Original Article

Awareness and Knowledge of Postoperative Surgical Site Infections in Patients from Saudi Arabia: A Multi-Regional Cross-Sectional Study

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Abstract

Background: Knowledge regarding surgical site infections (SSIs) can help reduce hospital stay, morbidity, and mortality associated with SSI.

Objectives: This study aimed to determine the knowledge and awareness of SSI among patients undergoing surgeries across Saudi Arabia.

Methods: This multi-center cross-sectional study included adult patients (aged >18 years) who underwent surgery at six centers located across the five regions of Saudi Arabia. A 36-item questionnaire was used to elicit data regarding demographics, patient's health status, procedures, and hospitalization history and awareness and knowledge about SSIs.

Results: A total of 375 patients were included (equally for all five regions of Saudi Arabia). Most patients were male (55.7%) and aged 18–34 years (44%). Most respondents (49.1%) had poor awareness; being illiterate and from the Northern region were significant factors ($P = 0.001$). Patients with no history of surgery ($P = 0.001$) or SSI ($P = 0.003$) also had poor awareness levels. In terms of knowledge, 45.8% and 35.2% of the participants had fair and poor knowledge, respectively, with the level of knowledge being significantly associated with region ($P = 0.001$). Patients those aged >65 years had poor knowledge ($P = 0.033$), while of males had good knowledge ($P = 0.02$). Patients with no history of surgery had poor knowledge of SSIs ($P = 0.003$). Only 32.8% of the patients recalled having been educated by healthcare workers. About 42% learned of SSIs from sources outside the hospital, with internet/social media platforms accounting for 48.4% of such sources.

Conclusion: A significant proportion of the patients included in this study had poor awareness and knowledge of SSIs. The study highlights the need for strengthening the preoperative patient education in Saudi Arabia to reduce the likeliness of SSIs.

Keywords: Awareness, knowledge, postoperative, surgical intervention, surgical site infections

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INTRODUCTION

Surgical site infections (SSIs) are infections that occur within 30 days of a surgery, affecting either the incision or deep tissue at the operation site, and thus often require surgical intervention for management.[1,2] Despite advances in surgical techniques, the rates of SSI remain considerably high, with a recent meta-analyses estimating the worldwide incidence of SSIs to be 11% after general surgeries and 7% after appendectomies.[3-5] SSI rates differ across countries depending on various factors.[3,6,7] In Saudi Arabia, SSIs have been reported to be 2.5%, 3.4%, and 12.9% following orthopedic surgeries, foot and ankle surgeries, and trauma laparotomies, respectively.[8-10]

SSI is a considerable disease and healthcare burden, as it increases hospitalizations, costs, and mortality rates.[11] For example, in the United States, SSI increases the average hospital length of stay by 9.7 days and the average cost of each patient by $20,000, resulting in an annual additional cost of $3.3 billion.[2] In low-and middle-income countries, SSI can pose a serious economic burden.[12] Therefore, there is need to lower the rates of SSIs worldwide.

One of the effective strategies for SSI prevention is increasing patient engagement.[13] A recent scoping review has highlighted a gap in patient participation to reduce SSIs; however, most studies in the literature are from high-income countries.[14] To develop effective engagement strategies, it is important to understand the current knowledge and awareness of patients. In Saudi Arabia, no such studies are currently available. Therefore, this study was conducted with the objective of measuring the knowledge and awareness of SSI among patients undergoing surgeries across Saudi Arabia. Through a multi-centered approach, the findings of this study would aid in the development of SSI preventative strategies in Saudi Arabia.

METHODS

Study design, setting, and participants

This multi-center cross-sectional study included adult patients (aged >18 years) who underwent surgery at the following six centers located across the five regions of Saudi Arabia: King Abdulaziz Medical City, Riyadh, and Al Kharj Armed Forces Hospital, Al Kharj (both from the Central region); King Fahd Hospital of the University, Al-Khobar (Eastern region); King Abdulaziz Specialist Hospital, Taif (Western region); King Salman Armed Forces Hospital, Tabuk (Northern region); and Asir Central Hospital, Abha (Southern region). The chosen hospitals serve as the main government health-care centers in their respective regions and have a high volume of surgical procedures.

The study was approved by the institutional review board of King Abdullah International Medical Research Center, Riyadh, Saudi Arabia.

