The ‘How to Guide’ for Reducing Surgical Complications

Post operative wound (surgical site) infections - Maintaining perioperative normothermia

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Intranet: http://nww.1000livescampaign.wales.nhs.uk
Website: www.1000livescampaign.wales.nhs.uk
Reducing Surgical Complications

Introduction
Surgery generally is very safe. However, there is the opportunity to improve further the system of care for surgical patients and experts have identified:

a) four ways to reduce the number of infections after surgery,
b) one key way further to improve team work
c) two approaches to prevent cardiovascular events

This sub guide introduces the specific intervention of maintaining perioperative normothermia. The full Surgical Complications ‘How to guide’ is available on http://howis.wales.nhs.uk/sites3/home.cfm?orgid=781. These interventions incorporate parts of the NICE 65 guidance and other bodies’ recommendations e.g. IHI and improvement methodologies. Organisations should consider all the implications of the NICE 65 guidance in their usual way.

For the purposes of the 1000 lives campaign this intervention and measures should be considered for adult patients undergoing elective surgical procedures in the hospital setting. This therefore does not include emergency procedures, outpatient surgical interventions or GP minor surgery. We suggest that the team start very small, perhaps with one patient, one surgeon / anaesthetists or one list, see how that goes and then spread this to other teams and lists. All the time checking how it worked, did it make a difference and was it easy to do.

This guide should be read with other papers provided by the Campaign e.g. Overall measures, improvement methodologies and other content areas.

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Maintenance of Intra Operative Normothermia

Recently released NICE guidance reinforces the evidence that maintaining normothermia for surgical patients is imperative (NICE 2008). It is not unusual for a patient’s core temperature to drop below 36.0°C following induction of general or regional anaesthesia. If the perioperative team do not manage this risk throughout the perioperative patient pathway, as many as 70% of patients undergoing routine surgery may be hypothermic on admission to the recovery room. In Wales this could mean nearly 290,000 patients per year (HSW 2007). The main reasons for hypothermia include the loss, under general or regional anaesthesia, of the behavioural response to cold and the impairment of thermoregulatory heat-preserving mechanisms and anaesthetic-induced peripheral vasodilation (with associated heat loss). Additional factors that increase the risk of hypothermia include the use of un-warmed blood and intravenous or irrigation solutions, and environmental factors such as a lower theatre temperature. It is also sensible to prevent patients getting cold while waiting or being transported for surgery, exposing the body during surgery and, avoiding fluid deprivation before anaesthesia.

If hypothermia does develop then patients can experience increased perioperative blood loss, longer post-anaesthetic recovery, postoperative shivering and thermal discomfort, increased risk of morbid cardiac events including arrhythmia, altered drug metabolism, increased risk of wound infection, reduced patient satisfaction with the surgical experience and a longer stay in hospital.

There are several systematic reviews of the literature concerning the effects and prevention of hypothermia (NICE 2008 and Scott & Buckland 2006). The medical literature indicates specifically that patients undergoing elective hernia repair, varicose vein surgery, or breast surgery and colorectal surgery have a decreased risk of post operative wound (surgical site) infection if they are warmed during the perioperative period (Melling 2001 and Kurz et al 1996). Whilst some experts believe
that initial efforts should be directed at colorectal surgery patients due to their increased risk of post operative (surgical site) infection, until additional clinical studies are performed, there is evidence to show that preventing hypothermia in all patients considered at risk is beneficial in reducing other complications.

*NOTE that this component of care does not pertain to those patients for whom therapeutic hypothermia is being used (e.g., hypothermic cardioplegia).

For the purposes of the 1000 Lives Campaign, the normothermia interventions are these:

1. Patients are risk assessed for the potential to develop inadvertent hypothermia during surgery and their risk of cardiovascular complications (documented).
2. Patients with a core temperature of less than 36.0°C pre operatively do not commence their anaesthesia and surgery until they have been warmed to at least 36.0°C using forced warm air. Active warming should then continue throughout the procedure.
3. All patients at higher risk and / or with surgery anticipated to last or more than 30 minutes, are warmed intra operatively using forced warm air.*
4. All patients routinely have their temperature monitored; 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.
5. Healthcare professionals should ensure that intravenous fluids (500 ml or more) and blood products are warmed to 37°C using an appropriate fluid warming device.
6. Patients who arrive in recovery with a temperature less than 36.0°C should be warmed using forced warm air and transfer to the ward should not be arranged until their temperature is 36.0°C or above.

* If this is not a practical intervention e.g. exposed surface area too extensive to allow forced warm air, then an alternative form of warming needs to be
considered. There is an extensive range of products on the market which could be used for most surgery.

What changes can we make that will result in improvement?
NICE 65 guidance was released in April 2008. The Campaign endorses the actions proposed by NICE. The following is not solely based upon the NICE guidance.

This intervention includes action across the whole surgical pathway (appendix one). In the perioperative period, ideally during the patient’s pre operative assessment appointments, patients who have two or more of the following risks should be identified as being at higher risk of developing hypothermia and its complications perioperatively:

- ASA grade II to V (the higher the grade, the greater the risk)
- Likely to undergo combined general and regional anaesthesia
- undergoing major or intermediate surgery
- at risk of cardiovascular complications.

