

**Alert: NPSA/2009/PSA002/U1
WHO Surgical Safety Checklist
27 January 2009**

Supporting information

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1 Endorsements for the Safer Surgery Alert

- Association of Anaesthetists of Great Britain and Ireland
- Association for Perioperative Practice
- College of Operating Department Practitioners
- Department of Health
- Healthcare Commission
- Health Inspectorate for Wales
- Independent Healthcare Advisory Services
- Royal College of Anaesthetists
- Royal College of Nursing
- Royal College of Obstetricians and Gynaecologists
- Royal College of Ophthalmologists
- Royal College of Radiologists
- Royal College of Surgeons
- World Alliance for Patient Safety
- Welsh Assembly Government
- Welsh Independent Healthcare Association
- 1000 Lives Campaign in Wales

2 Membership of the Expert Reference Group

- Association for Perioperative Practice
- College of Operating Department Practitioners
- Health Care Commission
- Independent Healthcare Advisory Services
- Imperial College
- National Patient Safety Agency
- Patient representative for the Royal College of Anaesthetists
- Patient Representative for the Royal College of Surgeons
- Royal College of Anaesthetists
- Royal College of Obstetricians and Gynaecologists
- Royal College of Ophthalmologists
- Royal College of Radiologists
- Royal College of Surgeons
- Welsh Assembly Government

3 Background

Surgical care is an essential component of worldwide healthcare. While surgical procedures are intended to save lives, unsafe surgical care can cause substantial harm. About 234 million operations are performed globally each year. In industrialized countries major complications are reported to occur in 3 – 16% of inpatient surgical procedures, with permanent disability or death rates of approximately 0.4 – 0.8%. In England and Wales, 129, 419 incidents relating to surgical specialties were reported to the National Patient Safety Agency's (NPSA) Reporting and Learning System (RLS) from 1 January to 31 December 2007.

4 Actions for organisations to take

Three key recommendations have been identified as part of the Alert with actions to be underway within four months from issue and completed within one year:

- 1) Ensure an executive and a clinical lead are identified in order to implement the surgical safety checklist within the organisation
- 2) Ensure the checklist is completed for every patient undergoing a surgical procedure (including local anaesthesia)
- 3) Ensure the use of the checklist is entered in the clinical notes or electronic record by a registered member of the team, for example, Surgeon, Anaesthetist, Nurse or Operating Department Practitioner (ODP).

5 WHO set of ten core standards

To assist operating teams to reduce the number of patient safety events in the surgical environment, a core set of standards have been identified by the WHO that can be applied universally within any healthcare setting to address issues including correct site surgery, haemorrhage risk, antibiotic prophylaxis, airway management and the risk of allergies.

The delivery of safe effective surgical care is complex involving many interventions, processes and safety checks that should be consistently applied for every patient, to achieve the ten essential objectives:

- 1. The team will operate on the correct patient at the correct site.**
- 2. The team will use methods known to prevent harm from anaesthetic administration, while protecting the patient from pain.**
- 3. The team will recognise and effectively prepare for life-threatening loss of airway or respiratory function.**
- 4. The team will recognise and effectively prepare for risk of high blood loss.**
- 5. The team will avoid inducing any allergic or adverse drug reaction known to be a significant risk for the patient.**
- 6. The team will consistently use methods known to minimise risk of surgical site infection.**
- 7. The team will prevent inadvertent retention of instruments or swabs in surgical wounds.**
- 8. The team will secure and accurately identify all surgical specimens.**
- 9. The team will effectively communicate and exchange critical patient information for the safe conduct of the operation.**
- 10. Hospitals and public health systems will establish routine surveillance of surgical capacity, volume, and results.**

This WHO Surgical Safety checklist is to be used by surgical teams within a perioperative environment. The global challenge to introduce the checklist into all hospitals was first supported at an event at the National Patient Safety Agency (NPSA) in February 2008 during which relevant colleges and professional bodies sign up to the principles of the Safe Surgery Saves Lives Campaign www.who.int/patientsafety/en

6 Modification of the WHO checklist for England and Wales

The WHO recommends that the checklist can be modified to take account of the variance in healthcare systems and that it is shaped to support national practice and priorities.

The NPSA, in collaboration with a multi – professional expert reference group, has adapted the checklist for use in England and Wales. The checklist contains the core content but can be adapted locally or for specific specialties through local clinical governance arrangements to ensure organisational accountability.