Sampling and data collection

The data collection method followed a non-randomized convenience sampling technique. The required sample was calculated using the Raosoft sample size calculator, with a 95% confidence interval and a 5% margin of error. The estimated sample size was 377 Saudi patients. Data were collected between November 2019 and March 2020 through face-to-face responses to a close-ended questionnaire. All interviewers were provided training to ensure coherency in the data collection process. The interviewers were natives of their respective regions and aware of differences in regional dialects, and thus were able to resolve any ambiguities in the questionnaire for the respondents. Patients with cognitive impairment or who could not communicate were excluded from the study. Participants were informed of their response being voluntary and were assured of data confidentiality. All respondents provided consent for participating in this study.

Study tool

This study adopted the questionnaire developed by Albishi *et al*.[15] and modified it for a patient population. The questionnaire was in English and was composed of 36 questions categorized into three sections [Appendix 1]. The first section questions elicited the demographic information (age, gender, nationality, region, marital status, level of education, and employment status). The second section investigated the patient's health status, procedures, and hospitalization history. The final section assessed the level of awareness (8 questions) and knowledge (6 questions) about SSIs using the scoring system described by Albishi *et al*.[15] (Good = ≥80%; fair = 50%–79%; or poor = <50% level of awareness and knowledge). The questionnaire was pilot tested in 50 randomly chosen patients from across the five regions, following which no additional changes were deemed necessary; these responses were not included in the full-scale study analyses. The reliability of the questionnaire was assessed using Cronbach alpha and was found to be 0.8.

Statistical analysis

Data were entered in Microsoft Excel 2016 and analyzed using SPSS version 25 (IBM Corporation, Armonk, NY,

USA). Chi-square test was used to compare categorical variables and the outcome variable. Numerical variables were compared using an independent sample *t*-test. ANOVA test was used to obtain the difference in means of variables. *P* value < 0.05 was considered statistically significant.

RESULTS

A total of 375 patients were included: 75 from each of the five regions of Saudi Arabia. The majority of the participants were male (55.7%), aged 18–34 years (44%), and married (62.4%). In terms of education level, 47.7% had completed school, while 42.4% had a bachelor's degree. Most patients had either undergone laparoscopic (46.1%) or open (40.8%) surgeries and had been hospitalized for 0–7 days (89.6%) [Table 1].

Awareness regarding surgical site infections

Most respondents (49.1%) had poor awareness, while 28.8% and 22.1% had good and fair awareness, respectively. The level of awareness was not associated with age, gender, marital status, and employment status. However, being illiterate and from the Northern region of Saudi Arabia were significantly associated with a poor level of awareness ($P = 0.001$); respondents from the Central region had the highest level of awareness. In addition, poor awareness levels were found in patients with no history of surgery (63.6%; $P = 0.001$) and SSI ($P = 0.003$) [Table 2 and Figure 1a]. Finally, 70% of the participants who knew someone that had developed SSIs had a good level of awareness ($P < 0.001$).

Knowledge regarding surgical site infections

In terms of knowledge, most (45.8%) had fair knowledge, while 35.2% and 18.9% had poor and good knowledge, respectively. The level of knowledge was not associated with marital status but was significantly associated with the region ($P = 0.001$). Participants from the Eastern region of Saudi Arabia had good knowledge, while those from the Southern region had poor knowledge. In terms of age, a significantly higher proportion of those aged >65 years had poor knowledge ($P = 0.033$). A significantly higher proportion of males had good knowledge of SSI compared with females ($P = 0.02$).

In terms of surgical characteristics, the level of knowledge was not significantly associated with the type of surgery, days of hospitalization, previous admissions, and the number of previous surgeries. Participants with a history of surgery had good knowledge of SSIs ($P = 0.003$). Furthermore, 27.2% of the participants with a history of SSIs had poor knowledge level ($P = 0.009$) [Table 3 and Figure 1b].

