



University  
of Glasgow

Kearns, R.J., Uppal, V., Bonner, J., Robertson, J., Daniel, M. and McGrady, E.M. (2011) *The introduction of a surgical safety checklist in a tertiary referral obstetric centre.* BMJ Quality & Safety, 20 (9). pp. 818-822.

<http://eprints.gla.ac.uk/53977/>

Deposited on: 9 December 2011

# The introduction of a surgical safety checklist in a tertiary referral obstetric centre

R J Kearns,<sup>1</sup> V Uppal,<sup>1</sup> J Bonner,<sup>2</sup> J Robertson,<sup>3</sup> M Daniel,<sup>4,5</sup> E M McGrady<sup>1</sup>

## ABSTRACT

**Background:** Surgery-related adverse events remain a significant and often under-reported problem. In a recent study, the introduction of a perioperative checklist by the WHO reduced deaths and complications by 46% and 36% respectively. The authors wished to evaluate the introduction of a surgical safety checklist in a busy obstetric tertiary referral centre by assessing staff attitudes, checklist compliance and effects upon patients.

**Methods:** A questionnaire-based assessment was performed on staff working in obstetric theatres before and after the introduction of the surgical safety checklist. Checklist compliance was assessed at 3 months and 1 year. Patients were asked questions relating to the performance of the surgical safety checklist in order to evaluate any anxiety caused.

**Results:** Non-medical staff were significantly more likely than medical staff to feel familiar with other team members both before ( $p < 0.001$ ) and after ( $p = 0.03$ ) the introduction of the checklist. 69.6% of all staff felt that interprofessional communication had improved following the introduction of the checklist. Compliance with pre- and postoperative checks was 61.2% and 67.6%, respectively, improving to 79.7% and 84.7% after 1 year. Although the majority of patients were aware of the checks being performed, this did not provoke anxiety.

**Conclusion:** Following consultation with staff and patients, the authors managed to institute and sustain the performance of a surgical safety checklist for elective cases in obstetric theatres. While significant progress has been made, the authors recognise that further work is required in order to further evaluate and optimise this process.

## INTRODUCTION

According to WHO data, major complications are reported to occur in 3e16% of inpatient surgical procedures in industrialised countries, resulting in permanent disability or death rates of 0.4e0.8%.<sup>1</sup> The National Patient Safety Agency's (NPSA) Reporting System received 129 419 reports of surgery-related adverse events in England and Wales in 2007, 1376 of which resulted in death or severe harm.<sup>2</sup> Despite the introduction of a 'no blame' culture within the NHS, it is recognised that such adverse events may be under-reported for a number of reasons.<sup>3 4</sup> Obstetric theatre is a complex and dynamic environment in which a multidisciplinary team must work together closely. Our unit is a tertiary referral obstetric centre with around 6400 deliveries per year. Following a recent merger of obstetric services throughout the city, the number of cases increased by around

400 cases per annum, and the number of staff working in obstetric theatres also increased due to redeployment from other units. This created a number of challenges for the working of the team, and in the maintenance of patient safety in a setting where the stakes are high, and patients are often awake and frequently anxious. Ensuring that each aspect of patient care is met on every occasion is challenging, even for the most experienced practitioner. Omissions of an aspect of patients care, although uncommon, may result in significant adverse events. For example, the accidental omission of routine thromboprophylaxis postoperatively may ultimately result in a pulmonary thromboembolism, and the omission of antibiotics may result in sepsis.

