



Making the **safety** of patients
everyone's highest **priority**

The 'How to' Guide for
**Reducing Harm in
Perioperative Care**

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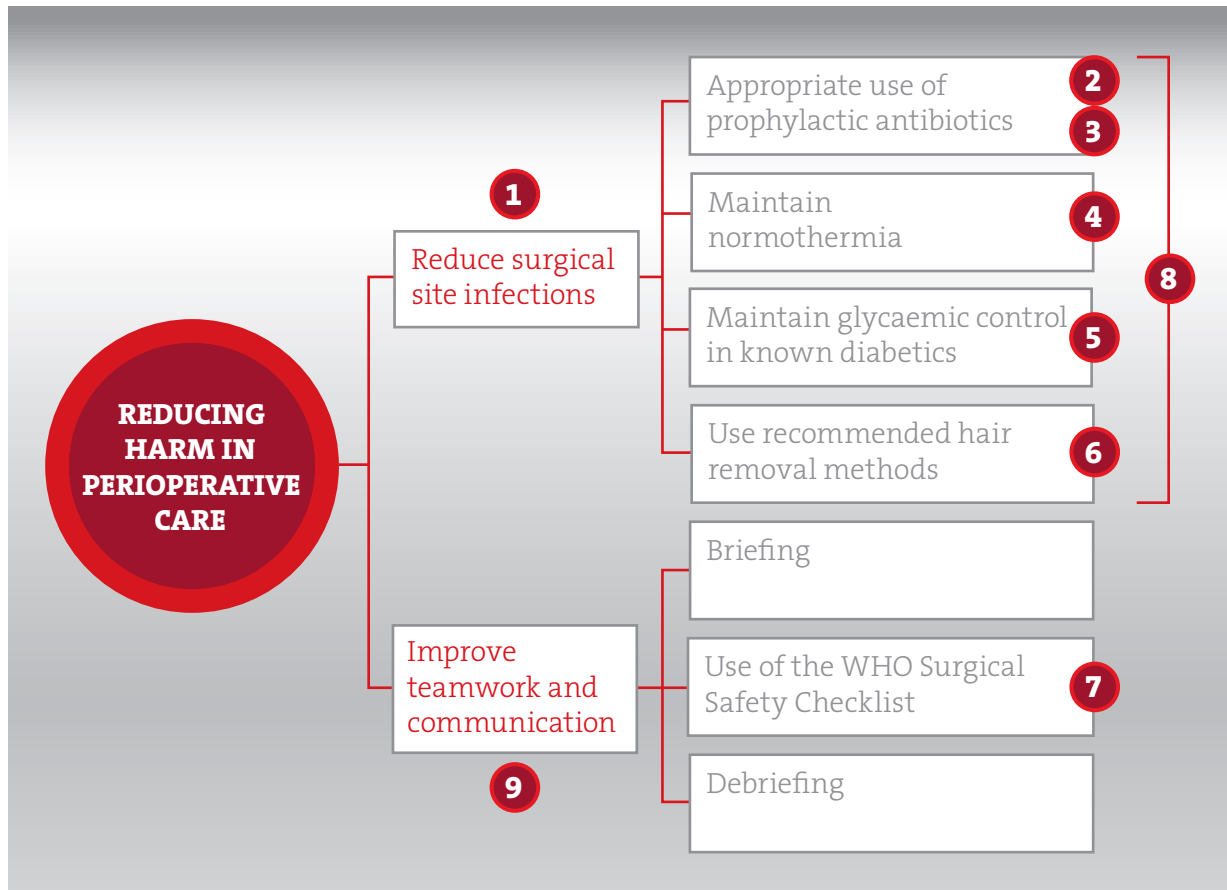
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Overview of the Intervention: Reducing Harm in Perioperative Care



- 1 Surgical site infection (SSI) rate 30 days post operation
- 2 % of surgical patients with antibiotics administered 'on time'
- 3 % of surgical patients with antibiotics discontinued 'on time'
- 4 % of surgical patients with normothermia
- 5 % of known diabetic surgical patients with controlled glucose
- 6 % of surgical patients with appropriate surgical site hair removal
- 7 % of lists using the WHO Surgical Safety Checklist
- 8 % compliance with the SSI 'bundle'
- 9 Days between surgical never events

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General Introduction

All over the world, including in the UK, health care workers are proving that patient safety can be greatly improved and many complications or harm events that were previously considered unavoidable actually are avoidable. They are in fact redefining what is acceptable in terms of patient safety.

The purpose of each of the Patient Safety First interventions is to provide you with a focus on which to begin or progress improvements in patient safety in your organisation. Each proposed intervention has an underpinning evidence base that identifies the need for change and how its elements can help you on a journey that will make a real impact on rates of patient harm and death.

The proposed elements, suggested changes and associated measures discussed in this document are not exhaustive; rather, a basis on which to start making a difference in the given area. It also provides a sound methodical approach that can be applied repeatedly in other improvement efforts you may wish to initiate.

The content of this 'How to' guide will never be considered to be final. Regular reviews will be conducted to update it with new evidence, initiatives and key learning from organisations participating in the Patient Safety First campaign. Your suggestions for improvement and case studies are welcomed; please share your learning with your local campaign contact or contact us direct via the Patient Safety First website www.patientsafetyfirst.nhs.uk.

Reducing Harm in Perioperative Care

Background

This document is aimed at team members involved in implementing changes to reduce harm in perioperative care. It may also provide a useful overview for the following:

- Relevant service managers
- Senior managers/executives supporting the work and monitoring its progress
- Service improvement personnel who may be required to provide improvement or change management expertise in relation to the work.

The evidence base for all components of this intervention have not been included in this document purely for the purpose of conciseness and an attempt to focus on the 'how to'. This information can be found in the accompanying Campaign documents:

- The summary *Reducing Harm in Perioperative Care*
- *Perioperative Care: References*

All are available from the Patient Safety First website www.patientsafetyfirst.nhs.uk.

The public should feel confident that surgery is performed in the most appropriate clinical setting, that they will remain free of infection and that their attending clinical team will work effectively together to assure their safety and optimum clinical outcomes. The quality of outcome and the safety of the patient during a surgical procedure relies on everyone involved in the perioperative pathway. Within an operating theatre it is assumed that everyone knows their role and the plan for the patient; it is assumed that what we expect to happen, such as the administration of prophylactic antibiotics, happens.