Table 1: Demographic and surgical characteristics of the respondents (*N*=375)

Characteristic	*n* (%)
Age (years)	
18-34	165 (44)
35-44	88 (23.5)
45-64	101 (26.9)
≥65	21 (5.6)
Gender	
Male	209 (55.7)
Female	166 (44.3)
Marital status	
Single	127 (33.9)
Married	234 (62.4)
Widowed	5 (1.3)
Divorced	9 (2.4)
Educational degree	
Illiterate	8 (2.1)
Can read and write	10 (2.7)
School education	179 (47.7)
Bachelor's degree graduate	159 (42.4)
Postgraduate degree	19 (5.1)
Employment status	
Student	85 (22.7)
Employed	233 (62.1)
Unemployed	0
Retired	42 (11.2)
Self employed	15 (4.0)
Region	
Central	75 (20.0)
Eastern	75 (20.0)
Western	75 (20.0)
Northern	75 (20.0)
Southern	75 (20.0)
Type of surgery	
Laparoscopy	173 (46.1)
Open	153 (40.8)
VATS	7 (1.9)
Plastic	5 (1.3)
Other	37 (9.9)
Days of hospitalization	
0-7	336 (89.6)
8-14	25 (6.7)
>14	14 (3.7)
Previous admission	
No	139 (37.1)
Yes	236 (62.9)
Number of admission	
No admission	197 (52.5)
1	102 (27.2)
2	40 (10.7)
3	14 (3.7)
4	12 (3.2)
5	2 (0.5)
>5 times	8 (2.1)
Previous surgery	
No	140 (37.3)
Yes	235 (62.7)
Number of surgeries	
Minor surgery not requiring admission	198 (52.8)
1	129 (34.4)
2	30 (8.0)
3	10 (2.7)
4	4 (1.1)
5	1 (0.3)
>5 times	3 (0.8)
History of surgical infection	
Yes	20 (5.3)
No	339 (90.4)
I do not know	16 (4.3)

VATS - Video-assisted thoracoscopic surgery

Table 2: Awareness level by demographic and surgical characteristics

Characteristic	Poor (*n*=184), *n* (%)	Fair (*n*=83), *n* (%)	Good (*n*=108), *n* (%)	*P*
Age (years)				
18-34	78 (47.2)	34 (20.6)	52 (31.5)	0.103
35-44	41 (46.6)	23 (26.1)	24 (27.3)	
45-64	57 (56.4)	23 (22.8)	21 (20.7)	
≥65	7 (33.3)	3 (14.3)	11 (52.4)	
Gender				
Male	108 (51.7)	42 (20.1)	59 (28.2)	0.451
Female	76 (45.8)	41 (24.7)	49 (29.5)	
Marital status				
Single	63 (49.6)	26 (20.5)	38 (29.9)	0.639
Married	115 (49.1)	56 (23.5)	63 (27.4)	
Widowed	2 (40)	0	3 (60)	
Divorced	4 (44.4)	2 (22.2)	3 (33.3)	
Educational degree				
Illiterate	5 (62.5)	2 (25)	1 (12.5)	0.001
Can read and write	6 (60)	1 (10)	3 (30)	
School education	107 (59.8)	34 (19.6)	38 (20.7)	
Bachelor's degree graduate	62 (39)	43 (27)	54 (34)	
Postgraduate degree	4 (21.1)	2 (10.5)	13 (68.4)	
Employment status				
Student	36 (42.4)	19 (22.4)	30 (35.3)	0.119
Employed	121 (51.9)	56 (24)	56 (24)	
Retired	21 (50)	4 (9.5)	17 (40.5)	
Self employed	6 (40)	4 (26.7)	5 (33.3)	
Region				
Central	35 (46.7)	11 (14.7)	29 (38.7)	0.001
Eastern	39 (52)	16 (21.3)	20 (26.7)	
Western	30 (40)	19 (25.3)	26 (34.7)	
Northern	49 (65.3)	20 (26.7)	6 (8)	
Southern	31 (41.3)	17 (22.7)	27 (36)	
Type of surgery				
Laparoscopy	79 (45.6)	38 (21.9)	53 (30.6)	0.526
Open	76 (49.7)	35 (22.9)	42 (27.5)	
VATS	5 (71.4)	0	2 (28.6)	
Plastic	1 (20.0)	2 (40.0)	2 (40.0)	
Other	22 (59.5)	8 (21.6)	7 (18.9)	
Days of hospitalization				
0-7	166 (49.4)	78 (23.2)	92 (27.4)	0.260
8-14	13 (52.0)	2 (8.0)	10 (40.0)	
>14	5 (35.7)	3 (21.4)	6 (42.9)	
Previous admission				
No	71 (51.1)	29 (20.9)	39 (28.1)	0.825
Yes	113 (47.9)	54 (22.9)	69 (29.2)	
Number of admissions				
No admission	104 (52.8)	40 (20.8)	52 (26.4)	0.466
1	50 (49.0)	24 (23.5)	29 (27.5)	
2	15 (37.5)	12 (30.0)	13 (32.5)	
3	4 (28.6)	4 (28.6)	6 (42.9)	
4	5 (41.7)	1 (8.3)	6 (50.0)	
5	2 (100.0)	0.0	0.0	
>5 times	4 (50.0)	2 (12.5)	2 (37.5)	
Previous surgery				
No	89 (47.3)	23 (17.1)	27 (19.3)	0.001
Yes	94 (40.4)	59 (25.1)	81 (34.5)	
Number of surgeries				
Minor surgery not requiring admission	115 (58.0)	38 (19.0)	46 (23.0)	0.003
1	54 (41.9)	33 (25.6)	42 (32.6)	
2	8 (26.7)	9 (33.3)	12 (40.0)	
3	4 (40.0)	0.0	6 (60.0)	
4	1 (25.0)	3 (75.0)	0.0	
5	0.0	0.0	1 (100.0)	
>5 times	2 (66.7)	0.0	1 (33.3)	
History of surgical infection				
Yes	8 (38.4)	5 (25.2)	7 (36.4)	0.004
No	167 (49.2)	74 (21.8)	98 (28.9)	
I do not know	9 (56.3)	4 (25.0)	3 (18.8)	

