WHO Guidelines for Safe Surgery

Standard 1:

The team will operate on the correct patient at the correct site.

Degree of Recommendation: Highly recommended

- Before induction of anaesthesia, a member of the team should confirm that the patient is correctly identified, usually verbally with the patient or family member and with an identity bracelet or other appropriate means of physical identification. Identity should be confirmed from not just the name but also a second identifier (e.g. date of birth, address, hospital number).

- A team member should confirm that the patient has given informed consent for the procedure and should confirm the correct site and procedure with the patient.

- The surgeon performing the operation should mark the site of surgery in cases involving laterality or multiple structures or levels (e.g. a finger, toe, skin lesion, vertebra). Both the anaesthesia professional and the nurse should check the site to confirm that it has been marked by the surgeon performing the operation and reconcile the mark with the information in the patient's records. The mark should be unambiguous, clearly visible and usually made with a permanent marker so that it does not come off during site preparation. The type of mark can be determined locally (signing, initialling or placing an arrow at the site). A cross or 'X' should be avoided, however, as this has been misinterpreted to mean that the site is the one not to be operated on.

- As a final safety check, the operating team should collectively verify the correct patient, site and procedure during a 'time out' or pause immediately before skin incision. The surgeon should state out loud the patient's name, the operation to be performed, and the side and site of surgery. The nurse and anaesthesia professional should confirm that the information is correct.

Audit criteria

1. Availability of patient identification bracelets with a minimum of two personal identifies e.g: name and age

2. Availability of informed consent form.

3. Availability of permanent markers in the operating room.

4. Verbal communication between surgical team and patient before induction of anaesthesia for patient identification and procedure verification and patient consent.

5. Marking of the site of surgery by the operating surgeon.

6. Checking of marking of site of surgery by other members of the surgical team.

7. Time out with final communication between surgical team members before skin incision.

8. Policy and procedures on patient identification, surgical site marking and time out.

Complete WHO Guideline for Safe Surgery document can be downloaded from the Alexandria Patient Safety Alliance website: www.mri.edu.eg

WHO Guidelines for Safe Surgery

Standard 2:

The team will use methods known to prevent harm from administration of anaesthetics, while protecting the patient from pain.

Degree of Recommendation: Highly recommended

- The first and most important component of peri-anaesthetic care is the continuous presence of a vigilant, professionally trained anaesthesia provider. If an emergency requires the brief temporary absence of the primary anaesthetist, judgement must be exercised in comparing the threat of an emergency to the risk of the anaesthetized patient's condition and in selecting the clinician left responsible for anaesthesia during the temporary absence.

- Supplemental oxygen should be supplied for all patients undergoing general anaesthesia. Tissue oxygenation and perfusion should be monitored continuously using a pulse oximeter with a variable-pitch pulse tone loud enough to be heard throughout the operating room.

- The adequacy of the airways and of ventilation should be monitored continuously by observation and auscultation. Whenever mechanical ventilation is employed, a disconnect alarm should be used.

- Circulation should be monitored continuously by auscultation or palpation of the heart beat or by a display of the heart rate on a cardiac monitor or pulse oximeter.

- Arterial blood pressure should be determined at least every 5 minutes and more frequently if indicated by clinical circumstances.

- A means of measuring body temperature should be available and used at frequent intervals where clinically indicated (e.g. prolonged or complex anaesthesia, children).

- The depth of anaesthesia (degree of unconsciousness) should be assessed regularly by clinical observation.

Degree of Recommendation: Recommended

- Inspired oxygen concentration should be monitored throughout anaesthesia with an instrument fitted with a low-oxygen concentration alarm. In addition, a device to protect against the delivery of a hypoxic gas mixture and an oxygen supply failure alarm should be used.

- Continuous measurement and display of the expired carbon dioxide waveform and concentration (capnography) should be used to confirm the correct placement of an endotracheal tube and also the adequacy of ventilation.

- The concentrations of volatile agents should be measured continuously, as should inspiratory or expired gas volumes.

- An electrocardiograph should be used to monitor heart rate and rhythm.

- A cardiac defibrillator should be available.

- Body temperature should be measured continuously in patients in whom a change is anticipated, intended or suspected. This can be done by continuous electronic temperature measurement, if available.

- A peripheral nerve stimulator should be used to assess the state of paralysis when neuromuscular blocking drugs are given.