From April 2007 to 31 March 2008, the National Patient Safety Agency's National Learning and Reporting System received over 135,247 reports of patient safety incidents from surgical specialties in England and Wales. The nature of these incidents varied greatly, from wrong site surgery to misplaced patient notes. Whilst not all of these incidents were serious, some regrettably led to patient harm or death. The table below shows the breakdown of these reports by degree of harm.

No harm	Low harm	Moderate harm	Severe harm	Death
94,306	31,108	8,331	1,206	296

Total: 135,247

Post-operative surgical site infections (SSIs) still occur and cause significant mortality and morbidity despite many advances in the surgical environment and techniques. The costs incurred when a patient contracts an SSI may be considerable in social/human and

financial terms. It has been estimated that patients with an SSI require on average an additional hospital stay of 6.5 days and that hospital costs are at least doubled.

In other high risk industries (Aviation, Oil, Nuclear) the incidence of serious events has been reduced by several orders of magnitude through a focus on safety, communication and individual behaviours (human factors). By focusing on the contributory elements of safety, disasters in said high risk industries have become much less common.

Despite massive technical advances in surgery, major errors and deficits in surgical care remain relatively common. This is not through a lack of vigilance, hard work, or a lack of concern, but is perhaps due to a collective failure to apply significant learning from parallel industries. These industries have found for example, that technical improvements alone cannot deliver all the potential safety gains to be made and that non-technical skills (such as teamwork and communication) can make a significant contribution. Effective teamwork and improved communications are important elements in improving safety and efficiency in the operating room. (Sexton JB, Thomas EJ, Helmreich RL. *Error Stress and Teamwork in Medicine and Aviations: cross sectional surveys*. British Medical Journal 2000 : 320: 745–9.)

This intervention recommends a five step process for improving teamwork and communication, three steps of which are achieved through the use of a checklist developed by the World Health Organisation (WHO) as part of their initiative *The Second Global Patient Safety Challenge: Safe Surgery Saves Lives*. In February 2008 at an event to publicise the checklist, Dr Atul Gawande stated:

“This extraordinary coalition of United Kingdom’s leading organisations for surgeons, anaesthesia professionals and nurses has endorsed a seemingly mundane but revolutionary idea: that a simple operating room checklist could save lives in surgery the same way that pilots’ checklists have saved lives in aviation for the last half century.”

More latterly in January 2009, the efficacy and impact of the checklist was demonstrated through a global pilot. Comparing data from 8 different hospitals, the checklist contributed to reductions in death rate and inpatient complications. (Alex B. Haynes, M.D et al for the Safe Surgery Saves Lives Study Group. *A Surgical Safety Checklist to Reduce Morbidity and Mortality in a Global Population*. New England Medical Journal 2009 : 360: 491-499.)

The checklist is about working differently. The goal is not to impose unnecessary routines on clinicians and practitioners, waste valuable operative time, compromise workflow patterns or create forced conversations. The goal is that teams implement simple and efficient priority checks in a way that opens up the lines of communication between all staff present and enhances teamwork, to realise improved safety and clinical outcomes for patients.

In January 2009, the National Patient Safety Agency in response to compelling evidence arising from the global pilot, issued an Alert to the NHS in England and Wales to be compliant in the use of the checklist for all surgical procedures by February 2010.

In addition to the checklist Patient Safety First advocates the use of two additional steps: pre list briefings and post list debriefings. Pre list briefings provide an opportunity for the operating team to share information about potential safety problems and concerns about specific patients in advance of sending for and anaesthetising the first patient on the operating list. They facilitate the integration of essential reporting on safety issues into everyday work and the opportunity for proactive information exchange. The pre list briefing enables the whole theatre team to discuss potential problems or challenges in a timely fashion. Debriefings at the end of the list provide an opportunity for reflection, learning and to identify issues that need to be rectified in advance of the next list.

Experience in field test sites for the **Productive Operating Theatre** demonstrates that when briefing and debriefing are used alongside the checklist, the impact on team performance and safety appears to be even greater, with the additional benefits of reductions in delays, smoother running lists and an improved safety climate. http://www.institute.nhs.uk/quality_and_value/productivity_series/the_productive_operating_theatre.html.

Recognition of the impact of human factors in assuring reliable and consistent surgical safety provides surgical teams an opportunity to deliver the quantum improvements that other high risk industries have enjoyed. This intervention promotes approaches to improving care for adult patients undergoing elective surgical procedures in acute or primary care settings. It details components of care that, where implemented, can reduce the incidence of SSI and improve communications to reduce the incidence of avoidable error and omission.

Implementing Reducing Harm in Perioperative Care

Before progressing further with this document it is recommended that you read the accompanying Campaign document *The Quick Guide to Implementing Improvement* as it contains background information on:

- The Model for Improvement – a suggested approach to undertaking any improvement activity
- Getting Started – a series of actions to consider working on prior to attempting to implement changes.

This intervention has two distinct parts:

Part A: Actions to reduce surgical site infections (SSIs)

- Appropriate use of prophylactic antibiotics
- Maintenance of normothermia
- Maintain glycaemic control for known diabetic patients
- Use of recommended hair removal methods.

Part B: Improving teamwork and communication

- Implementation of the World Health Organisation (WHO) Surgical Safety checklist.

The Quick Guide to Implementing Improvement

If you have started working through this accompanying document's list in 'Getting Started' you should have a team in place that is committed to reducing harm in perioperative care. Gather the team together and work through the remaining sections of this guide which use the questions based on the approach outlined in the Quick Guide's section 'The Model for Improvement'.

What are we trying to achieve?

In order to agree your aim you need to understand the current state. Find out your current rate of SSIs. This helps you to set a realistic timeframe for your goal. It is important to note that in the case of SSIs you are unlikely to see a significant fall in the rate within 1 year – this is a long term strategy. You still need to set your aim and monitor your progress towards it but your initial focus should be increasing compliance with the four components listed above. An example of an aim statement could be:

We will reduce perioperative harm by 30% within 18 months. This will be achieved through implementation of the Patient Safety First intervention which focuses on the reduction of SSIs and improving teamwork and communication.

Measuring improvement

Measurement is the only way to know whether a change represents an improvement.

Create the operational definition of your aim

It is critical that teams determine some set of criteria by which they will define an SSI. For the purposes of this Campaign, the Centers of Disease Control and Prevention (CDC) definition will be used:

'A surgical wound infection can be defined as the presence of pus and at least one of the following signs of symptoms: pain, localised swelling, redness or heat'.

With this established, all stakeholders will share a common understanding of what exactly qualifies as an SSI and what does not. Likewise, the team should determine its own exclusion criteria.

