

Benchmarking inadvertent perioperative hypothermia guidelines with the National Institute For Health And Clinical Excellence

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ABSTRACT

الأهداف: تحسين معايير الجودة والسلامة في الرعاية الطبية وذلك من خلال الاقتداء بالأفضل وإرشادات المعهد الوطني للتميز الصحي والطبي بالملكة المتحدة والمتعلقة بالوقاية من انخفاض درجة حرارة الجسم خلال فترة العملية الجراحية، وعمل مقارنة بين المعايير المطبقة لدينا وتلك المطبقة في المعهد.

الطريقة: أُجريت هذه الدراسة في مستشفى القوات المسلحة، وادي الدواسر، المملكة العربية السعودية، وقد بدأت في نوفمبر 2008م واستمرت لمدة 18 شهراً. لقد قمنا بتحميل الإرشادات التي نشرها المعهد الوطني للتميز الصحي والطبي بالملكة المتحدة في موقعه الإلكتروني عام 2008م. ثم قمنا بمقارنة الإرشادات التي طبقت في المستشفى بتلك التي يعمل بها المعهد وأجرينا التعديل اللازم فيها وأعدنا المقارنة كل ثلاثة أشهر لمدة 18 شهراً من أجل التأكد من حصول التطابق.

النتائج: أثبتت عملية الاقتداء بالأفضل أن أكثر الإرشادات المتبعة في المستشفى للوقاية من انخفاض درجة حرارة الجسم كانت مماثلة للإرشادات الموجودة في المعهد الوطني للتميز الصحي والطبي باستثناء تلك المتعلقة بالفترة التي تسبق العملية الجراحية. وتمت إضافة تلك الإرشادات المتعلقة بهذه الفترة إلى القائمة وتم تطبيقها مباشرة، وأعيد تقييمها كل ثلاثة أشهر لمدة 18 شهراً فأظهرت تحسناً ملموساً حيث قلت حالات حدوث انخفاض درجة حرارة الجسم من 1.5% إلى 0.3%.

خاتمة: تعد عملية الاقتداء بالأفضل والمتبعة في مستشفانا من أفضل طرق التقييم وذلك من أجل تحديد مناطق الضعف وتحسين الرعاية الطبية، ويجب أن تكون عملية الاقتداء بالأفضل جزءاً لا يتجزأ من برامج تحسين الرعاية الطبية. أثبتت هذه الدراسة مدى تحسن الرعاية الطبية والتي أدت إلى تقليل حالات انخفاض درجة حرارة الجسم خلال فترة العملية الجراحية.

Objectives: To improve standards of patients' care and safety, we benchmarked our practice guidelines of prevention of inadvertent perioperative hypothermia with those of the National Institute for Health and Clinical Excellence (NICE) of the United Kingdom.

Methods: The study started in November 2008 and lasted for 18 months and was conducted at the Armed Forces Hospital, Wadi Al-Dawasir, Kingdom of Saudi Arabia. The NICE clinical guidelines (CG65) published in April 2008 were downloaded from its website. Each practiced item in our guidelines was compared with its equivalent of NICE guidelines, absent equivalent NICE guidelines on our list were immediately added and implemented. To ensure compliance, follow-up audits took place every 3 months for an 18-month period.

Results: Benchmarking demonstrated that most steps taken in our hospital match those of NICE guidelines, except for guidelines governing the preoperative phase. This phase was added to our policy and procedures guidelines and immediately implemented. The follow-up audits carried out every 3 months showed that the incidence of hypothermia fell from a previous 1.5 to 0.3%.

Conclusion: Benchmarking is an evaluation of the current position of own practice compared to best practice to identify areas and means of performance improvement. Benchmarking must be part of quality improvement programs in healthcare. In this study, improvement in the service delivered to patients resulted in a drop in the incidence of inadvertent perioperative hypothermia.

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Hypothermia is defined by the National Institute for Health and Clinical Excellence (NICE) of the United Kingdom as a core body temperature of $<36^{\circ}\text{C}$.¹ Surgical patients are at risk of developing inadvertent perioperative hypothermia with possible fatal outcome. Hypothermia is associated with disturbances of coagulation, delayed post-anesthetic recovery due to altered drug metabolism, it raises postoperative oxygen consumption by shivering, increases cardiac morbidity (myocardial ischemia and arrhythmia), leads to a higher incidence of wound infection, and prolongs hospital stay.²⁻⁶ In a previous study conducted at our hospital, the incidence of inadvertent hypothermia was found to be 1.5% in the surgical population.⁷ The NICE has a set of evidence-based clinical guidelines for implementation in a healthcare facility. These guidelines cover a wide range of medical topics and are continuously updated. They are used as trusted sources and act as references when considering local guidelines for a variety of clinical conditions. The present study was conducted as part of our continuous quality improvement program. It aims at improving quality of service delivery, patient care, and patient safety by utilizing a known quality improvement tool, benchmarking,⁸ to mitigate any quality gaps between our practice and NICE guidelines.