Checklists may be used to improve patient safety by ensuring that all elements of a practice are instituted for each new clinical event. The introduction of a surgical safety checklist as part of the WHO Safer Surgery Saves Lives campaigns improved team work and efficiency in the operating theatre as well as reducing morbidity and mortality.<sup>6 7</sup> In a study of over 7500 patients, the introduction

<sup>1</sup>Department of Anaesthesia,  
Princess Royal Maternity  
Unit, Glasgow Royal  
Infirmary, Glasgow, UK

<sup>2</sup>Department of Anaesthesia,  
Ninewells Hospital, Dundee,  
UK

<sup>3</sup>Department of Anaesthesia,  
Western Infirmary, Glasgow,  
UK

<sup>4</sup>Department of Anaesthesia,  
Pain and Critical Care  
Medicine, Glasgow Royal  
Infirmary, UK

<sup>5</sup>Health Foundation/Institute  
for Healthcare Improvement  
Fellow 2010e11, Cambridge,  
MA

#### Correspondence to

Dr R Kearns, Department of  
Anaesthesia, Princess Royal  
Maternity Unit, Glasgow  
Royal Infirmary, 2nd Floor,  
Walton Building, 91, Wishart  
Street, Glasgow G31 2HT,  
UK; rachel.harrison890@  
gmail.com

Presented in part at the  
Obstetric Anaesthesia 2010  
Annual Meeting,  
NewcastleGateshead, UK.  
Accepted 26 May 2011

of the WHO three-stage perioperative checklist reduced the RR of surgery-related deaths by 46% and complications by 36%.<sup>7</sup> In the UK, the NPSA and the Royal College of Obstetricians and Gynaecologists recommended that a similar checklist be performed for all theatre cases by February 2010.<sup>2</sup>

Despite these recommendations, there is little practical

information on how to test, develop and implement such a checklist in real terms. It may be argued that an attempted change in practice is more likely to be effective and sustainable if there is a degree of local customisation of content and process. Making new procedures relevant and appropriate to the needs of an individual organisation or clinical area could be considered as more likely to drive staff participation and improve reliability. In keeping with the National Institute for Health and Clinical Excellence guidance on changing practice,<sup>8</sup> and before attempting to introduce a surgical safety checklist into obstetric theatre, we performed an assessment of staff opinion. After introducing the checklist, we performed an evaluation of compliance and reassessed the attitudes of staff. Furthermore, as obstetric patients are often awake, and preoperative anxiety is known to be common,<sup>9 10</sup> we sought to investigate whether performing such checks may be worrying to this unique patient group.

## METHODS

### Staff attitudes

A short questionnaire was made available to staff of all disciplines working in obstetric theatre in a tertiary referral obstetric centre with around 6400 deliveries per year. The questionnaire examined staff attitudes towards the introduction of the surgical safety checklist. A similar questionnaire was distributed after the checklist had been in use for 3 months. Chi square and Fisher exact tests were used to compare categorical variables. All statistical analyses were performed using MINITAB 15.1 Statistical Software (Minitab, State College, Pennsylvania). A p value of <0.05 was considered significant.

### Compliance

Key theatre staff were invited to provide input to the content of the checklist, to ensure it was relevant to obstetric practice and to decide on a strategy for its introduction. After the checklist had been in use for 3 months, compliance over a 1-month period was evaluated directly by an independent investigator (JB) who observed and recorded the use of the checklist in elective caesarean sections. This investigator was not involved with the running of the case, did not routinely work in the obstetric unit in question and had no prior involvement in the introduction of the checklist. Completion of the preoperative checklist (patient identity, indication for caesarean section, allergies, neonatology presence) and postoperative check (analgesia, oxytocic prescription, antibiotics, thromboprophylaxis and skin contact between mother and baby) was examined. Staff participation, roles assumed and adverse events were reviewed. After this initial assessment, staff were again consulted in order to establish any factors which prevented the checklist from being performed and to ask for opinion as to how things could be improved. Humorous posters and immediately accessible prompt cards were subsequently placed in obstetric theatres in order to remind staff to perform the checklist. A further period of staff education was performed and all staff empowered to remind the team to perform the checklist if it was forgotten. Compliance was again assessed in the same manner by

an investigator who did not routinely work within the obstetric unit in question, and who had not previously been involved with the introduction of the checklist (JR). Direct observation of checklist performance during elective caesarean section cases was performed as before. This was carried out over a 1-month period after the checklist had been in use for 1 year.

