

Operation theatre protocols in Oral and Maxillofacial Surgery

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Abstract

In the modern day's Oral and Maxillofacial surgical practice different esthetic and surgical procedures are carried out, with increased risk of infective complications. Hence, infection control practices need to be established to minimize the risk of exogenous infections and for the successful outcome of the procedures. These practices include hand washing, cleaning, sterilization, disinfection, operation theater sterilization and specifications. Proper hand washing after examination of each patient and prior to any surgery with a formulation containing alcohol alone or as a combination with other agents reduces the chances of transferring infections to and from patients. Sterilization and disinfection constitute the most important aspect of infection control. Proper knowledge of the operation theater decorum and disinfection of Operation theater is essential. The waste generated during practice is a potential source of nosocomial infections and should be treated as per the proper protocol and guidelines. This article reviews the

minimum standards and practices that need to be established and followed during surgical procedures and to understand the basic protocols in Operation theater and learn the clinical application of these protocols for reduction of the postoperative complications. Surgeries conducted with adequate protocols and checklists have resulted in reduction of postoperative events and complications.

Introduction

Good infection prevention and control is essential to ensure that patients who undergo any surgical procedure within the operating theatre receive safe and effective care. Surgical site infections (SSIs) account for 20% of healthcare-associated infections¹. Cleanliness of the hospital environment is the best starting point to achieve the highest patient safety. There is a need to decrease the bio-burden present in the environment in an operating room. A systematic method of precautions taken by operating team leads to a successful procedure. Aside from intraoperative technique, there are several standard approaches to prevent SSI which include patient preparation, hand antisepsis, appropriate antimicrobial prophylaxis before surgery, and postoperative surgical site care². Surgical attire is strictly regulated, as is the environment in the operating theatre. The bacterial counts in operating room air are directly proportional to the number of people moving about in the room³. The principle upon which this practice is based is that of 'Standard Precautions'. Effective infection prevention and control must be part of everyday practice and be applied consistently by everyone.

Disinfection is a process that eliminates many or all pathogenic microorganisms without removal of bacterial spores. Sterilization is defined as process by which an article, instrument or surface is made free from all vegetative bacteria, spore, fungi including the viruses. Antiseptic is a chemical that is applied to living tissue, such as mucous membrane or skin to reduce the number of organisms present, through inhibition of their activity or destruction. Disinfectant is a chemical used on non-vital objects to kill surface vegetative pathogenic organisms but not necessarily spore forms/ viruses.

Principles of Sterile Technique

The precise type of disinfection depends on the type of instruments. Medical devices, equipment, and surgical materials are divided into three general

categories depending on the potential risk of infection involved in their use as recommended by Spaulding⁴: critical items, semicritical items, and non-critical items.

Critical items- These are instruments or objects that are introduced directly into the bloodstream or into other normally sterile areas of the body. Example -surgical instruments.

Semicritical items- These instruments are introduced into body cavities and therefore come into contact with intact mucous membranes, but do not ordinarily penetrate body surfaces. Examples- noninvasive flexible and rigid fiber-optic endoscopes, endotracheal tubes, anesthesia breathing circuits, and cystoscopes. A high-level disinfection procedure with prior meticulous physical cleaning is adequate in most situations. Amongst the chemical sterilants, the most commonly employed for this purpose is glutaraldehyde. Glutaraldehyde solution should be alkaline and of more than 2% strength. The activated glutaraldehyde solution can be used for about a fortnight. The equipment should be kept immersed in glutaraldehyde solution for at least 45 minutes. If feasible, steam sterilization, may be used to sterilize many of these items, but is not absolutely essential.

Non-critical items- are items that do not ordinarily penetrate, but touch only intact skin. Example - crutches, bed boards, blood pressure cuffs, and a variety of other medical accessories. These items rarely, if ever, transmit disease. Consequently, depending on the particular piece of equipment or item, simple washing with a detergent may be sufficient.

Postoperative infections can be either of endogenous or exogenous origin. Factors associated with transmission of infective material exogenously in hospitals and clinics include presence of shedders of pathogenic microorganisms amongst the hospital personnel, use of inadequately sterilized equipment, contaminated environment and grossly contaminated surfaces. Linen color should be dyed green as it reduces glare from light, fatigue and eye strain. Sterile materials / area should be protected from moisture contaminated. Allow the paint to become dry before draping. Micro-organisms cannot be removed completely, so they should be kept as minimum as possible. Sterile area should be separated from other by draping. After incision of skin, the blade /knife should be isolated from other items. Team members should not talk except when essential. Bed clothes should be removed or replaced prior to entry into OT, nevertheless the patient should be covered with a coversheet at all times. The doors from corridors into operating room should keep close. Dressing removed from a wound should be placed at once in a bag & should be discarded.