Methods. This study was conducted following approval of the hospital Ethics and Research Committee of the Armed Forces Hospital, Wadi Al-Dawasir, Kingdom of Saudi Arabia, the study was started in November 2008 and lasted 18 months. During this period, NICE Clinical Guidelines (CG65): Inadvertent Perioperative Hypothermia; The Management of Inadvertent Perioperative Hypothermia in Adults published in April 2008 were downloaded from its website.¹ Each item in our guidelines was compared with its equivalent in the NICE guidelines with the possibilities that either our performance meets or falls short of NICE guidelines. Corrective action was taken if there was a quality gap between the 2 guidelines or, in case an item in the NICE guideline has no equivalent in our guidelines, it was added immediately to our guidelines. At the end of the initial 2-week study, the amended documents were distributed to all hospital areas involved in the care of the surgical patient in the form of a hospital wide document through the Department of Total Quality Management. This was accompanied by an orientation session of lectures and demonstrations explaining the new guidelines to all clinicians and nurses playing a role in the perioperative care of surgical patients. Follow-up of the improved guidelines took place every 3 months over an 18-month period.

Results. Items in our guidelines were compared with their equivalent of NICE guidelines no. CG65.⁹

Perioperative care. Patients (and their families and carers) should be informed that: staying warm before surgery will lower the risk of postoperative complications; the hospital environment may be colder than their own home; they should bring additional clothing, such as a dressing gown, a vest, warm clothing and slippers, to help them keep comfortably warm; and, they should tell the staff if they feel cold at any time during their hospital stay. The prevailing weather in our area is hot all the year round with the exception of a brief period during the winter when it is cold at night time. Window opening is not routine as this encourages admission of sand particles from frequent storms in the region. Hospital wards are composed of 2-bed rooms fitted individually with thermostatically controlled air-conditioning. The ambient temperature of each room is adjusted to the satisfaction of its occupying patients, and ranges from $21-25^{\circ}\text{C}$. Each bed has a minimum cover of one cotton sheet and a blanket. Additional covers may be provided on request. Patient temperatures are measured routinely, and recorded twice daily, and whenever the situation dictates. When using any device to measure patient temperature, healthcare professionals should: be aware of, and carry out, any adjustments that need to be made to obtain an estimate of core temperature from that recorded at the site of measurement; be aware of any such adjustments that are made automatically by the device used. The main instrument of measuring the temperature in the wards is the ear thermometer (Infrared Tympanic Thermometer, First Temp, Genius, Philadelphia, USA), and is considered to be practical and the most accurate among non-invasive temperature measuring devices.¹⁰⁻¹³ However, to minimize or eliminate measurement errors, we use only one model in the hospital so that all staff are familiar with it, and measurement of temperature is repeated for confirmation if the thermometer registered a body temperature below 36°C .

Preoperative phase. Patients should be assessed for their risk of inadvertent perioperative hypothermia and potential adverse consequences before transfer to the theater suite. Patients should be managed as higher risk if any 2 of the following apply: American Society of Anesthesiologists (ASA) grade II to V (the higher the grade, the greater the risk); preoperative temperature below 36°C (and preoperative warming is not possible because of clinical urgency); undergoing combined general and regional anesthesia; undergoing major or intermediate surgery; at risk of cardiovascular complications. If the patient's temperature is below 36°C : forced air warming should be started preoperatively on the ward, or in the emergency department (unless there

is a need to expedite surgery due to clinical urgency, for example bleeding or critical limb ischemia); forced air warming should be maintained throughout the intraoperative phase. The contents of this preoperative phase were not included in our guidelines, so corrective action was introduced. The corrective action included: first, in the form of stratifying patients according to the degree of the risk of inadvertent perioperative hypothermia. This assessment takes place on admission to the surgical ward and on a daily basis. Second, the surgical ward was provided with a forced air warming device to be used on scheduled patients for surgery with a body temperature below 36°C.¹⁴⁻¹⁶

Intraoperative phase. The patient's temperature should be measured and documented before induction of anesthesia, and then every 30 minutes until the end of surgery. Induction of anesthesia should not begin unless the patient's temperature is 36°C or above (unless there is a need to expedite surgery because of clinical urgency, for example bleeding or critical limb ischemia). Intravenous fluids (500 ml or more) and blood products should be warmed to 37°C using a fluid warming device. Patients who are at higher risk of inadvertent perioperative hypothermia, and who are having anesthesia for less than 30 minutes should be warmed intraoperatively from induction of anesthesia using a forced air warming device. All patients who are having anesthesia for longer than 30 minutes should be warmed intraoperatively from induction of anesthesia using a forced air-warming device.

