EDITORIAL

Surgical site infection and its prevention

Infection related to an operative procedure that occurs at or near the surgical incision within 30 days of the procedure or within 90 days if prosthetic material is implanted at surgery.

Clinical criteria for defining SSI include a purulent exudate draining from a surgical site, a positive fluid culture obtained from a surgical site that was closed primarily, a surgical site that is reopened in the setting of at least one clinical sign of infection (pain, swelling, erythema, warmth) and is culture positive or not cultured

Surgical site infection accounts for 14%–16% of hospital acquired infection, reported surgical site infection rate ranging from 0.5 to 13% depending on the type of surgery and patient characteristics.1 Surgical site infection is the second most common health care associated infection,[2] 2/3 of these infections are due to the incision, 1/3 are due to infection of the organs or spaces during surgery.

Despite the best efforts of healthcare facilities to maintain safe surgical environments, surgical site infections result in up to $10 billion in treatment costs every year in the U.S. alone, 780,000 out of 30 million surgical procedures performed annually in the U.S. result in SSI. In the United Kingdom, the estimated direct costs for a patient who has developed a surgical site infection are between €2,265 and €2,518. According to a study in the Netherlands, SSIs result in 5.8 to 17 extra days of hospitalization. In France, approximately 11% of surgical patients acquire a surgical site infection.

Surgical site infection may be Superficial Incisional SSI, Deep Incisional SSI, or involving the Organ of cavity. The risk factors are age, Diabetes, Obesity, cigarette smoking, Immunosuppression, Malnutrition.

Prevention of surgical site infection depends on decreasing the pre-operative colonization with potentially pathogenic microorganisms at the operating area, decrease presence of infection at a nonsurgical site, detecting the history of prior skin infections, avoid recent surgery, decrease duration of preoperative hospitalization, control of severity of underlying illnesses

During operative procedures due care should be given to duration of surgical scrub, maintain body temp during operation, skin antisepsis, pre-operative shaving, minimize duration of operation, proper anti-microbial prophylaxis, laminar operating room ventilation. Avoid Inadequate sterilization of instruments, any foreign material at surgical site should be removed, Surgical drains if possible should be avoided, good Surgical technique should be adopted, good hemostasis should be achieved, dead space should be obliterate.

There are no recommendations for discontinuing systemic steroid use, enhancing nutritional support and wound space oxygenation to prevent surgical site infection.

Among the well accepted measures to prevent surgical site infection, the recommendations are four evidence-based components, is grouped as a single intervention and standard of care for patients undergoing surgical procedures, these are known as bundle of care. These include appropriate use of antibiotics, appropriate hair removal, post-operative glucose control in patients undergoing major surgery and post-operative normothermia in patient undergoing major surgical procedures (colorectal surgery).[3]

Remove hair only when it interferes with the operation. Perform hair removal immediately before surgery and preferably with a clipper.[4,5] Razors are not recommended now-a-days.

Educate and assist patients in taking shower wash or bath at least the night before the operation. Pre-operative showers reduce the skin's microbial colony counts but studies did not show reduction in SSI.[6]

Chlorhexidine is a more effective skin disinfectant and repeated applications with this agent may be indicated for cardiac thoracic and orthopaedic surgical patients with known MRSA in hospitals and units where there is a high incidence of postoperative wound infections by MRSA or MRSE.[7,8] Colonic preparation and lavage peri-operatively is unnecessary in colorectal surgery for preventing anastomotic leaks and wound infections.[9,10] Inspect and clean gross contamination of skin at and around the incision site before performing preoperative antiseptic skin preparation in the operating theatre. Antiseptic skin preparation should include surgical incision and drain sites.

Pre-operative surgical hand preparation of surgical team nails should be kept short. The design of sinks should reduce risk of splashes. If hands are visibly soiled, wash hands with plain soap before performing surgical hand preparation. Debris from underneath fingernails should also be removed. The surgical hand antiseptic alcohol based handrub. Alcoholic Chlorhexidine was found to have greater residual antimicrobial activity. However, no clinical trials have evaluated the impact of scrub agent choice on SSI risk. After alcohol-based surgical handrub procedure, hands and forearms should be allowed to dry thoroughly before donning sterile gloves.