### Patient experience

Women undergoing elective caesarean section during a 3-month period were asked three questions relating to the performance of the surgical safety checklist. The questionnaire was completed following delivery and was designed to assess possible maternal anxiety induced by observing staff completing the checklist. The first question required a 'yes or no' answer, and a Likert scale (strongly disagree, disagree, neither agree nor disagree, agree, strongly agree) was used for the other two questions. Approval from the West of Scotland Research Ethics Committee was sought prior to commencing this part of the study and was deemed unnecessary. Information was analysed, and descriptive statistics calculated.

## RESULTS

### Staff attitudes

Sixty-five questionnaires were distributed to staff representing all disciplines in obstetric theatre during a 1-month period prior to the introduction of the checklist. Completion of the questionnaire was entirely voluntary, and results were anonymised. Fifty-three questionnaires were returned, giving a response rate of 81.5%.

Of the 53 responders, 17 were midwives, eight auxiliaries, eight obstetric trainees, eight anaesthetic trainees, five anaesthetic nurses, four anaesthetic consultants and three consultant obstetricians (table 1). The staff survey was then repeated after the surgical safety checklist had been operational for 3 months. Forty-six out of 65

Preintroduction of surgical safety checklist staff who:

Positive response

from medical staff

Positive response from

non-medical staff p Value

Felt familiar with others in theatre 1/23 (4.3%) 15/30 (50%) <0.001

Felt communication in theatre could improve 20/23 (86.9%) 23/30 (76.7%) 0.484

Felt the checklist would be useful in elective cases 19/23 (82.6%) 26/30 (86.7%) 0.715

Felt the checklist would be inconvenient in emergency cases 12/23 (52.2%) 16/30 (53.3%) 1.000

questionnaires (70.7%) were completed by staff, representing all disciplines in obstetric theatre, and the results were tabulated (table 2 and table 3).

### Compliance

Compliance with the checklist was monitored at 3 and 12 months and the results tabulated (table 4). Anaesthetists, anaesthetic nurses and midwives were present during the pre- and postoperative checks on all occasions in both audit cycles. The health professional most commonly leading the checklist was a midwife in the first cycle and anaesthetic nurse in the reaudit. An obstetrician was present during 91% of the checklists in the first evaluation period (after 3 months) and at 94% of checklists during the second evaluation period (after 12 months).

### Patient experience

Fifty-eight women undergoing elective caesarean section during a 3-month period were asked the following: 'The theatre team performed a series of checks at the start and end of the operation. Did you notice this?'

Forty-five patients (75%) remembered the checks being performed. Eleven patients (19%) remembered when prompted, and two (3%) did not remember, even when prompted. The 56 patients who recalled the checks being performed were asked a further two questions: 'If I said the checks made you worried, how would you reply?' (all patients either disagreed or strongly disagreed with this statement) and 'If I said the checks were reassuring, how would you reply?' (52 patients (93%) either agreed or strongly agreed with this statement; four patients (7%) neither agreed nor disagreed).

## DISCUSSION

The patient-safety movement has borrowed procedures from the airline industry.<sup>11</sup> In recognising that adverse events are often not foreseeable, and that human error will always be a factor, one step towards safer practice is considered to lie in the recognition and management of unanticipated events. The surgical safety checklist seeks to improve interprofessional communication, reduce the potential for individual error and provide a mechanism by which potential adverse events may be anticipated. The Royal College of Obstetricians and Gynaecologists has issued a statement to support the use of an adapted surgical safety checklist in the practice of obstetric and gynaecological surgery.<sup>12</sup> As a maternity-specific checklist was not available at the time of our study, we adapted the standard WHO checklist to be relevant to the obstetric population in our unit.