Decide what measures will inform you of your progress and how you are going to collect them

In terms of defining and measuring 'perioperative harm', this should be done through a review of reported incidents and the appropriate triggers on the UK Global Trigger Tool (originally developed by the Institute for Healthcare Improvement). All organisations participating in the Patient Safety First campaign will be undertaking random case note review using the Global Trigger Tool and reporting data on number of harm events monthly.

The relevant measure that requires reporting to Patient Safety First via the on line extranet site is:

Measure	How to calculate	Guidance
SSI rate 30 days post operation	<ul style="list-style-type: none"> • Determine the numerator: the number of patients in the sample who developed an infection within 30 days of the operation • Determine the denominator: the total number of patients reviewed • Calculate the rate of SSI by dividing the numerator by the denominator and multiplying the result by 100 	<ul style="list-style-type: none"> • YES/NO outcome – Did the patient develop an SSI? Only count each patient once regardless whether they developed more than one SSI • Report data monthly • Provide numerators and denominators when entering the data • The annotation section should be used to reflect any interventions that were made to reduce the SSI rate.

Further data collection guidance

In reality it can be difficult to assess SSI rate 30 days post operation depending on the system a hospital has in place to gain this information, if any. If so, a focus on the reliable implementation of the related process measures will assist in maintaining momentum. Examples of how some Trusts are tackling this are listed below:

- Calderdale and Huddersfield NHS Trust conduct telephone follow up calls of a random sample of 20 'clean' surgical patients per month to discuss post operative recovery (see **Appendix 1**)
- North Wales record all positive swabs received within 30 days of surgery. Whilst not an ideal process it enables the trust to utilise existing systems within secondary care and mitigates the potential to subjective judgement
- Wales, as part of the 1000 Lives Campaign, are using the data already collected as part of the national surveillance for primary joint, arthroplasty and Cesarean sections
- The Health Protection Agency requires mandatory surveillance of primary hip and knee replacements via the Surgical Site Infection Surveillance Service (SSISS). This service, as well as supporting the mandatory surveillance of SSI in orthopaedics, also provides voluntary surveillance in other categories of surgical procedures. Trusts already inputting to this service should consider how they can improve their monitoring within wider specialities. See link for more information http://www.hpa.org.uk/webw/HPAweb&HPAwebStandard/HPAweb_C/1195733793259?p=1191942150648

Whilst the following sections outline the individual process measures to be reported for each component it is strongly recommended that you also take a 'bundle' approach to the actions relating to SSI; that is, tracking your compliance with all elements.

Measure	How to calculate	Guidance
Percentage compliance with the SSI 'bundle'	<ul style="list-style-type: none"> • Determine the numerator: the number of surgical patients in the sample receiving all 4 components of the SSI 'bundle' • Determine the denominator: the total number of patients reviewed • Calculate the percent compliance by dividing the numerator by the denominator and multiplying the result by 100 	<ul style="list-style-type: none"> • In order to do this simply it is necessary to have easy access to documented evidence for all components • Decide locally where to collect data e.g. form completed by post op care staff as each patient discharged or retrospectively from surgical ward • Remember this is a YES/NO outcome – only patients receiving all 4 components are recorded as compliant. Remember to give credit where there is a clinical reason for exclusion providing it has been documented • Collect data weekly. Aggregate your 4 scores to get a monthly compliance rate.

An example of the *Saving Lives* audit tool, used for measuring compliance with care bundles can be found in **Appendix 2**.

Where teams have used a sampling approach some use spot checks three times per week, whereas others have chosen a weekly audit at designated times. Regardless of the method, be sure to maintain the standard over time for accurate results.

Post updates to results regularly and prominently

Enthusiasm for the project will wane over time if clinical staff perceive that the leadership's enthusiasm has diminished. It is essential to regularly update all involved staff in the work on the monthly change in rates and levels of compliance. Not only will this show dedication to the project but when the momentum becomes apparent, clinical staff will be aware of the progress. However, in the case of SSI, staff should be prepared for the fact that it will be some considerable time before they see an obvious improvement for this measure. If staff are not aware of this they may feel their efforts are fruitless.

Comparing rates between hospitals

The practice of comparing rates of disease entities or patterns of therapy across institutions is commonly known as ‘benchmarking.’ Benchmarking, while often utilised to track performance, may not be a valid method to compare performance between facilities because of differences in patient population, resource availability, or severity of illness.

Fortunately, none of the work required to improve any of the components of this intervention requires a comparison of rates between hospitals. As long as you establish methods in your organisation to determine the patterns and methods of your regular data collection, your results will be consistent over time with respect to your own performance and your own improvement, which is the primary interest.

Any benchmarking should be based on improvement, rather than comparing rates. If you learn of a hospital that has significantly improved, based on data and using the same measure over time, then learn from their work! Even if they are using a different definition from your hospital or treat some different populations, there will still be value in finding out what practices and changes they used to achieve their results.

What changes can we make that will result in an improvement?

Making this initiative fit into the patterns and habits at your institution is essential. Teams will be most effective if they engage doctors, nurses, operating department practitioners etc to work with them to develop key aspects of the implementation. Where possible, try to fit new actions alongside ones that are already established. This increases the likelihood that they will be remembered and therefore carried out – hence the inclusion of some elements into routine paperwork at some hospitals.

Discourage the tendency to select and try out items that seem easy at the expense of more difficult components also included in the intervention

There are many factors that contribute to perioperative harm and improving the care associated with each component of this intervention aggregates to a larger improvement overall. Only implementing one or two components reduces the overall impact of the intervention and it will be much more difficult to observe related changes in your outcome measure.

The changes you can make for this intervention fall into the categories described earlier; actions to reduce SSIs and improving teamwork and communication. These areas are discussed separately in the following sections. Each component of these areas has again been addressed using the Model for Improvement to account for the fact that they all need to be monitored individually.

Part A: Actions to Reduce Surgical Site Infections (SSIs)

This part of the intervention has four key components:

1. Appropriate use of prophylactic antibiotics
2. Maintenance of normothermia
3. Maintenance of glycaemic control for known diabetic patients
4. Use of recommended hair removal methods

1. Appropriate use of prophylactic antibiotics

What are we trying to achieve?

Find out if you already have a protocol in place. If you do, perform an audit to find out your current level of compliance. An example of an aim statement could be:

Within 1 year 80% of clinically appropriate surgical patients will receive on time appropriate antibiotics. We will increase this to more than 90% within 2 years.

How will we know a change has been an improvement?