Whilst enhancements to the checklist are encouraged, the removal of minimum checks is not. However, it is recognised that for some specialties several of the interventions may not be applicable. In this case they may wish to develop specific templates for local use following the appropriate scrutiny process. It is recommended that this is undertaken in accordance with high level guidance from the relevant college or specialty association.

The WHO Implementation Manual for the Surgical Safety Checklist provides further guidance for implementation of this alert:

www.who.int/patientsafety/safesurgery

7 The WHO Surgical Safety Checklist

The WHO Surgical Safety Checklist is designed to reduce the number of errors and complications resulting from surgical procedures by improving team communication and by verifying and checking essential care interventions.

SIGN IN (prior to induction of anaesthesia)

- **Has the patient confirmed his/her identity, site, procedure and consent?**

Wrong site or wrong patient incidents are rare but the consequences can result in considerable harm to the patient. From 1 January 2007 to 31 December 2007 16 cases of wrong site surgery incidents were reported to the RLS with one reported death and one rated as a severe outcome.

www.npsa.nhs.uk/advice

Wrong site from January 2007 – December 2007	Numbers
Surgery	16
Regional blocks	27
Site prepared	8
Site marked	5
Total	56

Degree of harm for wrong site surgery	Numbers
No harm	5
Low harm	5
Moderate harm	3
Severe harm	1
Death	1
Not known	1
Total	16

The patient should be involved in:

- confirmation of identity using the wristband;¹
- confirmation of the site of surgery;
- ensuring that informed consent for surgery has been given.

Staff should make the patient aware of the requirement for this process to be carried out several times as it can appear repetitive.

When confirmation by the patient is impossible, carers or significant others can support this process.

- **Is the surgical site marked?**

Best practice demands that marking the operative site must be undertaken by the operating surgeon performing the procedure.² Where judged appropriate this task may be delegated to a nominated deputy who must be present in the operating theatre when the procedure is carried out. In any event, the operative site must be confirmed by the operating surgeon with the team prior to the start of surgery (Appendix 1).

Further information relating to specific specialities are covered in Section 8.

- **Is the anaesthesia machine and medication check complete?**

Verification of the completion of an anaesthesia safety checklist is required to confirm the formal inspection of the anaesthetic equipment, medications and patient's anaesthetic risk before each.³

- **Does the patient have a known allergy?**

Known allergies that could cause risk to a patient must be established and communicated effectively prior to the start of the procedure. A positive outcome to an anaphylactic reaction depends on prompt and effective treatment.⁴

- **Does the patient have a difficult airway/aspiration risk?**

Death from airway loss during anaesthesia is still a common disaster globally but is preventable with appropriate planning.⁵ If the airway evaluation indicates a high risk for a difficult airway, the team must prepare against an airway complication.

The risk of aspiration should also be evaluated as part of the airway assessment. The risk can be reduced by modifying the anaesthesia plan, for example using the rapid induction sequence techniques from guidance produced by the Difficult Airway Society.⁶

- **Does the patient have a risk of >500 ml blood loss (7ml/kg in children)?**

Large volume blood loss is among the most common and important dangers for surgical patients and has been associated with poor surgical outcome^{7,8} with risk of hypovolaemic shock escalating when blood loss exceeds 500 ml (7 ml/kg in children). Adequate preparation and resuscitation can mitigate the consequences considerably. If there is a significant risk of a greater than 500 ml blood loss, consideration to venous access and availability of fluids and blood products must be given.⁹

TIME OUT (prior to start of surgical intervention e.g. skin incision)

- **Have all team members introduced themselves by name (first and last name) and role?**

Operating team members may change frequently. Effective management of high risk situations requires that all team members understand who each member is, their roles and capabilities. A simple introduction will achieve this including information regarding level of experience, e.g. if they are new to the department/team or have not undertaken the procedure before. Particular attention needs to be paid when team members change e.g. shift changes. This process should include all personnel including students and visitors/observers.

- **Surgeon, Anaesthetist and Registered Practitioner verbally confirm patient, site and procedure**

This step is the standard “Time Out” or “surgical pause” and meets the standards of many national and international regulatory agencies. Confirmation of the name of the patient using the wristband, the surgery to be performed using reliable documentation and imaging (if applicable), the site of surgery and, where appropriate, the positioning of the patient in order to avoid operating on the wrong patient or the wrong site.