Antimicrobial Prophylaxis, administer surgical antimicrobial prophylaxis as indicated, such as in some operations classified preoperatively as clean surgical wounds and clean-contaminated surgical wounds. Operations classified as contaminated or dirty surgical wounds are frequently receiving therapeutic antimicrobial agents preoperatively to treat related infections. They are not regarded as surgical antimicrobial prophylaxis. Select antimicrobial agents according to antimicrobial efficacy against the common pathogens most likely encountered in the specific surgical sites, avoid using newer broad-spectrum antibiotics whenever possible. Relatively narrow spectrum antibiotics, such as Cefazolin and Cefuroxime are preferred. Consider using peri-operative intranasal Mupirocin and take shower wash or bath in known carriers of Methicillin Resistant Staphylococcus aureus (MRSA) undergoing cardiothoracic and orthopaedic surgeries[11] where morbidity and mortality due to surgical infections are significant. The duration of antimicrobial prophylaxis should not routinely exceed 24 hours. For many prophylactic antimicrobial agents, the administration of an initial dose should be given within 30 minutes before surgical incision (coinciding with the induction of anaesthesia) to achieve an adequate tissue concentration at the time of initial incision. Administer additional intra-operative doses if the operation time exceeds two serum half-lives of the antimicrobial agent, or massive intra-operative blood losses occur.

Laparoscopic cholecystectomy carries a low rate of postoperative infection, attributable to the relative minor trauma, earlier patient mobilization and prompt resumption of nutrition. Antimicrobial prophylaxis does not seem to lower the incidence of postoperative infective complications, as demonstrated by several randomized controlled trials.[12] At present the use of antibiotic prophylaxis in elective laparoscopic cholecystectomy is still controversial.

Regarding ventilation and environment in the operating room department, traffic control of operating room should be performed by restricting the number of people allowed in the operating room, closing the doors to the operating room to prevent in and out traffic, and limiting taking and unnecessary movement in the operating room, maintain positive-pressure ventilation in the operating room, maintain the ventilation at a minimum of 15 air changes per hour (ACH) of which at least three ACH should be fresh air. Airflow monitoring device should be in place and filter all re-circulated and fresh air through HEPA filters at 99.97% efficiency.

Ventilation and environment in operating theatre should be done by Introducing air at the ceiling and exhaust air near the floor, laminar flow ventilation systems if possible should be used, maintain humidity at 30-60% and temperature at 20-23°C, do not shut down the heating, ventilation and air conditioning systems for purposes other than required maintenance, filter changes and construction and allow adequate time for commissioning including microbiological assessments by the hospital infection control team before an operating theatre is first used and after any subsequent changes in the operating room.

Surgical attire and Drapes, wear surgical mask to fully cover mouth and nose, wear cap to fully cover head and face hair, surgical gowns and drapes should be sterile and resistant to liquid penetration and remain effective barriers when get wetted, scrubbed surgical team members should wear masks, caps, sterile gowns and gloves, other personnel in the operating theatre should wear surgical masks if an operation is being performed or if sterile instruments are exposed use sterile surgical drapes to create a barrier between the surgical field and the environment or potential source of bacteria, sterilization of Surgical Instruments.

Regarding sterilization of surgical instrument, all surgical instruments, especially those with long and narrow lumens, must be clean and decontaminated adequately before sterilization process, heat resistant surgical instruments should receive steam sterilization. Heat sensitive instruments can use low temperature sterilization technology (not greater

than 60°C), such as hydrogen peroxide plasma, peracetic acid and ethylene oxide sterilization, laparoscopes, arthroscopes, cystoscopes and other scopes that enter normally sterile tissue should ideally be sterilized. When it is not feasible, they should at least be treated with high level disinfection after thorough cleansing.

Asepsis should be strictly observed and all the principle of aseptic technique should be complied during operations, when inserting intravascular devices, administration of admixture and medication, or placing anaesthetic devices, sterile surgical instruments, medications and solutions should be assembled just prior to use.

Observed good surgical technique during the operation, such as, gentle tissue handling to minimize trauma, minimal use of cautery, careful haemostasis, adequate debridement and removal of all dead, devitalized tissue and foreign bodies. If the surgical site is heavily contaminated, leave the incision open to close later when it is clean. Use close suction drain and insert through a separate incision. Remove the drain as early as possible.

Post-operatively the Incision site should be covered over the primarily closed clean surgical wound with sterile dressing and keep it intact for 24-48 hours. If excess oozing is noted, the dressing should be replaced, use normal saline to cleanse and remove surface bacteria and discharge from wound, perform hand hygiene before and after touching the surgical site or changing dressing.

Surgical site infection surveillance should be maintained with feedback of surgical infection rates to surgeons is one of the successful strategies to help reduce surgical site infection. All hospitals with surgical services are recommended to undertake surveillance of main components include: Select certain categories of operations in the scope of the surgical site infection surveillance based on risk and volume of procedures in local hospitals. Use standardized methods and definitions for data collection and analysis. Trained personnel with knowledge and understanding of epidemiology, surveillance and plan of the programme should be responsible for case-finding. Report the stratified, operation-specific surgical site infection rates periodically to the surgical members of the department

Quality measures should be established to assess the effectiveness of implementing the recommendations. We should use these performance indicators such as surgical site infection rate, percentage of surgical cases with appropriate timing, selection, dosage and duration of prophylactic antibiotic to reduce the surgical site infection.

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