REVIEW ARTICLE

Surgical Site Infections in Saudi Arabia: A Review

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ABSTRACT

Introduction: Surgical site infections (SSIs) are infections that occur postoperatively in the part of the body where the surgery took place. **Methods:** This study included searching PubMed for the keywords (SSIs rate) AND (Saudi Arabia) from January 1, 2006, to July 1, 2021. **Results:** The rate of SSIs in Saudi Arabia was very low in some studies (e.g. the rate was 0% in one of the studies) and high rate in other studies (e.g. the rate was 32.2% in one of the studies). The rate of SSIs in Saudi Arabia was dissimilar in different cities and for different types of surgeries. **Conclusion:** More researches are needed to study not only the rate of SSIs but also the associated risk factors to support the actions of the health team to reduce SSI occurrence and to decrease its complications if it is occurred.

Key words: Postsurgical infection, surgery, surgical site infections

INTRODUCTION

Healthcare-associated infections (HAIs) are infections associated with the devices used in medical procedures, such as ventilators and catheters. In addition to that, HAIs may also occur at surgery sites. These HAIs include catheter-associated urinary tract infections, central line-associated bloodstream infections, surgical site infections (SSIs), and ventilator-associated pneumonia.[1]

SSIs are infections that occur postoperatively in the part of the body where the surgery took place.[2] SSIs can sometimes be superficial and involve the skin only. Other SSIs are deeper and involve tissues under the skin, organs, or implanted material.[2] SSIs are defined as "soft tissue, deep tissue, or organ infections" that are observed within 30 days after surgery or within 1 year of surgery that includes the implantation of foreign body. They are considered as one of the most important causes of post-operative complications.[3]

METHODS

This study included searching PubMed for the keywords (SSIs rate) AND (Saudi Arabia) from January 1, 2000, to July 1, 2021. PubMed is a free resource supporting the search and retrieval of biomedical and life sciences literature and contains more than 32 million citations and abstracts of biomedical literature.

The searching resulted in 65 studies that were decreased to 28 studies after the searching results were limited to studies on human only and in English language only. The searching was limited more to include the articles after 2005, so all of the articles before 2006 were excluded and only 21 studies were included in this review. Figure 1 shows the searching flowchart.

More than half of the included studies were published after 2014. The years of publishing these studies, authors names, and journal names are shown in Table 1.

RESULTS AND DISCUSSION

SSIs in Al Khobar

Alshammari *et al*. conducted a retrospective study in a public hospital in Al Khobar, Saudi Arabia, and found that the rate

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of SSIs is 20 cases/1000 operation in 2009 and decreased to 3.5 cases/1000 operations in 2018 after the implementation of hospital accreditation strategy.[3] Al-Sharydah *et al*. found that the rate of shunt-related infections following cerebrospinal fluid shunt procedures in Saudi Arabia was 32.2%.[4] Al-Khayat *et al.* stated that in patients with pilonidal disease underwent excision and primary closure on elective basis, the incidence of SSI was 12.8%.[5]

SSIs in Dhahran

Elshamy *et al*. stated that the rate of SSI after elective cesarean section was 3.7% for surgeries that include skin preparation by chlorhexidine-alcohol. On the other hand, the rate of SSI after elective cesarean section was 4.6% for surgeries that include skin preparation using povidone-iodine.[6]

Table 1: The studies that were included in the review

Year	Authors	Journal name
2020	Alshammari et al.	Saudi Medical Journal
2018	Nazer *et al.*	Asian Cardiovascular and Thoracic Annals
2010	El Beltagy *et al.*	Journal of Chemotherapy
2006	Balkhy *et al.*	International Journal of Infectious Diseases
2020	Al-Sharydah *et al.*	Saudi Medical Journal
2021	Alghamdi *et al.*	Medicine
2020	Alkhaibary *et al.*	World Neurosurgery
2015	Al-Qahtani *et al.*	Surgical Infections
2019	Al Salmi *et al.*	Journal of International Medical Research
2015	Hibbert *et al.*	Surgical Infections
2018	Alomar *et al.*	Knee Surgery, Sports Traumatology, Arthroscopy
2007	Al-Khayat *et al.*	Journal of the American College of Surgeons
2020	Elshamy *et al.*	The Journal of Maternal-Fetal & Neonatal Medicine
2010	Abou Elella *et al.*	Pediatric Cardiology
2016	Zakaria	African Journal of Paediatric Surgery
2007	Al-Salamah *et al.*	Journal of Pakistan Medical Association
2016	Eldib *et al.*	The Heart Surgery Forum
2010	Rehman *et al.*	Journal of Neurosurgery: Pediatrics
2006	Al-Salamah	Saudi Medical Journal
2015	Rehman *et al.*	Journal of Spinal Disorders and Techniques
2010	Surahio *et al.*	Journal of Ayub Medical College Abbottabad