Create your operational definition

In the example above this means establishing the criteria for 'appropriate surgical patients', 'on time' and 'appropriate antibiotics':

- **On time** - Patients should receive antibiotics within 60 minutes before surgical incision. Due to the longer infusion time required for vancomycin, it is acceptable to start this antibiotic (e.g., when indicated because of beta-lactam allergy or high prevalence of MRSA) within 2 hours prior to incision
- Prophylactic antibiotics should be discontinued within 24 hours of surgery.

Decide what measures will inform you of your progress and how you are going to collect them

Measure	How to calculate	Guidance
Percentage of patients receiving on time antibiotics	<ul style="list-style-type: none"> • Determine the numerator: the number of eligible patients in the sample receiving on time antibiotics • Determine the denominator: the total number of patients reviewed • Calculate the percent by dividing the numerator by the denominator and multiplying the result by 100 	<ul style="list-style-type: none"> • Use a pilot population of adult, elective surgical patients and track 100% • Remember this is a YES/NO outcome – only patients receiving the antibiotics within the 60 mins prior to surgical incision are ticked as compliant. Give credit where a reason for exclusion is documented • Report data monthly – Report the 4 figures for the month as an aggregated numerator and denominator each month.
Percentage of prophylactic antibiotics discontinued on time	<ul style="list-style-type: none"> • Determine the numerator: the number of patients in the sample whose prophylactic antibiotics were discontinued on time • Determine the denominator: the total number of patients reviewed • Calculate the percent by dividing the numerator by the denominator and multiplying the result by 100 	<ul style="list-style-type: none"> • Use a pilot population of adult, elective surgical patients and track 100% • Remember this is a YES/NO outcome – only patients whose prophylactic antibiotics were discontinued within 24 hours of end of surgery are ticked as compliant • Exclude patients whose antibiotics are purposely continued as part of their treatment and this is documented • Report data monthly – Report the 4 figures for the month as an aggregated numerator and denominator each month.

What changes can we make that will result in an improvement?

- Involve your pharmacists and infection control team. They can help you with a variety of actions such as helping develop criteria for appropriate prophylactic antibiotics, patient inclusion/exclusion criteria and developing prompt methods if these are not administered or discontinued
- The use of pre-printed or computerised standing orders specifying antibiotic agent, timing, dose, and discontinuation
- Changing operating room drug stocks to include only standard doses and standard drugs, reflecting national guidelines
- Using visible reminders/checklists/stickers
- Verifying antibiotic administration time during intra-operative 'time-out'* so action can be taken if not administered.

** See later section relating to the implementation of the surgical checklist.*

2. Maintenance of normothermia

What are we trying to achieve?

Find out if you already have a protocol for perioperative warming in place. If you do, perform an audit to find out your current level of compliance. An example of an aim statement could be:

Within 1 year 95% of all surgical patients will be maintaining a body temperature within normal range during surgery and in the post operative phase.

How will we know a change has been an improvement?

Create your operational definition

In the example above this means establishing the definition of 'normal range' and 'post operative phase':

- Normal range = temperature of 36.5 – 37.5°C
- Exclusion criteria: Patients for whom hypothermia is deliberately sought for therapeutic reasons (e.g. hypothermic total circulatory arrest for cardiac surgery)
- Some hospitals only undertake warming of patients for particular procedures e.g. colorectal, open abdominal or longer procedures. Our recommendation is that this component should be aimed at all surgical patients unless they are in your locally determined exclusion criteria.

Decide what measures will inform you of your progress and how you are going to collect them

Measure	How to calculate	Guidance
Percentage of patients whose first temperature in post op care unit was >36°C	<ul style="list-style-type: none"> • Determine the numerator: the number of eligible patients in the sample whose first temperature in post op care unit was >36°C • Determine the denominator: the total number of patients reviewed • Calculate the percentage by dividing the numerator by the denominator and multiplying the result by 100 	<ul style="list-style-type: none"> • Use a pilot population of adult, elective surgical patients and track 100% • Use anaesthetic chart or post op unit chart as the primary data source • This is a YES/NO outcome. Only eligible patients with a temperature >36°C on arrival in post op care unit are recorded as compliant

What changes can we make that will result in an improvement?

- Monitor the temperature of all patients routinely: in the hour before surgery, before induction, every 30 minutes during surgery, on arrival in the recovery room and every 15 minutes during the recovery period. Attention should be paid to the differentiation between core temperature obtained via the rectal or nasopharyngeal route and that recorded peripherally via tympanic recording
- Pre-operative, intra operative and post operative interventions of forced warm air fluid warming should be initiated in response to the patient's recorded core temperature
- Assess patients for their potential to develop inadvertent hypothermia during surgery. Include identification of patients undergoing surgery anticipated to last >30 minutes, providing them with forced warm air intra operatively. If this is not a practical intervention e.g. exposed surface area too extensive to allow forced warm air, then electric blankets underneath the patient will help maintain core temperature
- Ensuring that where patients are pre-operatively assessed as having a core temperature of less than 36°C that their anaesthesia and surgery is delayed, until the patient has been warmed using forced warm air. Active warming should continue throughout the duration of surgery
- Ensuring that intravenous fluids (500 ml or more) and blood products are warmed to 37°C using an appropriate fluid warming device
- Warm patients arriving in recovery with a temperature of less than 36°C using forced warm air.

The full NICE guidance *The management of inadvertent perioperative hypothermia in adults* April 2008 is available at <http://guidance.nice.org.uk/CG65/Guidance/pdf/English>

3. Maintenance of normal serum glucose level for known diabetic patients

What are we trying to achieve?

Find out if you already have a protocol for known diabetics undergoing surgery in place. If you do, perform an audit to find out your current level of compliance. An example of an aim statement could be:

Within 1 year 95% of all surgical patients will be maintaining a serum glucose level within normal range on the day of surgery.

How will we know a change has been an improvement?

Create your operational definition

In the example above this means establishing the definition of 'normal range'.

- Controlled serum glucose = 5.0 – 10.0 mmol/l

Decide what measures will inform you of your progress and how you are going to collect them

Measure	How to calculate	Guidance
The percentage of known diabetic elective surgical patients with controlled serum glucose (5.0-10.0 mmol/l) on the day of surgery	<ul style="list-style-type: none"> • Determine the numerator: the number of patients in the sample with controlled serum glucose on the day of surgery • Determine the denominator: the total number of patients reviewed • Calculate the percentage by dividing the numerator by the denominator and multiplying the result by 100 	<ul style="list-style-type: none"> • Use a pilot population of adult, elective, known diabetic surgical patients and track 100% • This is a YES/NO outcome. Only eligible patients with controlled serum glucose on the day of surgery are recorded as compliant.