Obstetric theatres have their own unique features which can hamper communication. There is a high turnover of doctors in training in anaesthesia, obstetrics, and neonatology as well as anaesthetic assistants who may rotate from other parts of the hospital. Students in obstetrics, anaesthesia, midwifery, and nursing studies are also frequently present. Staff working in elective obstetric theatre lists which run within the labour ward environment are frequently subject to distractions from the labour ward, requesting advice about labourward issues. As mothers become older and larger with increasing comorbidity, there is more information to be shared with the theatre team, yet there can be less time to impart it, as time in between cases can often be spent attending to emergencies. Finally, in addition to all of the issues which can interfere with the running of general surgical elective theatre lists, there are factors specific to obstetrics which lead to unplanned alterations in the schedule. These include waiting for a partner or family member to support the mother in theatre, and, frequently, obtaining an interpreter. In addition, obstetricians undertaking both elective and emergency work

**Table 1** Medical and non-medical staff opinion prior to the introduction of a surgical safety checklist  
Preintroduction of surgical safety checklist staff who:

Positive response  
from medical staff

Positive response from  
non-medical staff p Value

Felt familiar with others in theatre 1/23 (4.3%) 15/30 (50%) <0.001

Felt communication in theatre could improve 20/23 (86.9%) 23/30 (76.7%) 0.484  
 Felt the checklist would be useful in elective cases 19/23 (82.6%) 26/30 (86.7%) 0.715  
 Felt the checklist would be inconvenient in emergency cases 12/23 (52.2%) 16/30 (53.3%) 1.000  
**Table 2** Medical and non-medical staff opinion after the introduction of a surgical safety checklist  
 Postintroduction of surgical safety checklist staff who:  
 Positive response  
 from medical staff  
 Positive response from  
 non-medical staff p Value  
 Felt familiar with others in theatre 8/26 (30.8%) 15/20 (75%) 0.003  
 Felt communication in theatre had improved 15/26 (57.7%) 17/20 (85%) 0.046  
 Felt the checklist was useful in elective cases 19/26 (73.1%) 18/20 (90%) 0.262  
 Felt that the checklist would be inconvenient in emergency cases 8/26 (30.8%) 6/20 (30%) 0.955

**Table 3** Combined staff opinion after the introduction of a surgical safety checklist  
 Postintroduction of surgical safety checklist staff who:

Positive response  
 (all staff) p Value  
 Felt familiar with others in theatre  
 23/46 (50%) 0.026  
 Felt communication in theatre had improved  
 32/46 (69.6%)  
 Felt that the checklist was useful in elective cases  
 37/46 (80.4%) 0.556  
 Felt that the checklist was inconvenient in emergency cases  
 14/46 (30.4%) 0.025

have responsibilities outwith the obstetric theatre, which mean they are often absent between cases, limiting the opportunity for communication during theatre turnover. Implementing a sustained change in practice produces a number of challenges. This staff survey highlights some interesting trends in terms of the different reactions of professional groups to a proposed change. It was notable that non-medical staff were significantly more likely than medical staff to feel familiar with other team members both before and after the introduction of the checklist. Non-medical staff were also significantly more likely to feel that communication had improved following the checklist introduction. A team introduction as part of the 'Time out' phase of the WHO checklist aims to promote familiarity among team members by defining individual roles, breaking down hierarchical boundaries and empowering staff to communicate concerns. The results of our staff survey suggest that despite being highlighted as an area of suboptimal performance in the initial survey, two-thirds of staff felt that interprofessional communication had improved following the introduction of the checklist. Staff were generally more receptive to the use of a checklist in elective cases when compared with emergency cases. Concerns expressed included the potential for delay in emergency cases and the likelihood that the checklist would 'be forgotten in the heat of the moment'. While the points made are valid, it can be argued that an abbreviated checklist could be performed during preoxygenation or while the patient is being

prepared for a spinal without causing undue delay.<sup>13</sup> Staff were statistically significantly less likely to feel that the checklist would be inconvenient in emergency cases after they had become accustomed to its use in elective cases. One would hope that as a team becomes more familiar with the checklist procedure, it should become easier to apply in the emergency situation.