SSIs in Riyadh

Nazer *et al*. reported that among patients having coronary surgery, the rate of SSIs in the patients who had a liver dysfunction was 12.1% and the SSIs rate in the patients who did not have liver dysfunction was 0.30%.[7] They found that transient liver dysfunction increased SSIs.[7] Furthermore, El Beltagy *et al*. found that the rate of SSIs for herniorrhaphies and cholecystectomies performed at a tertiary care hospital in Riyadh in 2007 was 0.88% for herniorrhaphy and 0.48% for cholecystectomy.[8] Balkhy *et al*. conducted a point prevalence and risk factors survey in a tertiary care center in Saudi Arabia and found that there were 38 patients with HAIs and that none of these HAIs were SSIs, so the SSI rate=0.[9] Alkhaibary conducted a study about the SSI incidence among 103 cases of cranioplasty from subcutaneously preserved bone flaps and found that the SSI incidence was 15.7%.[10] In addition, Hibbert *et al*. conducted a prospective observational longitudinal study in a tertiary referral center about the incidence of abdominal SSIs after colorectal surgery and found that the incidence of abdominal SSI was 30%.[11] Alomar *et al*. conducted a study on 50 patients undergoing primary isolated anterior cruciate ligament reconstruction. No patient developed post-operative SSI (rate=0%).[12] Abou *et al*. found that among children undergoing cardiac surgery, the infection rate is low (4%).[13] Al-Salamah *et al*. reported that the SSI rate in patients having excision with midline closure for pilonidal sinus disease was 4.2% and the rate was 3.12% in patients having excision without midline closure.[14] Al-Salamah *et al*. found that for incisional hernia, the wound infections rate was 5.50% in suture repair surgeries and 3.9% in mesh repair surgery.[15]

SSIs in Jeddah

Alghamdi *et al*. included 201 patients who underwent spinal surgery in their study and found that the overall SSI rate was 4.0%.[16] Al-Qahtani *et al*. conducted a study about post-appendectomy SSI rate after using an antimicrobial film incise drape and found that the rate of SSI was 11.5% in the patients who had the antimicrobial film incise drape and 5.1% in the patients who did not have the drape.[17] Furthermore, Al Salmi *et al*. reported that the rate of SSI was 10.25% after coronary artery bypass grafting and decreased to 3.36% after the implementation of a program that includes an evidence-based practice.[18] Eldib *et al*. conducted a study about surgical revascularization for patients with stenosis of both the left main and right coronary arteries and found that five out of 46 patients developed sternal wound infection (10.87%).[19]

SSIs in Al-Ahsa

Zakaria reported that the rate of infection was 2% (3 infections/145 surgeries) among patients having circumumbilical pyloromyotomy approach and 1.8% (3

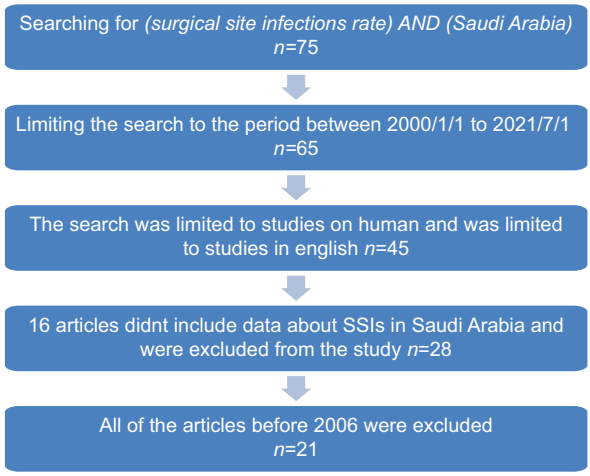

Figure 1: Searching flowchart

infections/171 patients) among patients having the classic Ramstedt's pyloromyotomy approach.[20]

SSIs in Al-Qassim

Rehman *et al*. reported that for patients having standard protocol ventriculoperitoneal shunt placement, the infection rate was 16.33%. On the other hand, changing of gloves before handling the shunt catheter decreased the infection rate to 3.77%.[21]

Rehman *et al*. conducted a study about the patients requiring lumbar spine and stated that among 179 patients who were treated with standard protocol for the procedure, the SSI rate was 3.35% and among the other 210 patients in whom, after initially double gloving, the outer pair of gloves was removed before handling the instrumentation, the SSI rate was 0.48%.[22]

SSIs in Makkah

Surahio *et al*. reported that in clean procedures, the rate of infection was 7.77%, while in clean contaminated procedures, it was 8.18%.[23]

CONCLUSION

The rate of SSIs was different and ranges from very low SSIs rate in some studies (e.g. the rate was 0% in one study and 0.30% in another study) to high SSIs rate in other studies (e.g. the rate was 32.2% in a study and 16.33% in another study). More researches are needed to study not only the rate of SSIs but also the associated risk factors to undertake optimal precautions and standard surgical techniques and to support the actions of the health team to reduce SSI occurrence and to decrease its complications if it is occurred.

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