- **Anticipated critical events**

Effective team communication is a critical component of safe surgery, efficient teamwork and the prevention of major complications. Communication of critical patient issues, during the “Time Out” encourages the sharing of risk assessments and operative plans that are required to mitigate anticipated critical dangers. Consideration should also be given to how this is best undertaken when caring for conscious patients who can hear the briefing.

- **Surgeon reviews: What are the critical, expected or unexpected issues, anticipated blood loss, specific requirements and any special investigations?**

A discussion of “critical or unexpected steps” is intended, at a minimum, to inform all team members of any steps that put the patient at risk of rapid blood loss, injury or other major morbidity. This is also an opportunity to confirm that specific equipment, implants (e.g. type and power of intra-ocular lens implants), preparations and investigations that are required are available.

- **Anaesthesia team reviews: Are there any patient specific concerns?**

The co-morbidities (ASA Grade), risk of major blood loss, haemodynamic instability or complications attributable to the procedure should be considered and discussed by the team to highlight potential problems and their management. In particular, appropriate monitoring equipment and other supportive resuscitative measures, as necessary, should be in place.

- **Nurse/ ODP reviews: Has the sterility of the instrumentation been confirmed (including indicator results) and are there any other equipment issues or concerns**

Verbal confirmation that a check of the sterility of instrumentation has already been undertaken should be confirmed by the team and any discrepancies addressed prior to the skin incision. This is also an opportunity to highlight and discuss any other specific concerns of the scrub team that have not been addressed by the surgical or anaesthesia team.

- **Has the Surgical Site Infection (SSI) bundle been undertaken?**
 - **Antibiotic prophylaxis within the last 60 minutes?**

Administration of antibiotics within one hour prior to incision is inconsistently undertaken. Therefore, confirmation that prophylactic antibiotics have been given during the previous 60 minutes is required.^{10,11}

If prophylactic antibiotics have been administered more than 60 minutes prior to knife to skin, consideration should be given to redosing the patient.

The exceptions to this are:

- Patients that have been given vancomycin which requires two hours to reach therapeutic levels
- Patients whose procedure involves the inflation of a tourniquet
- Women who require a caesarean section when antibiotic administration is withheld until after the umbilical cord has been clamped.
- **Maintenance of normothermia**

It has been identified that maintaining normothermia during surgery can reduce the rate of infection and several studies have demonstrated the benefits of both preoperative warming and perioperative maintenance of normothermia. Recent NICE guidance supports the maintenance of normothermia for surgical patients.¹²

- **Use of recommended hair removal methods**

The method of preoperative hair removal can affect post operative surgical site infection rates. Evidence indicates that electric clippers should be the apparatus of choice to reduce the incidence of post operative wound infection.¹³

- **Maintenance of glycaemic control**

The extent of hyperglycaemia in the perioperative period has been connected with post operative wound (surgical site) infection in patients undergoing major cardiac surgery.¹⁴ It has also been demonstrated glucose control in surgical intensive care unit patients reduces mortality.¹⁵ Therefore, local guidelines on glycaemic control should be followed.

- **Has Venous Thrombo Embolism (VTE) prophylaxis been undertaken?**

Venous thrombo embolism (VTE) is associated with inactivity during surgical procedures. The level of risk increases with the duration of the operation and period of immobility. NICE Guidance advocates the use of documented risk assessment for every patient and provides recommendations on the most clinically and cost-effective measures to reduce the risk of VTE.¹⁶

- **Is essential imaging displayed?**

Imaging is critical to ensure proper planning and conduct of many operations. Confirmation must be obtained that the essential imaging is in the room and prominently displayed for use during the operation. If imaging is needed, but not available, it should be obtained.

SIGN OUT (before any team member of the team leaves the operating theatre)

- **Registered Practitioner verbally confirms with the team the name of the procedure recorded**

Since the procedure may have changed or expanded during the course of an operation, the procedure that has been carried out must be confirmed.