Staff related protocols

Surgical team

Chief surgeon, who directs the surgery. One or more **assistant surgeons**, who help the chief surgeon

Anesthesiologist, who controls the supply of anesthetic and monitors the person closely.

Scrub nurse, who passes instruments to the surgeon.

Circulating nurse, who provides extra equipment to the operating team.

Importance of Staff Education

Cheerful / Dedicated staff Make a Great success. Specify the staff for duties and responsibilities. Education is a matter of continuity. Train the assistant staff under the seniors observation. Train the staff with scientific goals so that they should know the importance of sterile field and how it can affect the outcome of the surgery.

Assistance

Circulator - Unsterile team member should provide wide margin of safety while passing away from sterile area. Face the sterile area while passing; don't go within the sterile circle. Notify the scrub person while passing behind him. Stand at a safe distance while adjusting the light. Grasp the table legs well below the table top to move the sterile table.

Assisting the surgeon – Floor nurse

The duty of the assistant nurse is to receive the patient from the ward, from the staff nurse.

Assisting the surgeon - Scrub Nurse

Scrubbed nurse helps the surgeon in bringing the instruments trolley and paint the trolley with betadine. Remove the drape/rubber sheet from the container and spread it on the trolley (instrument/linen), using cheattle forceps. Transfer the linens from the bin to the trolley. Scrubbed nurse arrange the instruments in a designated fashion in the trolley and count them. Drape the two trolleys with small drapes and pass the gown, gloves to the surgeon. Handover the paint and drapes to the surgeon, co-ordinate with the floor nurse for passing consumables and connect various tubes and wires as required. Pass the instruments to the surgeon as required. Scrubbed nurse should count the instrument at the end of the procedure. After surgery she should assist in surgical site dressing and re-gowning the patient.

Good hand washing practices

Hand Scrubbing area decorum

The scrub area sink should be wide enough to facilitate easy scrubbing without touching anywhere. It should have depth of about **3 feet** which prevents splashing of rebound water onto the clean hands. The scrub sinks are fitted with doctors' taps, rather than ordinary taps, to facilitate

its operation with the help of arms to prevent contamination of scrubbed hands during closing the tap. The peddle operated taps or sensor operated taps are ideal in scrub areas as it permits hand free operations. The cleaned hands are mopped with sterile towel and disinfected with antiseptic solution. Hand washing is your personal contribution⁵.

Scrubbing Technique

The hands should be washed under running tap water, starting from tips of the finger up to 2 cm above the elbow. Various antiseptic solutions are available for the hand scrubbing such as povidone iodine 7.5% hand scrub, chlorhexidine gluconate scrub 4%, phenolic soaps like Lifebuoy, dettol etc. After cleaning of nails with sterile soft brush the foam is generated by vigorous scrubbing of the antiseptic solution over the hands. This procedure should be continued for atleast 3 to 5 minutes. In 1939, Price suggested a seven-minute hand wash with soap, water and a brush, followed by 70% ethanol for three minutes after drying the hands with a towel.⁶ In the second half of the twentieth century, the recommended time for surgical hand preparation decreased from >10 minutes to 5 minutes. Even today, five minute protocols are common, and still suggested for surgical hand hygiene with the World Health Organization (WHO) recipe for an alcohol-based compound.⁷

Gowning and Gloving

No touch technique is used to apply the sterile gown after the hand scrubbing. The gowns are folded inside out during autoclaving. The Association of Perioperative Registered Nurses (AORN) suggests the front of the gown is sterile field. Jesse E. Bible et al. suggested the area immediately below the neckline or the axillae may represent the upper limits of the sterile zone. The sterility of the gown sleeves extends proximally to 2 inches above the elbow crease. The sterile gown is picked up by the assistant with the help of sterile chital forceps. The surgeon holds the gown with clean hands touching the inside of the gown and slides it over his hands and the body. The straps of the gown are tied by the assistant at the back and the straps of the gown are tightened by the surgeon himself.

Gloving

Closed gloving technique- note the left glove is slid over the hand with the right hand covered by sterile gown. The right cuff is then adjusted with gloved left hand and the right glove is slid using left gloved hand without touching the outside of the gloves with bare hands.

Open method of gloving- Left glove is picked up with bare, scrubbed right hand, touching its inside

and slid over left hand without uncuffing it. The right glove is picked up with gloved left hand touching only its outside. It is uncuffed over the cuff of the gown. Then with the gloved right hand the left glove is uncuffed.