Our compliance rates with pre- and postoperative checks were demonstrated to have improved from the initial assessment at 3 months to the assessment at 12 months. Informal feedback suggested that an appropriate allocation of responsibilities, the cultivation of respected individuals who would act as 'local champions', the development of a sense of ownership by team members and ongoing staff consultation may have contributed to this success, although this was not formally examined. Benchmark data on this topic are scarce, though in a procedure so integral to patient safety, one could argue that the target for compliance should be 100%. Unfortunately, collection of compliance data in the time period between the two time points relied upon manual recording by theatre staff and was inconsistent. Therefore, the creation of a run chart to reliably document progress over time was not possible. We hope to address this issue by introducing a new form which must be completed and collected for each checklist performed. The creation of staff feedback in the form of a run chart is our next goal in the implementation of the safety checklist. Although safety checklists should take minutes and not cause delay, it may not always be possible for all staff to attend owing to clinical demands. Having a dedicated elective theatre team should help to alleviate other demands upon staff, though this is not always possible, owing to resourcerelated factors. Working patterns may need to be reviewed in order to improve this.

One argument against the use of surgical safety checklists is the concern that patients may find it worrying or 'unprofessional' that staff expected to be familiar with their case ask fundamental questions such as their name and procedure to be performed. In obstetric theatre, the patient is often awake, making this a particularly pertinent issue. The effect of performing safety checklists on obstetric patients is an area where data are lacking. Our results suggest that although the majority of patients are aware of the checks being performed, they do not find this worrying, and may in fact find it reassuring.

This study has a number of strengths as well as some weaknesses. First, we involved and consulted with staff, providing feedback and further education throughout the process of introducing the checklist. Making the checklist relevant to the local setting produced a sense of ownership and enthusiasm, which we believe contributed

to the checklist being performed in a sustained fashion. In addition, the evaluation of patient experience provides new information in an area where data are lacking. The main weakness was that not all staff members completed the questionnaire, which may have



resulted in a degree of responder bias. However, it is difficult to know whether those who were for or against the surgical safety checklist were more likely to respond. It may have been beneficial to target non-responders in an attempt to engage them to participate. However, we felt that this acted against the anonymous nature of the survey. Although individuals completing the follow-up questionnaire were not always the same as those completing the initial questionnaire, this was again unavoidable owing to staff turnover and maintenance of anonymity. Despite these limitations, the results were thought to be representative of the opinions of a wide selection of staff from all disciplines and with varying degrees of experience. We did not evaluate adverse events in relation to the introduction of the checklist. This was outwith the scope of this study but is an area meriting further work.

Following our experience in the introduction of a surgical safety checklist into an obstetric centre, we would suggest the following learning points;

1. Staff involvement from the outset is crucial if the plan is to succeed.
2. Cultivate enthusiastic and respected local champions who will encourage others and promote compliance.
3. Start off small/dry out the proposed intervention in a small number of cases or on 1 day and seek feedback before attempting to change routine practice.
4. Continually re-evaluate the process to identify barriers and address these successfully.
5. Encourage all staff to put forward ideas as to how performance can be made more reliable/the simplest ideas are often the most effective.
6. Try to develop a sense of ownership among staff.
7. Provide and encourage feedback.

## CONCLUSION

Following consultation with staff and patients, we managed to institute and sustain the performance of a surgical safety checklist for elective cases in obstetric theatres and demonstrated that this allayed maternal anxiety.

The response of staff to the introduction of the surgical safety checklist was generally positive. Although familiarity among team members was significantly higher among non-medical professionals prior to the introduction of the checklist, communication was felt to have improved once the checklist had been operational for a period of time. Staff were more positive regarding the use of a checklist for emergency cases after its introduction in elective cases.