Normally, the temperature inside our operating rooms is adjusted to around 24°C, however, this may change to reach a compromise between the need to keep the patient normothermic and a comfortable working atmosphere for the operating team. All our operating tables have warming mattresses containing heating metal coils with thermostatically controlled temperatures between 36-38°C^{17,18} (Thermo Maquet 2000, Maquet GMBH, Rastatt, Germany). Once in the operating table, the patient is provided with a warm cotton blanket. Blankets, intravenous fluids, and fluids used in bladder irrigation during transurethral surgical procedures are warmed in a thermostatically controlled warming cabinet located in the operating suite (Olympic Warmette, Olympic Medical, Seattle, USA). All administered intravenous fluids are warm, however, if more than one liter of fluid is transfused, a fluid/blood warmer is used (Animic AM4, Elltec Co. Ltd, Nagoya, Japan). Before induction of anesthesia, the patient's temperature is measured using the infrared ear thermometer. Depending on the site of surgery, the core body temperature is measured using a thermistor, either from the esophagus, or the rectum, and continuously

displayed using the temperature module of the anesthetic delivery unit (AS/5 Datex Ohmeda, Helsinki, Finland). A closed anesthetic circuit is used whether the patient is spontaneously breathing or mechanically ventilated. In this type of circuit, delivered oxygen and anesthetic gases are warmed as a result of reaction between expired carbon dioxide and sodium hydroxide granules (soda lime) incorporated in the breathing circuit. When applied, these measures are appropriate to keep the patient normothermic if anesthesia lasts for less than one hour. Otherwise, forced-air surface warming (Bair Hugger Model 500, Augustine Medical, Inc, Eden Prairie, Minnesota, USA) will be applied before induction of anesthesia to patients at risk of developing hypothermia, or if the body temperature is already below 36°C, or expected operative time is more than one hour. The type of blanket of the forced-air surface warming applied on the patient depends on the size of the patient and site of surgery, and when allowed to continue in the postoperative period, it is changed to a full-size blanket.

Postoperative phase. The patient's temperature should be measured and documented on admission to the recovery room, and then at 15-minute intervals. Ward transfer should not be arranged unless the patient's temperature is 36°C or above. If the patient's temperature is below 36°C, they should be actively warmed using forced air warming until they are discharged from the recovery room, or until they are comfortably warm. Vital signs (including temperature) are taken, and recorded by recovery room staff on arrival of the patient at recovery. If the body temperature is between 36-37°C a space blanket (MPI Outdoors, Windham, New Hampshire, USA) is placed on the patient to preserve the body temperature. Forced-air surface warming is used when the temperature is below 36°C. Patients are not released from recovery to the wards unless their body temperature is 36°C or above. However, forced-air surface warming continues on patients admitted to the intensive care unit.

We incorporated the changes in our policy and procedures guidelines (PPGs) related to the management of inadvertent hypothermia in the surgical patients. As these are hospital wide documents, they were distributed to the different departments together with the clinical pathways for the prevention of hypothermia. To ensure that the changes were understood and implemented, follow-up audits were carried out every 3 months for an 18-month period ending in June 2010. These audits showed consistency in the implementation of the amended guidelines. During the 18-month follow-up period, 1703 patients received the recommended care for the prevention of perioperative inadvertent

hypothermia. This resulted in a marked fall in the incidence of inadvertent perioperative hypothermia from the previous 1.5⁷ to 0.3% over the 18 month period.

Discussion. In the NICE guidelines,⁹ the expected normal temperature range of adult patients, at which the patient is comfortably warm is between 36.5°C and 37.5°C, while hypothermia is defined as a patient core temperature of below 36°C. Prevention of inadvertent hypothermia in the surgical patient is of paramount importance to avoid adverse effects on the body systems.¹⁹ As hypothermia becomes severe, cardiac irritability leading to ventricular fibrillation can occur. The clinical guidelines programme of the NICE is the largest in the world, and is unique in considering both clinical effectiveness, as well as cost effectiveness. With modifications to suit our locality, these guidelines constitute an important reference when constructing or revising the different clinical policies and procedures in our hospital. On implementation, the NICE guidelines act as a trusted reference when the healthcare facility seeks recognition by an accreditation authority.

Benchmarking is a method, whereby an establishment measures its performance or process against other organizations' best practices, determines how those establishments achieved their performance levels, and uses the information to improve its own performance. Benchmarking regularly compares aspects of performance with others. Determination of benchmark performance must be based on objective criteria and must incorporate what is reliably and validly measured. It should identify disparities in performance and work towards closing any quality gap. It allows learning from others' experiences and practices. In addition, benchmarking clinical outcomes is critical for quality improvement and informing decisions concerning service provision. However, benchmarking should not be considered a one-off exercise.²⁰ To be effective, it must become an ongoing, integral part of a continuous quality improvement process with the goal of keeping abreast of the ever-improving best practice in healthcare. On the other hand, the process of benchmarking is not without disadvantages. Poorly prepared benchmarks may lead to wasted effort and meaningless results. Comparisons may be incorrectly defined, and there may be reluctance to share information.²¹

Benchmarking studies usually take a long time to complete and to detect areas of possible improvement. They may also take a similar time to implement quality improvement changes. Studies of this kind recruit multidisciplinary activities, and the full cooperation of individuals and departments is essential for successful outcomes.

In conclusion, our study has demonstrated how patient care and improvement in healthcare service can lead to better patient safety by utilizing one of the quality tools, that is, benchmarking. Benchmarking always searches for the best practice. When included in the quality improvement plan of any health facility, periodic benchmarking keeps the healthcare improvement process ever going.

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