VATS - Video-assisted thoracoscopic surgery

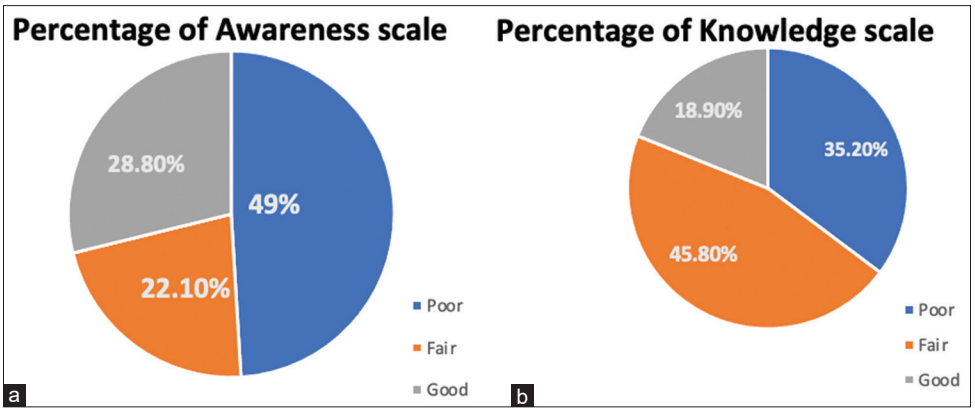

Figure 1: (a) Level of awareness and (b) level of knowledge

Participants who knew of someone with SSIs had a good level of knowledge compared with those who did not (27.8% vs. 16.1%; $P = 0.001$). The association between pre-operative counseling on the possibility of SSI after surgery with the type of surgery and hospital stay was found to be statistically insignificant. Furthermore, only 12.5% of participants who believed they have sufficient knowledge of SSI were found to have good levels of knowledge compared to 36.3% who stated they did not have a sufficient knowledge level ($P < 0.001$).

Source of surgical site infections education

Around one-third (32.8%) of the patients reported that healthcare workers (HCWs) educated them about SSIs. Of these, 81.3% were satisfied with the amount of information provided and 83.7% were satisfied with the amount of time dedicated. About 42% learned of SSIs from sources outside the hospital, with internet/social media platforms accounted for 48.4% of such sources followed by awareness campaigns in malls (10.2%) and articles in newspapers (8.6%).

Prevention of surgical site infections

In terms of perception on the possibility of preventing SSI, 93.3% of the respondents believed that SSI is preventable. Of these, 66.3% and 52.3% believed that keeping the wound clean and hand washing, respectively, were the most effective preventative measures. In regard to smoking cessation, 76% considered smoking increases the risk of developing SSI post-operatively.