Audit criteria

1. Number of qualified anesthetists available in relation to number of functioning operating rooms.

2. Availability of central and local oxygen supply

3. Availability of pulse oximetry instruments per operating room.

4. Anaesthetic machines with the following capabilities:

    a. Airway pressure
    b. Tidal volume
    c. Minute volume
    d. Analysis of inspired oxygen concentration (fractioned inspired oxygen concentration alarm)
    e. Analysis of expired $C0_2$ (capnography)
    f. Volatile agent (multi-gas) analyser

5. Availability of a haemodynamic monitor for each operating room.

6. Documentation of arterial blood pressure in anaesthetic sheet and the use of lower and upper blood pressure alarms values with monitors.

7. Availability of skin or oesophageal temperature probes.

8. Availability of body warmers.

9. Availability of blood warmers.
10. Availability of computerized electroencephalography.
11. Availability of cardiac defibrillator per operating room or surgical suite.
12. Availability of nerve stimulators.

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Acknowledgment: We would like to thank Professor Khaled Yassen, MD, FFARCST for his contribution in developing the audit criteria related to this standard.

WHO Guidelines for Safe Surgery

Standard 3:

The team will recognize and effectively prepare for life-threatening loss of airway or respiratory function.

Highly recommended

• All patients should undergo an objective evaluation of their airway before induction of anaesthesia, even when intubation is not anticipated, in order to identify potential difficulties in airway management.

• The anaesthesia professional should have a planned strategy for managing the airways and be prepared to execute it, even if airway loss is not anticipated.

• When the anaesthesia professional suspects a difficult airway, assistance during induction should be immediately available and a back-up plan for airway management should be clearly identified.

• When a patient is known to have a difficult airway, alternative methods of anaesthesia should be considered, including regional anaesthesia or awake intubation under local anaesthetic.

• All anaesthesia professionals should maintain their airway management skills and be familiar with and proficient in the multiple strategies for dealing with difficult airways.

• After intubation, the anaesthetist should always confirm endotracheal placement by listening for breath sounds as well as gastric ventilation and monitoring the patient's oxygenation with a pulse oximeter.

• Patients undergoing elective surgery should be fasting prior to anaesthesia. Those at risk of aspiration should be pre-treated to reduce gastric secretion and increase pH.

Recommended

• The anaesthesia professional should confirm endotracheal placement after intubation by use of capnography.

• The results of the airway evaluation and a description of the ease or difficulty of intubation, if performed, should be recorded in the anaesthesia record.

Audit criteria

1. Knowledge of Malampati classification.
2. Observe airway assessment.
3. Documented Malampati classification.

4. Availability of stylets, elastic bougie, laryngeal masks, fiberoptic intubations
5. Training on difficult airways.
6. Policy and procedure for difficult airways.
7. Check for capacity to use regional anesthesia (spinal, brachial).
8. Observe proper endotracheal placement check (auscultation of breath sounds and gastric ventilation).
9. Policy and procedure for patient fasting.
10. Availability of capnography.
11. Documentation of difficult airway situations.
12. Suction facility (local or central).

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Acknowledgment: We would like to thank Professor Khaled Yassen, MD, FFARCST for his contribution in developing the audit criteria related to this standard.

WHO Guidelines for Safe Surgery

Standard 4:

The team will recognize and effectively prepare for risk of high blood loss.

Highly recommended

• Before inducing anaesthesia, the anaesthetist should consider the possibility of large-volume blood loss, and, if it is a significant risk, should prepare appropriately. If the risk is unknown, the anaesthetist should communicate with the surgeon regarding its potential occurrence.

• Before skin incision, the team should discuss the risk for large-volume blood loss and, if it is significant, ensure that appropriate intravenous access is established.

Recommended

• A member of the team should confirm the availability of blood products if needed for the operation.

Audit criteria

1. Availability of blood loss risk assessment form.
2. Documented check for availability of anticipated blood loss.
3. Discussion of blood loss potential during time out by surgical team.
4. Policy and procedures of central and peripheral IV line insertion.
5. Number, size, site, time of insertion of peripheral cannula.
6. Place and time of insertion of central IV catheter.
7. Haemostatic equipment.

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WHO Guidelines for Safe Surgery

Standard 5:

The team will avoid inducing an allergic or adverse drug reaction for which the patient is known to be at significant risk.

Highly recommended

• Anaesthesia professionals should fully understand the pharmacology of the medication they prescribe and administer, including its toxicity.

• Every patient to whom any drug is administered must first be identified clearly and explicitly by the person administering the drug.

• A complete drug history, including information on allergies and other hypersensitivity reactions, should be obtained before administration of any medication.

• Medications should be appropriately labeled, confirmed and rechecked before administration, particularly if they are drawn into syringes.