(NICE 2008)

In order to ensure patients do not lose heat prior to or during the transfer to the theatre department, they should be encouraged to wear their own warm normal clothing, bed clothing, dressing gowns and slippers for as long as possible. Ideally patients should walk to theatre covered with a dressing gown and wearing slippers. Where patients are transferred on trolleys, then they should be covered with one cotton sheet and two blankets, or alternatively a duvet.

In addition to the interventions above, to ensure other environmental factors are not detrimental to the maintenance of normothermia, the theatre temperature should be set at 21°C whilst the patient is exposed, and the patient should be covered for as
long as possible. This temperature setting could be turned down as soon as forced air warming is established. If however the team members are uncomfortably warm then active cooling clothing is available to purchase.

It is also important to ensure that healthcare professionals are trained in the use any temperature recording or warming device. They should also be aware of, and carry out, any adjustments that need to be made in order to obtain an estimate of core temperature from that recorded at the site of measurement and be aware of any such adjustments that are made automatically by the device used.

A phased approach to this issue may be the way teams wish to take this intervention forward. The requirement to have a policy on the prevention of inadvertent hypothermia has been in place for several years (Welsh Risk Management Standards). Trusts may find that undertaking a base line assessment of the incidence of hypothermia in recovery as a starting point, to identify which population of patients they should concentrate on first.
Measure
The team need to identify a sub group of patients which they are going to use as a pilot for this intervention. Using the PDSA cycle the team should use the process measures as a way of identifying as base line measure and improvement measure for this intervention. These measures are for the team to use internally within the organisation to identify improvements; they do not need to be reported either to the organisations board or the extranet. However they will wish to share them with their peers at the development events.

Many teams are already routinely measuring patients’ temperature on arrival into recovery. We recommend collecting baseline information on this measure in order to determine current practice.

Local feedback is important to identify areas of weakness and success. This intervention lends itself to a particular type of measure - “the number of patients between incidents of hypothermia (i.e. patients who arrive at recovery with a temperature less than 36.0°C)”. This can be displayed locally and collated over time to identify an increase in the amount of time lapsed between events.

<table>
<thead>
<tr>
<th>Measure name: % with perioperative normothermia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure type: Process</td>
</tr>
<tr>
<td>Related content area / driver: Prevent Post Operative Wound (Surgical Site) Infections In Elective Surgery</td>
</tr>
<tr>
<td>Description: The percentage of appropriate elective surgical patients with a body temperature of greater than 36.0 degrees Centigrade immediately following surgery.</td>
</tr>
<tr>
<td>Rationale: This measure assesses whether units are complying with agreed guidance. The implication is that high compliance should reduce the risk of developing a Surgical Site Infection</td>
</tr>
<tr>
<td>Numerator: The number of appropriate elective surgical patients with a body temperature of greater than 36.0 degrees Centigrade immediately following surgery.</td>
</tr>
<tr>
<td>Data Source: Local Audit</td>
</tr>
<tr>
<td>Denominator: The total number of surgical patients not excluded from normothermic maintenance in your pilot population.</td>
</tr>
<tr>
<td>Data Source: Local Audit</td>
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</tbody>
</table>

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Method of calculation:
Calculate the actual percent of eligible surgical patients with perioperative normothermia by dividing the numerator by the denominator and then multiplying the resulting proportion by 100.

Collection guidance:
Create a system to track this measure prospectively in 100% of the surgical patients in the pilot population. Temperature readings should be record immediately upon leaving the operating theatre.

Normothermia = temperature of greater than 36.0 degree Centigrade. Exclusion criteria: Patients for whom hypothermia is deliberately sought for therapeutic reasons (e.g. hypothermic total circulatory arrest).

If you start measuring this in a pilot population, you will have to create a new data series in the Extranet every time you add another area to your surgical population.

An issue needed to be considered when collecting this measure is the method used to capture the temperature (e.g. tympanic, oral, auxiliary or rectal etc.). The key point is consistency, as long as the same measure is used over time, then comparisons in data can be made.

Incident reporting should also be used to report any cases of post operative hypothermia. The number of incident reports over time could be used internally as a measure.

Further information on suppliers and ordering details of products from Welsh Health Supplies will be available via the surgical complications content area on the extranet.
### Perioperative hypothermia - the surgical pathway

<table>
<thead>
<tr>
<th>Preoperative Assessment</th>
<th>Documented Risk Assess for hypothermia *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgical Ward</td>
<td>Document temp and keep warm / actively warm if temperature less than 36.0 degree C</td>
</tr>
<tr>
<td></td>
<td>Transfer to theatre suitably dressed</td>
</tr>
<tr>
<td>Anaesthetic room</td>
<td>Document temp</td>
</tr>
<tr>
<td>Theatre</td>
<td>Document temp every 30 mins</td>
</tr>
<tr>
<td></td>
<td>Actively warm if at risk of hypothermia or its complications, or if anaesthesia is expected to last more than 30 minutes.</td>
</tr>
<tr>
<td></td>
<td>Use warm IV / Irrigation fluids and blood</td>
</tr>
<tr>
<td>Recovery</td>
<td>Document temp on arrival*</td>
</tr>
<tr>
<td></td>
<td>Document temp every 15 mins</td>
</tr>
<tr>
<td></td>
<td>Actively warm if hypothermic</td>
</tr>
</tbody>
</table>

* suggested process measurement points.
References

Health Solutions Wales Data Extract (10326) Total number of surgical operations, for Welsh residents 2006. Received 27-02-08