What changes can we make that will result in an improvement?

- Regularly check perioperative blood glucose levels on all diabetic patients to identify hyperglycaemia and hypoglycaemia
- Eliminate the use of sliding insulin dosage scales; if a sliding scale is used, standardise it through the use of a protocol and pre-printed order form or computer order, that clearly designates the specific increments of insulin coverage

- Standardise to single concentration of IV infusion insulin
- Assign responsibility and accountability for blood glucose monitoring and control.

4. Use of recommended hair removal methods

What are we trying to achieve?

Find out if you already have a protocol for appropriate hair removal in place. If you do, perform an audit to find out your current level of compliance.

An example of an aim statement could be:

Within 1 year 95% of all elective surgical inpatients will be having hair removal for surgical procedures performed using the recommended method.

How will we know a change has been an improvement?

Create your operational definition

In the example above this means establishing the definition of a ‘recommended method’:

- The recommended method for this intervention is that only electric shavers/clippers will be used to remove hair around the incision site.

Decide what measures will inform you of your progress and how you are going to collect them

Measure	How to calculate	Guidance
Percentage of patients with hair removal by the recommended method	<ul style="list-style-type: none"> • Determine the numerator: the number patients in the sample with hair removal by recommended method • Determine the denominator: the total number of patients reviewed • Calculate the percentage by dividing the numerator by the denominator and multiplying the result by 100 	<ul style="list-style-type: none"> • Use a pilot population of adult, elective, surgical inpatients and track 100% • This is a YES/NO outcome. Only eligible patients with hair removed using the correct method are recorded as compliant.

What changes can we make that will result in an improvement?

- Ensuring adequate supply of electric clippers and that staff are trained in their proper use
- Using reminders (signs, posters)
- Educating patients not to self-shave pre-operatively
- Removing all razors from the entire hospital (except for men who wish to shave their faces)
- Working with the purchasing department so that razors are supplied only to appropriate areas.

Part B: Actions to Improve Teamwork and Communication

This section outlines a five step process for improving the way theatre teams communicate with each other and behave as a team.

- **Step 1:** Pre list briefing
- **Step 2:** Sign In
- **Step 3:** Time Out
- **Step 4:** Sign Out
- **Step 5:** Post list debriefing

Step 1: Pre list briefing

Many hospitals successfully use team briefings at the start of shifts in a variety of areas including wards and Intensive Care Units to help identify specific risks and safety issues in advance.

Allocating five minutes before the start of the operating list enables team members to have an opportunity to discuss the requirements of the list and any anticipated safety concerns. For example, patient allergies, anticipated surgical complications, list order changes, patients with similar names etc. Organisations are reporting that briefings assist greatly in accommodating team introductions and advance preparation of equipment and patient care. Where departments have introduced briefings, the requirement of the checklist to ensure team introductions for every patient on the list has become a redundant step unless there is a change in the team.

Briefings should be short and focussed on the information necessary to ensure all team members are aware of the safety issues pertinent to each patient and the smooth running of the list. Some hospitals that have implemented briefings use them to cover some of the information currently in the Time Out section of the Surgical Safety Checklist which means it does not need to be covered again during that step. In addition, the improvement in communication prior to the start of the list has been shown to actually reduce overall list time. One orthopaedic surgeon has found that now his team have become more efficient in communicating in this way, they can now perform one more hip replacement on each of his lists.

Many theatre teams have concerns that implementing pre list briefings will delay the start of lists when they are already under pressure to start on time. One hospital has overcome this issue by listing “Mr Team Briefing” as the first patient on the list so they can then demonstrate that the start of the briefing is when the list officially begins. Theatre departments should determine locally whether they will send for the first patient on the

list before or after the briefing has been carried out and may be dependent on issues such as the speed of their portering service at the time of day the briefing would take place. In hospitals or theatres where the surgeon regularly changes during the course of a list (such as emergency theatres) a quick briefing should take place before that surgeon's case(s).

Where departments wish to track use of briefings, this can be done using the same process as discussed later for auditing the use of the Surgical Safety Checklist. If relying on self reporting from theatre teams for this data, departments should still audit a sample of lists on a regular basis to ensure briefings are being carried out in the way they would like i.e. with all members of the surgical team present.

Steps 2,3 and 4: Sign In, Time Out and Sign Out (the WHO Surgical Safety Checklist)

A copy of the checklist can be found in **Appendix 3**. A print quality version of this checklist and an implementation manual can be downloaded from www.who.int/patientsafety/safesurgery/ss_checklist/en/.

A Starter Kit has also been developed by WHO to assist pilot sites in implementing the checklist. This can be found at www.patientsafetyfirst.nhs.uk.

The WHO Surgical Safety Checklist, which can be adapted to accommodate additional local requirements, brings together existing best practices relating to safety checks in theatres. A version adapted for use in England and Wales by the National Patient Safety Agency (NPSA) was issued as an Alert to the NHS in January 2009 (**Appendix 4**). Where organisations can demonstrate they have implemented the WHO Checklist this will supersede the NPSA Correct Site Surgery Alert of 2005.

There are a variety of film clips covering use of the checklist including those made by WHO and Great Ormond Street Hospital as well as its appearance on the television programme 'ER'. All are available at www.youtube.com by typing 'WHO checklist' in the search field. A film made by St Mary's Hospital and other useful resources can be found at <http://www.patientsafetyfirst.nhs.uk/Content.aspx?path=/interventions/Perioperativecare/>.

What are we trying to achieve?

An example of an aim statement could be:

We will experience no 'never events' and theatre staff will report an X improvement in safety culture within the operating room by February 2010.*

*The numerical goal for the improvement in safety culture will be dependent on the culture tool selected by the organisation.

How will we know a change has been an improvement?

Create your operational definition

In the example above this means establishing your local definition of a positive safety culture and adopting the NPSA’s definition of a ‘never event’. For more information on never events see <http://www.npsa.nhs.uk/corporate/news/never-events/>.

The checklist is a tool designed to improve communication and teamwork in the operating room. Therefore, whilst compliance may be measured by sourcing evidence that the checklist was used, organisations will need to assure themselves that all team members are present and contribute to essential communications at each step.

Decide what measures will inform you of your progress and how you are going to collect them

There is one measure that requires reporting to Patient Safety First via the on line extranet site. This information will also be used to inform the progress of the WHO *2nd Global Challenge: Safe Surgery Saves Lives*.