• Before any drug is administered on behalf of another health provider, explicit communication should take place to ensure that the two have a shared understanding of the indications, potential contraindications and any other relevant information.

Recommended

• Medication drawers and workspaces should be organized systematically to ensure consistent positions of medication ampoules and syringes, tidiness and separation of dangerous drugs or drugs with similar-sounding names.

• Labels on ampoules and syringes should be legible and include standardized information (e.g. concentration, expiration date).

• Similar packaging and presentation of different medications should be avoided when possible.

• Errors in intravenous drug administration during anaesthesia should be reported and reviewed.

• Drugs should be drawn up and labelled by the anaesthetist who will administer them.

Suggested

• Medications in a similar class should be colour-coded according to an agreed system that is understood by all members of the operating team.

Audit criteria

1. Availability of emergency drugs at a convenient position:

    a. Corticosteriods

   b. Adrenaline
   c. Ephedrine
   d. Calcium
   e. Atropine

2. Patient identification policy and procedure.

3. Drug administration policy and procedures

4. Policy and procedure for drugs administered on behalf of another individual.

5. Observe patient identification procedure.

6. Observe medication administration procedures.

7. Documented history of allergies.

8. Observe labeling of syringes with medication name and concentration.

9. Observe double checking of medication before administration.

10. Check medication storage area for the following:

    a. Orderly storage
    b. High alert medication
    c. Look alike
    d. Sound alike
    e. Medication without labels and expiration date

11. Medication adverse event report sheet.

12. Medication adverse event policy and procedures.

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WHO Guidelines for Safe Surgery

Standard 6:

The team will consistently use methods known to minimize the risk for surgical site infection.

Highly recommended

• Prophylactic antibiotics should be used routinely in all clean–contaminated surgical cases and considered for use in any clean surgical case. When antibiotics are given prophylactically to prevent infection, they should be administered within 1 hour of incision at a dose and with an antimicrobial spectrum that is effective against the pathogens likely to contaminate the procedure. Before skin incision, the team should confirm that prophylactic antibiotics were given within the past 60 minutes. (When vancomycin is used, infusion should be completed within 1 hour of skin incision.)

• Every facility should have a routine sterilization process that includes means for verifying the sterility of all surgical instruments, devices and materials. Indicators should be used to determine sterility and checked before equipment is introduced onto the sterile field. Before induction of anaesthesia, the nurse or other person responsible for preparing the surgical trays should confirm the sterility of the instruments by evaluating the sterility indicators and should communicate any problems to the surgeon and anaesthesia professional.

• Redosing with prophylactic antibiotics should be considered if the surgical procedure lasts more than 4 hours or if there is evidence of excessive intraoperative bleeding. (When vancomycin is used as the prophylactic agent, there is no need for redosing in operations lasting less than 10 hours.)

• Antibiotics used for prophylaxis should be discontinued within 24 hours of the procedure.

• Hair should not be removed unless it will interfere with the operation. If hair is removed, it should be clipped less than 2 hours before the operation. Shaving is not recommended as it increases the risk for surgical site infection.

• Surgical patients should receive oxygen throughout the perioperative period according to individual requirements.

• Measures to maintain core normothermia should be taken throughout the perioperative period.

• The skin of all surgical patients should be prepared with an appropriate antiseptic agent before surgery. The antimicrobial agent should be selected on the basis of its ability to decrease the microbial count of the skin rapidly and its persistent efficacy throughout the operation.

• Surgical hand antisepsis should be assured with an antimicrobial soap. The hands and forearms should be scrubbed for 2–5 minutes. If the hands are physically clean, an alcohol-based hand antiseptic agent can be used for antisepsis.

• The operating team should cover their hair and wear sterile gowns and sterile gloves during the operation.

Recommended

• 'On call' orders for administration of antibiotic prophylaxis should be discouraged.

• If hair is to be removed, the use of depilatories is discouraged.

• Tobacco use should be stopped at least 30 days before elective surgery if possible.

• Surgical patients should take a preoperative shower with antiseptic soap.

• Prior infections should be eliminated before a scheduled operation.

• The operating team should wear masks during the operation.

• Surgical drapes that are effective when wet should be used as part of the sterile barrier.

• Sterile dressing should be maintained over the surgical wound for 24–48 hours.

• Active surveillance for surgical site infections should be conducted prospectively by trained infection control practitioners.

• Information on the surgical site infection rate should be provided to surgeons and appropriate administrators.