DISCUSSION

This study found that 49.1% and 35.2% of the patients included in the study had poor levels of awareness and knowledge, respectively, which is similar to findings from a study conducted across three hospitals in England.[16] Interestingly, those with a history of SSI in the current study had significantly poor awareness levels, indicating a lack of learning curve from prior SSIs. The study was unable to assess if this was due to their lack of self-care or lack of knowledge provided after the initial SSI, and this needs to be assessed in future studies to provide data for focused interventions.[17] To the best of our knowledge, this is the first study from Saudi Arabia that has assessed the knowledge and awareness of surgical patients at risk of contracting SSIs, and the findings from this study is a call for action to further increase the awareness and knowledge of such patients through patient engagement.

Patient engagement by healthcare workers is a viable strategy for reducing SSIs.[13] However, in this study, only 32.8% of the patients recalled having been educated by HCWs, which is similar to the findings of Anderson *et al.*,[11] who reported that only 40% of surgical patients at risk of developing SSI recalled education by HCWs. Nonetheless, in our study, most patients who recalled having received education by HCWs were satisfied by the amount of information provided (81.3%) and time dedicated (83.7%). While the current study did not collect data regarding the exact amount of time HCWs spent educating patients regarding SSI, Anderson *et al.* found this to be <5 mins in 42% of the patients. A similar proportion of patients in our study and that of Anderson *et al.* (42.4% and 46%, respectively) learned of SSIs from sources outside the hospital. Internet/social media accounted for 48.4% of such sources in our study. This is understandable given the adoption of and access to internet in Saudi Arabia is high,[18] but also indicative of the urgent need to direct these patients reliable sources for obtaining information digitally. Participants in this study who believed they have sufficient knowledge about SSI had significantly poor level of knowledge, which may have been because of using incorrect sources. Surprisingly, only 16.8% of the participants in the current study reported being given educational material about SSI by HCWs, considerably

Table 3: Knowledge by demographic and surgical characteristics

Characteristic	Poor (*n*=132), *n* (%)	Fair (*n*=172), *n* (%)	Good (*n*=71), *n* (%)	*P*
Age (years)				
18-34	53 (32.1)	72 (43.6)	40 (24.2)	0.033
35-44	30 (34.1)	47 (53.4)	11 (12.5)	
45-64	37 (36.6)	47 (46.5)	17 (16.8)	
≥65	12 (57.1)	6 (28.6)	3 (14.3)	
Gender				
Male	71 (34.0)	88 (42.1)	50 (23.9)	0.020
Female	61 (36.7)	84 (50.6)	21 (12.7)	
Marital status				
Single	39 (30.7)	59 (46.5)	28 (22.8)	0.492
Married	89 (38.0)	102 (44.4)	42 (17.5)	
Widowed	2 (40.0)	5 (60.0)	0	
Divorced	2 (22.2)	6 (66.7)	1 (11.1)	
Educational degree				
Illiterate	5 (62.5)	2 (25.0)	1 (12.5)	0.000
Can read and write	8 (80.0)	1 (10.0)	1 (10.0)	
School education	76 (43.0)	81 (45.3)	21 (11.7)	
Bachelor's degree graduate	40 (24.5)	82 (52.2)	37 (23.3)	
Postgraduate degree	3 (15.8)	5 (26.3)	11 (57.9)	
Employment status				
Student	23 (27.1)	35 (41.2)	27 (31.8)	0.033
Employed	86 (37.3)	113 (48.5)	33 (14.2)	
Unemployed	0	0	0	
Retired	16 (38.1)	17 (40.5)	9 (21.4)	
Self employed	6 (40.0)	7 (46.7)	2 (13.3)	
Region				
Central	23 (29.3)	36 (48.0)	16 (22.7)	0.001
Eastern	9 (12.0)	49 (65.3)	17 (22.7)	
Western	26 (34.7)	36 (48.0)	13 (17.3)	
Northern	51 (69.3)	19 (25.3)	5 (5.3)	
Southern	23 (30.7)	32 (42.7)	20 (26.7)	
Type of surgery				
Laparoscopy	56 (32.4)	81 (46.8)	36 (20.8)	0.154
Open	60 (39.2)	63 (40.5)	30 (20.3)	
VATS	1 (14.3)	5 (71.4)	1 (14.3)	
Plastic	0	4 (80.0)	1 (20.0)	
Other	15 (40.6)	19 (54.0)	1 (5.4)	
Days of hospitalization				
0-7	115 (34.4)	157 (46.8)	63 (18.8)	0.866
8-14	12 (44.0)	9 (36.0)	5 (20.0)	
>14	5 (35.7)	6 (42.9)	3 (21.4)	
Previous admission				
No	51 (36.7)	59 (42.4)	29 (20.9)	0.566
Yes	81 (34.3)	113 (47.9)	42 (17.8)	
Number of admissions				
No admission	69 (35.5)	93 (46.7)	35 (17.8)	0.603
1	44 (34.3)	57 (44.1)	28 (21.6)	
2	17 (42.5)	18 (45.0)	5 (12.5)	
3	4 (28.6)	6 (42.9)	4 (28.6)	
4	3 (25.0)	7 (58.3)	2 (16.7)	
5	2 (100.0)			
More than 5 times	0	2 (75)	1 (25)	
Previous surgery				
No	64 (45.7)	51 (36.4)	24 (17.9)	0.003
Yes	68 (28.9)	120 (51.5)	47 (19.6)	
Number of surgeries				
Minor surgery not requiring admission	81 (40.9)	83 (41.9)	34 (17.2)	0.183
1	39 (29.5)	63 (49.6)	27 (20.9)	
2	10 (33.3)	13 (43.3)	7 (23.3)	
3	1 (10.0)	8 (80.0)	1 (10.0)	
4	1 (25.0)	3 (75.0)	0	
5	0	0	1 (100.0)	
>5 times	1 (33.3)	1 (33.3)	1 (33.3)	
History of surgical infection				
Yes	6 (27.2)	10 (51.7)	4 (21.2)	0.009
No	116 (34.2)	157 (46.3)	66 (19.4)	
I do not know	10 (62.5)	5 (31.3)	1 (6.3)	