Measure	How to calculate	Guidance
The percentage of lists using WHO Surgical Safety Checklist	<ul style="list-style-type: none"> • Determine the numerator: the total number of lists in the month on which the checklist was used • Determine the denominator: the total number of lists in the sample during the month • Calculate the percentage by dividing the numerator by the denominator and multiplying the result by 100 	<ul style="list-style-type: none"> • Sampling is appropriate for this measure • This is a YES/NO outcome. Only lists where the checklist was used for all patients are recorded as compliant.

You can check compliance with list Briefings/Debriefings using the same method.

This measure is useful for seeing the overall Trust progress in implementing the checklist but may show progress to be slow. You may find it useful and easier to also audit a sample of 10 individual cases more frequently to get a sense of how well the checklist is being implemented in specific areas such as those still testing and adapting the checklist, or those to where checklist usage has recently been spread.

In addition to this, Trusts may wish to measure the impact of using the checklist by monitoring the incidence of surgical never events and improvements in teamworking and communication in the operating room.

Measure	How to calculate	Guidance
Days between surgical never events	<ul style="list-style-type: none"> Count days between surgical never events 	<ul style="list-style-type: none"> A surgical never event is considered to have occurred in any circumstance of retained swab, needle or instrument or a case of wrong site/wrong operation Use incident reports to track occurrence of never events The number of cases can be identified from local means of activity reporting.

Measuring ‘days between’ is easy to calculate and can create a powerful message for theatre staff as they see the length of time since a never event took place in their department increasing. ‘Cases between’ may be technically a more meaningful measure for some (such as patients or surgeons) as from this it can be calculated how likely it is that a surgical patient will experience a never event and accounts for hospitals of differing sizes/levels of theatre activity. It is however slightly more difficult to measure as it requires the retrieval of data on case volumes from the software system in use. Managers may wish to create a custom measure for ‘cases between’ and collect both measures, using the information from each for the appropriate target audience.

With regard to monitoring improvement in safety culture, organisations are encouraged to use a teamwork/culture survey. A custom measure can be created on the extranet depending on the method or tool chosen. For more information and tools to measure teamworking culture see <http://www.npsa.nhs.uk/nrls/improvingpatientsafety/humanfactors/teamworking/>.

In an attempt to quantify the benefits of improved communication some theatre teams have maintained ‘glitch lists’; lists to qualify the range of errors, miscommunications and detail of all adverse events avoided as a result of using the checklist. The aim would be to observe a gradual decrease in your glitch count as you address the root causes of commonly occurring glitches. It only takes one big glitch to be avoided to create a local champion for what you are trying to achieve. An example of a glitch count tool can be found in the community area of Patient Safety First’s website <http://www.patientsafetyfirst.nhs.uk/Community/UserFiles/Default.aspx> (All users, Periop, PowerPoint presentations).

At North Cumbria Hospital they have implemented a method of checking how staff are feeling on a daily basis by using coloured counters. At the end of every list staff rate how the list went by posting a coloured counter in a jar. More information on this method of checking teamwork and culture can be found in the same section of the website.

What changes can we make that will result in an improvement?

The checklist was designed for international use, and adapting the WHO checklist therefore to complement local context/nature of surgery will significantly assist implementation, spread, sustainability and long term compliance. It is advised that the core content is retained but local testing may highlight speciality requirements that need to be added. Small tests of change will enable organisations to assess how the checklist can be incorporated within existing documentation to avoid duplication.

Methods of implementation

There is a risk that teams can become fixated on the 'physical' checklist as an end in itself versus focussing on the aim, particularly as there is no explicit requirement to use a paper based system. Small tests of change will highlight what will work locally and enable teams to develop ways of working that satisfy the elements of the checklist and lead to improved teamwork and communication.

Learning from early implementer sites has highlighted different tools as well as methods of recording the checklist usage:

- Whiteboards in theatre
- Hanging a clipboard from an IV stand that accompanies the patient from the anaesthetic room into theatre
- Laminated checklists to act as a prompt
- Incorporating the checklist into care pathway documentation
- Inputting the checklist into IT systems such as Galaxy
- Recording that the checklist was completed by adding stickers to patient notes
- Adding a column to the Theatre Register for the surgeon to sign showing the checklist was used for the patient.

Planning versus doing

You do not need a committee to drive implementation of the checklist. Leadership and a co-ordinated approach is important; but time and energy should be focussed on running small tests of change to refine the checklist for local use, rather than lengthy attempts to achieve department wide consensus .

A plan to spread and roll out the checklist is advisable to ensure co-ordination and also momentum is maintained in the testing phase. However organisations should resist forging ahead with roll out until use of the checklist is reliably achieved in the test area i.e. minimum 95% compliance.

Using the PDSA cycle

- Identify one consultant who is happy to test using the checklist
- Identify one patient on one list with whom you will test out using the checklist

- Use all 3 parts of the checklist during that case – Sign In, Time Out, Sign Out
- If wishing to incorporate Briefings and Debriefings, these should be tested in the same way
- At an appropriate point in the day, encourage the team involved to discuss how ‘user friendly’ each part of the checklist was
- Discuss the following: the content of each section – is there anything the team would like to see added or re-ordered to the briefing? How long did it take? Did it pick up any ‘glitches’? How could the team make the form or process better next time?
- Make refinements based on the discussion. Do not waste energy in formally producing new forms in the early stages of testing; you can arrange for production at a later stage. Continue with small tests, by making manual changes for example handwriting in an additional check or simply cutting and pasting a paper copy to move the order of checks. A brief PowerPoint presentation showing the testing stages of such an approach taken by Luton & Dunstable Hospital NHS Foundation Trust can be found in the community area of Patient Safety First’s website <http://www.patientsafetyfirst.nhs.uk/Community/UserFiles/Default.aspx> (All users, Periop, PowerPoint presentations)
- Continue with further cycles of testing making refinements as you go until you generate a checklist that works for you
- Now test with another consultant and another team. It may help if the second team are supported by someone from the first testing team.

Cycles of testing should accommodate a number of specialities to enable a single checklist to be developed for the organisation. Where particular specialities require numerous additional checks over and above the core content, these can be accommodated by a supplementary list.

While it is important to gain the support of an enthusiastic consultant to get started and to encourage clinical engagement, the checklist is not necessarily a consultant led process. All members of the team should become comfortable in leading the checklist if it is to improve teamworking and empower team members to challenge should the need arise.