Suggested

• A high fraction of inspired oxygen (80%) should be administered throughout the operation, and supplemental oxygen should be administered for at least 2 hours postoperatively.

• Positive pressure ventilation should be maintained in the operating room.

• The operating room should be cleaned thoroughly after 'dirty' or 'infected' cases and at the end of each operating day.

• Standardized infection control policies should be implemented.

• Surgical teams should be educated about infection prevention and control at least annually.

Audit criteria

1. Availability of prophylactic antibiotic policy and procedures including the following:

    a. Type of surgery.
    b. Type of antibiotic.
    c. Individual responsible.
    d. Timing of administration.
    e. Indications for re-dosing.
    f. Timing of stoppage in the postoperative period.

2. Document individual responsible for administration of prophylactic antibiotic.
3. Check documentation of timing of administration of prophylactic antibiotic.
4. Observe confirmation of administration of prophylactic antibiotic during a time out.
5. Sterilization:
    a. Availability of sterilization policy and procedures.
    b. Check usage of sterility indicators on instruments and drapes containers .
    c.
6. Hair removal policy and procedures.
7. Observe hair removal time and technique.
8. Availability of hand disinfection policy and procedures.
9. Material used for surgeon and patient skin disinfection.
10. Availability of patient blanket warmers and temperature probes.
11. Postoperative oxygen therapy policy and procedures.
12. Check patient oxygen supply in recovery area.
13. Availability of preoperative smoking stoppage policy and procures.
14. Check if patients have had a preoperative shower.
15. Wearing of masks and head covers by surgical team and circulating personnel.
16. Availability of water proof gowns or disposable drapes.
17. Postoperative wound dressing policy and procedures.
18. Availability of SSI team, audit, policy and procedures.
19. Availability of theatre positive pressure environment.
20. Operating room cleaning policy and procedure.
21. Observe cleaning of operating room at end of surgery.

22. Operating room infection control policy and procedure.

23. Attendance and availability of infection control educational sessions.

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WHO Guidelines for Safe Surgery

Standard 7:

The team will prevent inadvertent retention of instruments or sponges in surgical wounds.

Highly recommended

• A full count of sponges, needles, sharps, instruments and miscellaneous items (any other item used during the procedure and is at risk of being left within a body cavity) should be performed when the peritoneal, retroperitoneal, pelvic or thoracic cavity is entered.

• The surgeon should perform a methodical wound exploration before closure of any anatomical cavity or the surgical site.

• Counts should be done for any procedure in which sponges, sharps, miscellaneous items and instruments could be retained in the patient. These counts must be performed at least at the beginning and end of every eligible case.

• Counts should be recorded, with the names and positions of the personnel performing the counts and a clear statement of whether the final tally was correct. The results of this tally should be clearly communicated to the surgeon.

Suggested

• Validated, automatic sponge counting systems, such as bar-coded or radiolabelled sponges, should be considered for use when available.

Audit criteria

1. Availability and usage of documents related to preoperative and postoperative counts of instruments, needles and sponges including names of the surgical team.
2. Observe preoperative and postoperative counting.
3. Observe communication of counting results to the surgeon.
4. Written policies for cavity exploration before cavity closure.
5. Observe adherence of surgeons to cavity exploration before cavity closure.
6. Check availability of radiolabelled sponges.

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WHO Guidelines for Safe Surgery

Standard 8:

The team will secure and accurately identify all surgical specimens.

Highly recommended

• The team should confirm that all surgical specimens are correctly labeled with the identity of the patient, the specimen name and location (site and side) from which the specimen was obtained, by having one team member read the specimen label aloud and another verbally confirming agreement.

Audit criteria

1. Two original identifiers (patient name and date of birth) on specimen label and pathology examination request.

2. Specimen anatomical name including side, if relevant, on specimen label and pathology examination request.

3. Observe double checking of patient identification data.

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WHO Guidelines for Safe Surgery

Standard 9:

The team will effectively communicate and exchange critical information for the safe conduct of the operation.

Highly recommended

• Before skin incision, the surgeon should ensure that team members, in particular nurses, anaesthesia professionals, and surgical assistants are aware of the critical steps of the procedure to be performed, the risk for heavy blood loss, any special equipment needed (such as instruments, implants, intraoperative imaging, frozen section pathology) and any likely deviation from routine practice. The nurse(s) should inform the team members about any critical safety concerns and the lack of availability or preparation of any special equipment. The anaesthesia professional should inform the team about any critical safety concerns, in particular any difficulty in preparing for resuscitation after heavy blood loss or patient comorbidities that add risk to the anaesthesia.