Achieving a sustained change in practice is challenging, particularly in the complex and dynamic environment of the operating theatre. NPSA guidelines regarding surgical safety checklists should not only be employed in obstetric surgery, but also embraced as an opportunity to further improve interindividual relationships and working practices in this field.

**Competing interests** None.

**Provenance and peer review** Not commissioned; externally peer reviewed.

## REFERENCES

1. World Alliance for Patient Safety. The Second Global Patient Safety Challenge: Safe Surgery Saves Lives. <http://www.who.int/entity/>

- patientsafety/safesurgery/knowledge\_base/SSSL\_Brochure\_finalJun08.pdf (accessed 19 Sep 2009).
2. National Patient Safety Agency. National Reporting and Learning System. Putting Patient Safety First. 2008. <http://www.npsa.nhs.uk/nrls/> (accessed 19 Sep 2009).
  3. Sari AB, Sheldon TA, Cracknell A, et al. Sensitivity of routine systems for reporting patient safety incidents in an NHS hospital: retrospective case note review. *BMJ* 2007;334:79e81.
  4. Smith AF, Goodwin D, Mort M, et al. Adverse events in anaesthetic practice: qualitative study of definition, discussion, and reporting. *Br J Anaesth* 2006;96:715e21.
  5. World Health Organization. Safe Surgery Saves Lives. 2008. [http://www.who.int/patientsafety/safesurgery/ss\\_checklist/en/index.html](http://www.who.int/patientsafety/safesurgery/ss_checklist/en/index.html) (accessed 2 Sep 2009).
  6. Lingard L, Regehr G, Orser B, et al. Evaluation of a preoperative checklist and team briefing among surgeons, nurses, and anesthesiologists to reduce failures in communication. *Arch Surg* 2008;143:12e17.
  7. Haynes AB, Weiser TG, Berry WR, et al. A surgical safety checklist to reduce morbidity and mortality in a global population. *N Engl J Med* 2009;360:491e2.
  8. How to Change Practice: Understand, Identify and Overcome Barriers to Change 2007. <http://www.nice.org.uk/media/D33/8D/Howtochangepractice1.pdf> (accessed 21 Feb 2010).
  9. Wyatt SS, Jones DA, Paech MJ, et al. Anxiety in patients having caesarean section under regional anaesthesia: a questionnaire and pilot study. *Int J Obstet Anesth* 2001;10:278e83.
  10. Uppal V, Rooney KD, Young SJ. Better antenatal education is a good idea, but does not reduce maternal anxiety regarding anaesthesia for emergency caesarean delivery. *Int J Obstet Anesth* 2009;18:97e8.
  11. Toff NJ. Human factors in anaesthesia: lessons from aviation. *Br J Anaesth* 2010;105:21e5.
  12. WHO Surgical Safety Checklist: for Maternity Cases Only. <http://www.library.nhs.uk/GUIDELINESFINDER/ViewResource.aspx?resID%394172&tabID%4288> (accessed 30 Jan 2011).
  13. Rao K, Lucas DN, Robinson PN. Surgical safety checklists in obstetrics. *Int J Obstet Anesth* 2010;19:235e40.

## The introduction of a surgical safety

<http://qualitysafety.bmj.com/content/early/2011/06/20/bmjqs.2010.050179.full.html>

Updated information and services can be found at:

*These include:*

### References

<http://qualitysafety.bmj.com/content/early/2011/06/20/bmjqs.2010.050179.full.html#ref-list-1>

This article cites 8 articles, 4 of which can be accessed free at:

**P<P** Published online June 21, 2011 in advance of the print journal.

### service

#### Email alerting

the box at the top right corner of the online article.

Receive free email alerts when new articles cite this article. Sign up in

#### Notes

publication.

Advance online articles must include the digital object identifier (DOIs) and date of initial

publication priority; they are indexed by PubMed from initial publication. Citations to available prior to final publication). Advance online articles are citable and establish not yet appeared in the paper journal (edited, typeset versions may be posted when Advance