Case Study: Leeds Teaching Hospitals NHS Trust

The Trust had been using the National Patient Safety Agency's four-point checklist since it was introduced in 2005. However, important lessons were learnt from an incident that revealed more checks were needed. Jan Rayner, Senior Operating Department Practitioner at the Trust explains, "A patient was brought into the pre-operating room and started to receive an anaesthetic without having signed the consent form. It may not sound dangerous but it showed that a patient could be operated on without routine checks being done. We knew we needed a better system of ensuring safety in surgery."

The new 'Surgical Communication Checklist' hinges around a ten to fifteen minute pre-op team briefing at the start of the day. This is a time when the team introduce each other, and interestingly, some of the surgeons have only got to know the names of some of the theatre staff since this briefing was introduced.

Also during the briefing each operation is analysed in advance, with contributions from different team members. "The surgeon will highlight extra risk, the anaesthetist tells us about patients with medical problems or a potential difficulty with intubation and there is time for the rest of the team to discuss problems and prepare essential equipment," says Jan.

Immediately before each operation, there's an extra check for good measure. "Until we've had this final check, the surgeon insists that the blade doesn't go onto the scalpel." A final team debriefing at the end of the day provides an opportunity to discuss the session, evaluate the team's practice and consider possible improvements to safety and productivity.

According to Jan, the contrast between surgical lists with and without these changes could not be more obvious: "Surgical firms that have signed up to the changes recommended are less rushed, better prepared and simply more professional."

For the full case study visit the perioperative intervention section at www.patientsafetyfirst.nhs.uk.

Implementing the Surgical Safety Checklist and Team Briefings will undoubtedly encounter some difficulties and resistance but these can be countered. Learning from early implementers can help you overcome this.

“We are creatures of habit. Once it is established practice, we will look back in amazement that we didn’t always do it.”

Mr James Clarke, Medical Director Elective Orthopaedic Centre (Southwest London)

Step 5: Post list debriefing

These add value by providing the team with the opportunity to evaluate the list, to learn from issues that arose and to remedy problems such as equipment failure. They also provide an opportunity to discuss how all parts of the five step process are working in that theatre and ways to refine them to make their implementation easier for staff and more reliably performed.

Many theatres have found it difficult to ensure debriefings take place after a list as it is a busy time for all members of the team. Some theatres have found it possible to carry out the debriefing during wound closure and have improved usage of them as a result.

As discussed earlier with pre list briefings, their usage can be audited to ensure they are being carried out reliably and with the right people involved.

Common questions and concerns

The table to follow seeks to address some of the questions and concerns that may be encountered while implementing the checklist and briefings/debriefings.

Issue/Concern	Response
Teams may not see why they need another checklist when they already use one	Local testing will mitigate the risk of duplication and ensure that the checklist complements local practice
Teams think it will slow down the list	<i>“The time invested in conducting briefings and using the checklist is more than compensated by the overall efficiency achieved for the operating list. Working this way I have increased my list from four to five joints.”</i> Mark Emerton, Consultant Orthopaedic Surgeon, Leeds Teaching Hospitals NHS Foundation Trust


<p>I have never had a problem before</p>	<p>‘The tyranny of small numbers’ means that some colleagues may not have experienced a serious adverse event incident or catastrophic error. Risk departments can provide local and regional data to highlight the scale of surgical harm. It should be noted that this will still under-represent the incidence of near misses that are so rarely reported.</p> <p><i>“It’s not enough to say ‘because we have never done something in the past and in most cases it all seemed to go okay, we do not need to do it in the future.’”</i></p> <p>Mr James Clarke, Medical Direct Elective Orthopaedic Centre (South West London)</p>
<p>It may become another mechanised checking process</p>	<p>The risk of this is high, and can only be mitigated where all team members enter into the spirit of what is intended and commit to being present for each step of the checklist as appropriate, and where team members actively contribute to the sharing of information. This will only happen if each member of the team fully understands what the checklist is trying to achieve</p>
<p>The hierarchical nature in some theatre teams means that one senior colleague can derail the effort</p>	<p>Remember the tips for running PDSA cycles: <i>‘Go where the will is’</i>. Over time you will build a body of experience and an army of enthusiasts that will mean that spread will develop its own momentum</p>

“It’s important to emphasise that the aim is to get teams to talk. The exact content, timing and delivery can be decided at a local level.”

Mr Krishna Moorthy, Consultant Surgeon (Upper GI), Imperial College Healthcare

Appendix 1

Surgical Site Infection tracking: example telephone checklist

Calderdale and Huddersfield 
NHS Foundation Trust

SURGICAL SITE SURVEILLANCE

Introduction to include - We hope that you have had no problems with the healing of your wound and to ensure we are providing the best care possible would appreciate it if could spare a few minutes to answer the following questions ;

Patients Name:

Operation: **Operation date:**

Do you think you have developed a wound infection since you have been discharged from hospital?

(Please tick one box only) Yes No

IF NO: Please thank patient and return form.

IF YES: Please ask the following questions:

	Yes	No	If yes, date first noticed
• Clean fluid leaking from your wound	Yes <input type="checkbox"/>	No <input type="checkbox"/>	___/___/___
• Pus, cloudy yellow fluid leaking from wound	Yes <input type="checkbox"/>	No <input type="checkbox"/>	___/___/___
• Pink/red fluid or blood seeping from wound	Yes <input type="checkbox"/>	No <input type="checkbox"/>	___/___/___
• Wound very swollen	Yes <input type="checkbox"/>	No <input type="checkbox"/>	___/___/___
• Red or inflamed skin around the wound	Yes <input type="checkbox"/>	No <input type="checkbox"/>	___/___/___
• Have you seen a healthcare professional (doctor, midwife, nurse) regarding your concern about your wound	Yes <input type="checkbox"/>	No <input type="checkbox"/>	___/___/___
• Wound gaping open	Yes <input type="checkbox"/>	No <input type="checkbox"/>	___/___/___
• Are you taking antibiotics for a wound infection	Yes <input type="checkbox"/>	No <input type="checkbox"/>	___/___/___

If yes, name of antibiotic: _____

Please state:
‘If you are concerned with your wound please contact your GP as this information will not be reviewed by a doctor or nurse and is to be used for audit purposes only.’

Please ask if there are any other comments the participant wishes to make.

Please thank the participant for their co-operation and return form to Infection Control Team HRI

Appendix 2

Example of care bundle audit tool

Saving Lives: delivering clean and safe care. Department of Health.

Available at www.clean-safe-care.nhs.uk.

