist (SSC) should be completed for every surgical patient within the NHS in a bid to improve surgical safety. However since its introduction, there have been issues with checklist compliance, staff engagement and surgical serious incidents continue.
*Aims:* This study seeks to explore if an unavoidable pre-recorded audio delivery of the SSC improves compliance and staff engagement with the checklist.
*Methods:* The performance of the time-out and sign-out sections of the SSC were observed in three phases: standard practice, audio prompt and full audio delivery. Two researchers visited operating theatres throughout a three-week period. The outcome measures were occurrence of time-out/sign-out, completion of checklist, and presence, and engagement of staff during checklist administration. Staff feedback on the process was also sought.
*Results:* Observation of time-out and sign-out was undertaken for 92 procedures. Time-out and sign-out were performed for 100% of the procedures when using full audio delivery of the SSC, an improvement on findings during the standard practice phase (time out- 97.4%, sign out- 86.8%). The compliance with completion of checklist items also improved with audio delivery of the SSC. However, the presence of all key staff and active participation of team members with the checklist was unaffected by the mode of delivery. Team members' self-reported engagement did not significantly vary across the different practices.
*Conclusion:* The intervention seems to improve rate of checklist completion, particularly signout. It also brought more consistency on the questions read out during checklist administration. It doesn't necessarily ensure all key staff are present neither does it significantly improve staff engagement in the process.



## 1. Introduction

The World Health Organisation's (WHO) surgical safety checklist (SSC) was designed in 2008 and its implementation across the NHS began in 2009 and this is now used in all NHS organisations [1]. The aim of the SSC is to improve the safety of surgical care [2] and reduce the occurrence of adverse events [3], in particular ‘never

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events' such as wrong site surgery and retained foreign objects in the patient [4]. The WHO SSC includes an initial Team Brief prior to the start of the operating list, where all team members discuss the cases for the day, and three main stages: sign-in prior to anaesthesia, time-out prior to start of surgical procedure and sign-out after completion of procedure [5].

The initial trial of the WHO "*Safe Surgery Saves Lives*" program showed a reduction in rate of death and post-operative complications [6], but despite widespread adoption, surgical 'never events' and other theatre – related serious incidents still occur, which could in part be due to problems with compliance to the SSC [3,7]. Several studies have identified issues in particular with sign-out compliance [3,8,9].

Literature has also shown varying levels of staff engagement with the process and inconsistent delivery of checklist information [3] and omission of items [8]. In a French study [10], staff in nine out of eighteen centres, reported that the checklist took too long to complete as they already had a heavy workload and did not perceive the added benefit. Five centres reported that items could be ticked off even when they had not been checked, because of time constraints. In these cases, the items were ticked only to comply with the management audit and therefore failed to improve patient safety.

These issues with the current format of the SSC suggest there is scope for improvement. It has also been suggested that future research should be focused on checklist design in order to improve behaviours in the operating theatre [11].

We explored if an alternative method to delivering the WHO SSC was effective in addressing these problems. Researcher-led delivery of the SSC via pre-recorded audio was trialled. The hypothesis was that this would bring consistency to practice and make the checklist unavoidable, increasing overall compliance.

## 2. Methods

The study took place in the operating theatres of a large teaching hospital. This was a comparison study between standard SSC practice and pre-recorded audio delivery of the SSC. The focus was on aspects of the performance of the time-out and sign-out sections of the WHO checklist. The study took place over a three week period in October 2015 and was organised into three phases:

Phase 1: Observation of staff performing the time-out and sign-out sections of the SSC under standard practice.

Phase 2: Trial of pre-recorded audio prompt played prior to time-out and sign-out, after which staff proceeded with the usual standard practice. The audio played three words: "STOP: Time Out" and "STOP: Sign Out".

Phase 3: Trial of full pre-recorded audio delivery of the time-out and sign-out sections of the SSC wherein all questions related to time out and sign out were delivered by the audio prompt.

Standard practice for time-out and sign-out involves the theatre Team Leader reading the checklist aloud from a pre-printed card and confirming responses from the appropriate team members. The researchers observed discretely from a distance equal to that of the team member furthest from the leader. If checklist items were not audible from this position then they were recorded as not communicated. The checklist used is an adapted version of the WHO checklist specific for this Trust (appendix 1). This version includes an additional question about throat pack compared with the standard WHO version.

### 2.1. Intervention and delivery

The audio interventions were delivered via an iPod™ touch connected to Bose™ Bluetooth speakers. During phase 2 the researchers played a single prompt over the speakers stating either "STOP: Time-out" or "STOP: Sign-out" after which the theatre team would carry out time-out or sign-out using standard practice, reading the questions aloud themselves. During phase 3, the trial of full audio delivery of the SSC, the same prompts as in phase 2 were played, followed by all the checklist questions detailed in appendix 1. Questions were manually played from the iPod™ touch by researchers, one at a time. They played the next question after a response from staff. Speakers were set to full volume so the audio could be heard clearly anywhere in the operating theatre including the scrub room. During the intervention phases [2 and 3], at Team Brief staff were asked not to initiate timeout and sign-out and instead the researchers would do this. The audio intervention for timeout was delivered prior to the start of the procedure and the exact timing varied based on team preference, but this was always before the start of the surgery. Theatres were selected at random with exclusion of Cardiology, Ophthalmology, Obstetrics and Emergency lists as they use a modified checklist. The following specialities were observed: General, Maxillofacial, Ears Nose & Throat, Plastics, Trauma & Orthopaedics, Gynaecology, Vascular, Cardiothoracic and Urology. Wherever possible, observations took place in the same theatre for the full day, so that cases were consecutive and the same staff were observed throughout the day. A data collection proforma was developed and completed for each operation.

### 2.2. Measures

To determine the effectiveness of the audio prompt and audio delivery, one researcher recorded observational outcome measures of compliance with time-out and sign-out for each procedure. This is based on the approach used in previous research [3,12,13]. The following variables were collected:

1. Was a time-out/sign-out performed? If staff made an attempt at performing a timeout or sign-out this was recorded a single yes/no result. If yes, then the following additional data was collected:
2. Was all information communicated? For procedures where a time-out/sign-out was attempted, the individual time-out and sign-out questions that were asked and discussed were recorded as a yes/no result for all questions for that case. A percentage for overall completeness of time-out and sign-out items was determined, and a mean value for each phase is calculated.
3. Were all team members present? In order for this condition to be met, a minimum of the following staff must have been present in theatre at the time of SSC performance: Operating Surgeon, Anaesthetist, Anaesthetic Practitioner, Scrub Practitioner, Team Leader (may be Scrub Practitioner), Circulating Person (i.e. n = 6). This was recorded as a simple yes/no result, if no was recorded, then the team members absent were recorded. The number of procedures with the minimum number of staff present was counted and converted into a percentage for each phase.
4. Was there active participation [3] of team members with the process? Team active participation with the checklist is ranked for every question on a red-amber-green 'traffic light' scoring system, defined follows:

Red = None of team members stopped other activities and engaged with the process.

Amber = One or more team member not stopped and engaged with process.

Green = All team members stopped and fully engaged with the process meaning that their sole focus/activity was the checklist.

For each procedure, the number of individual questions that