- **Verify that the instruments, swabs and sharps counts are correct (or not applicable)**

Retained instruments, swabs and needles/blades are uncommon but remain serious errors. Confirmation of the completeness of final swab and sharps counts must be carried out according to local policy. There are a number of sources of information that can be used to inform local policy, for example Association for Perioperative Practice.¹⁷

Incidents reported to the RLS from April 2007 – March 2008 has identified 779 reports of missing or retained swabs and instruments as follows:

Missing or retained swabs and instruments	Numbers
Surgery	470
Obstetrics and Gynaecology	145
Anaesthesia	30
Other	134
Total	779

- **Have the specimens been labelled? (including patient name)**

Incorrect labelling of pathological specimens is potentially disastrous for a patient and has been shown to be a frequent source of laboratory error. Errors in labelling laboratory specimens occur due to mismatches between the specimen and the requisition, unlabelled or mislabelled specimens.¹⁸

Incidents reported to the RLS from September 2007 – August 2008 has identified 105 reports of incorrect or mislabelled specimens as follows:

Incorrect/mislabelled specimens	Numbers
Surgery	68
Diagnostic services	13
Obstetrics and Gynaecology	8
Anaesthetics	5
Other	11
Total	105

- **Have any equipment problems been identified?**

Equipment problems are not uncommon in operating theatres. Accurately identifying the sources of failure and instruments or equipment that have malfunctioned is important in preventing devices from being recycled back into the theatre before the problem has been addressed.

- **Surgeon, Anaesthetist and Registered Practitioner review the key concerns for recovery and management of this patient**

A review of the postoperative recovery and management plan must be carried out, focusing in particular on intraoperative or anaesthetic issues that might affect the patient. Events that present a specific risk to the patient during recovery and that may not be evident to all involved are especially pertinent. The aim of this step is the efficient and appropriate transfer of critical information to the entire team.

8 Requirements for specific specialties

In some instances, specific recommendations may be required to be developed for individual clinical specialities. Some examples of this are as follows:

Anaesthesia:

- Regional blocks - the overall responsibility for the site marking should remain with the operating surgeon. The Anaesthetist should only proceed with a regional block when he/she has confirmed that the site for surgery has been marked.

Radiology:

- Radiologists must assume the responsibility for marking the patient when undertaking invasive procedures that involve laterality.

Ophthalmology:

- Marking and verification should be undertaken for all cases where laterality can be determined preoperatively.
- Availability of correct intra ocular lens implants (IOL's) and of alternative IOL's for use in the event of complications during cataract surgery to be checked before surgery commences.
- "Time Out" prior to cataract surgery to include verification of IOL type and power, desired refractive outcome and any planned astigmatic modification.

Spinal Surgery:

- Marking and verification required for all cases even if this is to be confirmed under x ray control prior to the case being undertaken.
- Writing the level to be operated on can provide more specific guidance to the operating site.

Neurosurgery

- Marking usually on the side of the forehead or the back of the neck (below the hairline) for posterior approaches.¹⁹

9 Briefing and debriefing within theatre teams

It has been recognised through root cause analysis of adverse events that deficits in 'non technical' skills such as poor communication, lack of situational awareness and ineffective teamwork were accountable to 60-80% of cases.²⁰

Although briefing and debriefing sessions are not integral to the checklist, it is considered good practice for these to take place at the beginning and end of a theatre list to remedy deficits in team performance.

10 Evaluation from the global pilot

Imperial College Healthcare NHS Trust was identified as one of the eight sites worldwide to pilot the implementation of the checklist as part of the global initiative by WHO. Learning from their experience of implementing the checklist has informed the development of this alert.

11 Other related initiatives

The NPSA is working in partnership with the following initiatives to ensure an integrated and complimentary approach to safer surgery:

- Patient Safety Campaign (England) – www.patientsafetyfirst.nhs.uk
- 1,000 Lives Campaign (Wales) – www.wales.nhs.uk
- The NHS Institute for Innovation and Improvement ‘The Productive Operating Theatre’ – www.institute.nhs.uk

12 Additional resources

Additional resources for implementation will continue to be developed and will be available on the website to support local implementation.

Learning from early implementer sites and planned workshops for NHS staff will inform the development of future resources to support organisations in the implementation of the checklist.

The ‘How to Guide’ for Reducing Harm in Perioperative Care (England) – www.patientsafetyfirst.nhs.uk

The ‘How to Guide’ for Reducing Surgical Complications – The 1,000 Lives Campaign (Wales) is available – www.wales.nhs.uk

Appendix 1: Correct Site Surgery Alert 2005

The following recommendations have been adapted from the Correct Site Surgery Alert 2005²¹ following feedback from clinical focus groups:

How

- Using reliable documentation and imaging (if applicable)
- The mark must be an arrow that extends to, or near to, the incision site and remains visible after the application of skin preparation
- In some circumstances it may be appropriate to note the procedure to be undertaken
- An indelible marker pen must be used that is suitable to the patients skin type and the type of skin preparation to be used