Care elements	Care element 1	Care element 2	Care element 3	Care element 4	All elements performed
Observation					
1	✓		✓	✓	
2	✓	✓		✓	
3	✓	✓	✓	✓	✓
4	✓	✓	✓		
5	✓	✓	✓	✓	✓
Total number of times an individual element was performed	5	4	4	4	2
% when element of care was given	100%	80%	80%	80%	40%

This example shows that while most care elements were performed, on only two occasions were ALL elements performed correctly. Overall compliance with all elements was only 40% and as a result the risk of infection was significantly increased.

Appendix 3

WHO Surgical Safety Checklist (First Edition)

World Health Organization		SURGICAL SAFETY CHECKLIST (FIRST EDITION)	
Before induction of anaesthesia		Before skin incision	
Before patient leaves operating room			
SIGN IN		SIGN OUT	
<input type="checkbox"/>	PATIENT HAS CONFIRMED • IDENTITY • SITE • PROCEDURE • CONSENT	<input type="checkbox"/>	NURSE VERBALLY CONFIRMS WITH THE TEAM:
<input type="checkbox"/>	SITE MARKED/NOT APPLICABLE	<input type="checkbox"/>	THE NAME OF THE PROCEDURE RECORDED
<input type="checkbox"/>	ANAESTHESIA SAFETY CHECK COMPLETED	<input type="checkbox"/>	THAT INSTRUMENT, SPONGE AND NEEDLE COUNTS ARE CORRECT (OR NOT APPLICABLE)
<input type="checkbox"/>	PULSE OXIMETER ON PATIENT AND FUNCTIONING	<input type="checkbox"/>	HOW THE SPECIMEN IS LABELLED (INCLUDING PATIENT NAME)
	DOES PATIENT HAVE A:	<input type="checkbox"/>	WHETHER THERE ARE ANY EQUIPMENT PROBLEMS TO BE ADDRESSED
	KNOWN ALLERGY?	<input type="checkbox"/>	SURGEON, ANAESTHESIA PROFESSIONAL AND NURSE REVIEW THE KEY CONCERNS FOR RECOVERY AND MANAGEMENT OF THIS PATIENT
	NO		
	YES		
	DIFFICULT AIRWAY/ASPIRATION RISK?		
	NO		
	YES, AND EQUIPMENT/ASSISTANCE AVAILABLE		
	RISK OF >500ML BLOOD LOSS (7ML/KG IN CHILDREN)?		
	NO		
	YES, AND ADEQUATE INTRAVENOUS ACCESS AND FLUIDS PLANNED		
TIME OUT		ANTICIPATED CRITICAL EVENTS	
<input type="checkbox"/>	CONFIRM ALL TEAM MEMBERS HAVE INTRODUCED THEMSELVES BY NAME AND ROLE	<input type="checkbox"/>	SURGEON REVIEWS: WHAT ARE THE CRITICAL OR UNEXPECTED STEPS, OPERATIVE DURATION, ANTICIPATED BLOOD LOSS?
<input type="checkbox"/>	SURGEON, ANAESTHESIA PROFESSIONAL AND NURSE VERBALLY CONFIRM • PATIENT • SITE • PROCEDURE	<input type="checkbox"/>	ANAESTHESIA TEAM REVIEWS: ARE THERE ANY PATIENT-SPECIFIC CONCERNS?
		<input type="checkbox"/>	NURSING TEAM REVIEWS: HAS STERILITY (INCLUDING INDICATOR RESULTS) BEEN CONFIRMED? ARE THERE EQUIPMENT ISSUES OR ANY CONCERNS?
		<input type="checkbox"/>	HAS ANTIBIOTIC PROPHYLAXIS BEEN GIVEN WITHIN THE LAST 60 MINUTES? YES NOT APPLICABLE
		<input type="checkbox"/>	IS ESSENTIAL IMAGING DISPLAYED? YES NOT APPLICABLE


THIS CHECKLIST IS NOT INTENDED TO BE COMPREHENSIVE. ADDITIONS AND MODIFICATIONS TO FIT LOCAL PRACTICE ARE ENCOURAGED.

Appendix 4

NPSA version of adapted checklist

WHO Surgical Safety Checklist

(adapted for England and Wales)



National Patient Safety Agency
National Reporting and Learning Service

SIGN IN (To be read out loud)
Before induction of anaesthesia

Has the patient confirmed his/her identity, site, procedure and consent?
 Yes
 No

Is the surgical site marked?
 Yes/not applicable
 No

Is the anaesthesia machine and medication check complete?
 Yes
 No

Does the patient have a:
Known allergy?
 No
 Yes

Difficult airway/aspiration risk?
 No
 Yes, and equipment/assistance available

Risk of >500ml blood loss (7ml/kg in children)?
 No
 Yes, and adequate IV access/fluids planned

Name: _____
Signature of Registered Practitioner: _____

TIME OUT (To be read out loud)
Before start of surgical intervention for example, skin incision

Have all team members introduced themselves by name and role?
 Yes
 No

Surgeon, Anaesthetist and Registered Practitioner verbally confirm:
 What is the patient's name?
 What procedure, site and position are planned?

Anticipated critical events
Surgeon:
 How much blood loss is anticipated?
 Are there any specific equipment requirements or special investigations?
 Are there any critical or unexpected steps you want the team to know about?

Anaesthetist:
 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?

Nurse/ODP:
 Has the sterility of the instrumentation been confirmed (including indicator results)?
 Are there any equipment issues or concerns?

Has the surgical site infection (SSI) bundle been undertaken?
 Yes/not applicable
 No
• Antibiotic prophylaxis within the last 60 minutes
• Patient warming
• Hair removal
• Glycaemic control

Has VTE prophylaxis been undertaken?
 Yes/not applicable
 No

Is essential imaging displayed?
 Yes/not applicable

Name: _____
Signature of Registered Practitioner: _____

PATIENT DETAILS

Last name: _____

First name: _____

Date of birth: _____

NHS Number:* _____

Procedure: _____

*If the NHS Number is not immediately available, a temporary number should be used until it is.

SIGN OUT (To be read out loud)
Before any member of the team leaves the operating room

Registered Practitioner verbally confirms with the team:
 Has the name of the procedure been recorded?
 Has it been confirmed that instruments, swabs and sharps counts are complete (or not applicable)?
 Have the specimens been labelled (including patient name)?
 Have any equipment problems been identified that need to be addressed?

Surgeon, Anaesthetist and Registered Practitioner:
 What are the key concerns for recovery and management of this patient?

Name: _____
Signature of Registered Practitioner: _____

This checklist contains the core content for England and Wales

www.npsa.nhs.uk/nrls

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