• In cases of bilaterality, multiple body parts (e.g. fingers or toes) and multiple levels (e.g. spine) or when intraoperative decisions on the extent of surgical resection are to be made in conjunction with radiographic imaging, the team should confirm that the necessary imaging is available and displayed in the operating room.

• Before removing the drapes at the end of the operation, the surgeon should inform team members of any alterations that were made to the procedure performed, any problems that may occur in the postoperative period and essential postoperative plans (which might include antibiotics, venous thromboembolism prophylaxis, oral intake or drain and wound care). The anaesthesia professional should summarize the clinical condition of the patient during the operation and any other instructions needed to ensure a safe recovery. The nurse should notify the team of any additional concerns recognized during the operation or for recovery.

• An accurate, complete, signed surgical record should be maintained. All patient records should be:

clear: the patient clearly identified by his or her name and hospital number on each page, written legibly or typed and each entry signed, dated and timed;

objective: opinions should be based on recorded facts;

contemporary: notes should be written as soon as possible after an event; tamper-proof: attempts to amend records should be immediately apparent; if computerized systems are used, they should record the date and author of any notes and track any amendments;

original: records should not be altered or amended once an entry is complete. If a mistake is noticed, amendments or corrections may be added and clearly identified

as such. If a change is made to the record, it should be signed and dated, and a note should explain why the change was made.

• Information recorded by the surgeon in the operation note should include, at a minimum, the name of the main procedure performed and any secondary procedures, the names of any assistants, the details of the procedure and the intraoperative blood loss. The information recorded by the anaesthetist should include, at a minimum, intraoperative vital sign parameters recorded at regular intervals, medications and fluids administered intraoperatively and any intraoperative events or periods of patient instability. The information recorded by the nursing team should include, at a minimum, sponge, needle, sharps and instrument counts, the names and positions of the personnel performing the counts, instruments and sponges specifically left inside the patient, any action taken in the event of a count discrepancy, and, if no count was performed, the reasons for not conducting a count. The complete operation record should therefore include the names of all team members involved.

Audit criteria

1. Performance of time out to discuss critical safety issues by each member of the surgical team (surgeon, anesthetist, nurse).

2. Display of x-rays especially when operating bilateral, multiple body parts or multiple levels.

3. Discussion of postoperative plan by members of surgical team.

4. Availability of operative notes including the following:

    a. Patient identification
    b. Date and time of documentation
    c. Names of all surgical team members and their role
    d. Information recorded by surgeon:
        i. Name of main procedure
        ii. Name of secondary procedures
        iii. Details of procedure
        iv. Intra-operative blood loss
    e. Information recorded by anesthetist:
        i. Regular intra-operative vital signs
        ii. Medications
        iii. IV fluids
        iv. Periods of patient instability
    f. Information recorded by nurse:
        i. Sponge, needle, sharps, instrument counts (pre and post-operative)
        ii. Name and position of personnel performing counts
        iii. Action taken in the event of count discrepancy

g. Look for apparent corrections
h. Check signatures

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Safe Surgery

WHO Guidelines for Safe Surgery

Standard 10:

Hospitals and public health systems will establish routine surveillance of surgical capacity, volume and results.

Highly recommended

• For surgical surveillance at the national level, the following data should be collected systematically by WHO Member States:

- Number of operating rooms.
- Number of surgical procedures performed in an operating room.
- Number of trained surgeons and number of trained anesthetists.
- Day-of-surgery mortality rate.
- Postoperative in-hospital mortality rate.

• For surgical surveillance at hospital and practitioner levels, the following data should be collected systematically by facilities and clinicians:

- Day-of-surgery mortality rate.
- Postoperative in-hospital mortality rate.

Recommended

- As more detailed measures of surgical surveillance in WHO Member States with more advanced data capability, the following data should be collected systematically:
  - Number of operating rooms by location: hospital or ambulatory, public or private.
  - Number of trained surgeons by specialty: general surgery, gynecology and obstetrics, neurosurgery, ophthalmology, otorhinology, orthopedics and urology.
  - Number of other surgical providers: residents, unaccredited physicians, medical officers.
  - Number of trained anesthetists by level of training: physician anesthesiologists, nurse anesthetists, anesthesia officers.
  - Number of perioperative nurses.
  - Number of surgical procedures performed in operating rooms for the 10 most frequent procedures in the country, emergent or elective.
  - Proportion of deaths on the day of surgery by procedure for the 10 most frequent procedures in the country.
  - Proportion of in-hospital deaths after surgery by procedure for the 10 most frequent procedures in the country .

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