When

- The surgical site must be marked in the designated area prior to surgery e.g. ward or pre admission area prior to pre medication being administered if applicable

Where

- Surgical site must be identified and marked accordingly although some exceptions may apply e.g. some gynaecological and urological procedures that do not require external marking for surgery on singular internal organs i.e. uterus or bladder
- Surgical procedures that involve side (laterality) must always be marked with particular consideration to specific digits of hands, feet and spinal levels

Who

- Marking must be undertaken by the operating surgeon, or nominated deputy, who will be present in the operating theatre at the time of the procedure. The operative site must always be confirmed by the operating surgeon with the team prior to the start of surgery

References

- ¹ National Patient Safety Agency. *Standardising wristbands improves patient safety*. www.npsa.nhs.uk 2007
- ² Giles SJ, Rhodes P, Clements G, Cook GA, Hayton R, Maxwell MJ, Shelson TA, and Wright J. Experience of wrong site surgery and surgical marking practices among clinicians in the UK. *Quality and Safety in Healthcare* 2006; 15: 363-386
- ³ The Association of Anaesthetists of Great Britain and Ireland. *Checking Anaesthetic Equipment*. www.aagbi.org. 2004
- ⁴ World Alliance for Patient Safety. *WHO Guidelines for Safe Surgery* (First Edition). 2008.
- ⁵ Benumof JL. Management of the Difficult Adult Airway: with special emphasis on awake tracheal intubation. *Anaesthesiology* 1991; 75, 1087-1110
- ⁶ Difficulty Airway Society. *Difficulty airway society-Rapid sequence induction guidelines*. www.das.uk.com. 2008
- ⁷ Holland AJ, Bell R and Ibach EG et al. Prognostic factors in elective aortic reconstructive surgery. *ANZ Journal of Surgery* 1998; 68: 16-20
- ⁸ Wolters U, Wolf T, Stutzer H, Schroder T. ASA classification and perioperative variables as predictors of postoperative outcome. *British Journal of Anaesthesia* 1996; 77(2): 217-222
- ⁹ National Patient Safety Agency. *Rapid Response Report: Emergency Support in Surgical Units: Dealing with haemorrhage*. www.npsa.nhs.uk 2007
- ¹⁰ Dellinger EPM. What Is the ideal time for administration of antimicrobial prophylaxis for a surgical procedure? *Annals of Surgery* 2008
- ¹¹ Mallari-Catungal MG, Codamos LJ, Coronel RF, Platt J. Antibiotic Prophylaxis in Elective Breast Surgery: A meta-analysis of randomized placebo-controlled trials. *Anaesthesiology* 1993
- ¹² NICE Guidance. *Management of inadvertent perioperative hypothermia in adults*. www.nice.org.uk. 2008
- ¹³ Tanner J, Woodings D, Moncaster K. Preoperative hair removal to reduce surgical site infection. *Cochrane Database of Systematic Reviews* 2006
- ¹⁴ Latham R, Lancaster AD, Covington JF, Pirolo JS, Thomas CS. The association of diabetes and glucose control with surgical site infections among cardiothoracic surgery patients. *Infection Control Hospital Epidemiology* 2001; 22: 607-612
- ¹⁵ Van den Berghe G, Wouters P, Weekers F, Verwaest C, Bruyninckx F, Schetz M et al. Intensive Insulin Therapy in Critically Ill Patients. *New England Journal of Medicine* 2001; 345(19):1359-1367

¹⁶ NICE Guidance. *Venous thrombo embolism: reducing the risk of venous thrombo embolism (deep vein thrombosis and pulmonary embolism) in inpatients undergoing surgery*. www.nice.org.uk 2007

¹⁷ Association for Perioperative Practice. *Standards and Recommendations for Safe Perioperative Practice*. www.afpp.org.uk 2007

¹⁸ Linden LV, Wagner K, Voytovich AE, and Sheehan J. Transfusion errors in New York State: an analysis of 10 years experience. *Transfusion*. 2000; 40: 1207– 1213

¹⁹ National Patient Safety Agency. *Rapid Response Report 9: Avoiding wrong side burr holes/ craniotomy*. www.npsa.nhs.uk 2008

²⁰ Kohn LT, Corrigan J, Donaldson MS. *To err is human: building a safer health system*. Institute of Medicine (US). 2000

²¹ National Patient Safety Agency and the Royal College of Surgeons. *Patient Safety Alert: correct site surgery*. www.npsa.nhs.uk 2005