Design of Operation Theatre

Ideally the floor of the operating room should not be less than 500 sq ft. The ideal operating room walls should be of stainless steel without sharp line angles and corner should be molded round. Drainage pipe lines should be concealed. The OT complex should have only one entry. The doors of the OT complex which exist between critical area, semi-critical area, non-critical area must not be in single line to break the air velocity. The unidirectional air flow velocity should not be greater than 2m/min. The floors and walls should be absolutely smooth and easily cleanable and should have minimum and neatly made or no joints. Flooring should be non porous, scratch proof, anti skid and antistatic. The walls should also be covered with smooth material like granite with minimum joints. The ceilings should be painted with oil paints which give smooth finish. Stress must be laid on -Temperature, Humidity and Ventilation. Temperature: 24-27⁰ C. Relative Humidity: 45⁰ – 60⁰ C.⁸

Ventilation

Several studies have shown that improvements in airflow and ultraviolet lighting reduce not only bacterial counts but also rates of surgical site infection. A cohort study by Knobben et al. demonstrated that, compared with use of conventional airflow systems, use of a laminar-flow operating theater significantly decreased the rates of bacterial wound contamination (p = 0.001), prolonged wound discharge (p = 0.002), and superficial infection of the surgical site (p = 0.004).⁹

Types of Ventilation

1. Mixing
2. Parallel Flow – (Laminar Airflow)
 - a) Vertical Parallel Flow
 - b) Horizontal Parallel Flow

Cleaning and Fumigation

Daily cleaning should be carried out after the operating sessions are over. All the surfaces should be cleaned with detergent and water and may be wiped over with a phenol if any spills with blood / body fluid are present. All the walls must be wiped down to hand height everyday. The floors should be scrubbed with warm water and detergent and dried. No disinfectant is necessary. The O.T. table and other non clinical equipments must be wiped to remove all visible dirt and left to dry. Weakly cleaning of all the areas inside the operating theatre complex should be done thoroughly with warm water and detergent and dried. The storage shelves

must be emptied and wiped over, allowed to dry and restacked.

Procedure for fumigation

The windows should be sealed and formaldehyde should be generated either by boiling a solution of formalin 40% or by adding it to potassium permanganate, in a metal vessel on the floor, since heat is also generated. The door is then closed and sealed. For a 10 x 10 x 10 ft room - 150 gm potassium permanganate and 280 ml of formalin are used.

Patient Preparation

Preparation of patient in the ward

Hospitalization 2 – 3 days prior to surgery. A good bath to clean all the dirt from the body. Outside clothing should be discarded and the patient should be provided clean hospital clothing. Lipstick, nail varnish & other cosmetics should be removed. Patient should not be shifted in operating room with full bladder.

Preparation of oral cavity

The oral cavity should be thoroughly inspected for any septic foci, calculus, tartar, infected carious teeth, infected periodontal pockets etc. and they should be removed. Antiseptic mouth washes should be prescribed for periodic mouth rinsing to reduce the count of microorganism. Loose teeth should be extracted as they may come in the way of intubations of patient and may get knocked out and aspirated during the intubation.

Preparation of surgical site

Preoperative Skin Antisepsis

Procedural and surgical site infections create difficult and complex clinical scenarios. A source for pathogens is often thought to be the skin surface, making skin preparation at the time of the procedure critical.¹⁰ The most commonly used antiseptic agents for surgical scrubbing include chlorhexidine gluconate, alcohol-based solutions, and iodophors such as povidone-iodine. Chlorhexidine gluconate acts to disrupt the cellular membranes of bacteria and is favored for its long-lasting activity against gram-positive and gram-negative organisms found on human skin¹¹. The scrubbing is started from the center and goes to periphery and the swab is discarded. In no case the swab from periphery should touch the central area. This exercise is first done with swab soaked in antiseptic soap solution like savlon, cetrimide or povidon iodine (Beta scrub) for about 2 minutes. Finally the area is painted with 5% povidon iodine solution and this should not be wiped off because microbial activity is sustained by release of free iodine as the agent dries and color fades from skin. It should remain on skin for at least 2 minutes. To

hasten drying of skin, alcohol may be painted on the area without friction before a self – adhering drape is applied. Isopropyl and ethyl alcohols are broad spectrum agents that denature proteins in cells. The area is isolated by draping the other parts with the help of sterile surgical towels exposing only the surgical field. A double layer drape is effective. For isolation of mouth clear plastic drape with an adhesive side can be used.

The close of operation

Confirm the completion of the entire surgical plan. Report the anesthetist regarding completion of procedure. Check for satisfactory wound closure & cessation of hemorrhage. Mouth should be checked for –Clot, Debris, Swabs, Extracted teeth. Throat pack should be removed. Write the operative notes. Shift the patient on a trolley equipped with oxygen cylinder & mask, assisted by 2 persons. Keep the patient in recovery room & in recovery position. Emergency situations can be managed by surgeon/anesthetist/both.

Conclusion

In the managed health care environment, practitioners must ensure that all patient outcomes are favorable. The ideal conditions would include sufficient surgical instrumentation to allow for proper decontamination and terminal sterilization. The sterilization techniques and operation theater protocols must be performed by all personnel to reduce postoperative events and complications.

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