lower than that reported in the study by Anderson *et al.* (60%).[11]

Being illiterate and aged >65 years were significant factors associated with poor levels of awareness and knowledge, respectively. Understandably, this indicates that the health information-seeking behavior among these populations are low and a more focused approach should be adopted to ensure the delivery of SSI preventive information to these groups. A higher proportion of males were found to have "good" knowledge compared with females. While it was beyond the scope of the current study to correlate the knowledge levels with those who contracted infections post-surgery, previously, SSI have been reported to be more common among males than females.[19]

Local economic conditions can cause regional healthcare variations.[20] This was also observed in our study, where SSI knowledge was highest among patients from the Central and Eastern regions, which are largest regions of the country and have the highest GDP. The Central region also has the highest number of healthcare facilities, and potentially, their health-promotion activities may have resulted in the higher knowledge levels noted in this study.[21,22]

Participants who knew someone who had SSIs had a good level of knowledge and awareness compared with those who did not. A plausible explanation for this is that knowing someone having SSIs may have led to increased health information-seeking behavior; however, this is not a robust explanation, as patients with a history of SSIs were found to be significantly poor awareness levels. Therefore, further studies are required to identify factors that influence the health information-seeking behavior in surgical patients from Saudi Arabia.

Limitations

Although the sampled population was representative and statistically adequate, a larger sample size would have increased the power of the findings. In addition, only key government tertiary hospitals were included for each region; a similar study conducted within private hospitals would widen the scale of knowledge, and collectively, better guide policymakers in formulating patient-centered policies for reducing SSIs.

CONCLUSION

A significant proportion of the patients included in this study had poor awareness and knowledge of SSI, and remarkably, those with a history of SSI, had a poor level of awareness and knowledge.

Ethical consideration

The study was approved by the Institutional Review Board of King Abdullah International Medical Research Center, Riyadh, Saudi Arabia (Ref no.: RC19/382/R; dated: October 19, 2019). In addition, verbal approval obtained from the general surgery section heads at each hospital. All participants provided consent for participating in this study. The study adhered to the general principles outlined in the Declaration of Helsinki, 2013.

Data availability statement

The datasets generated during and/or analyzed during the current study are not publicly available but are available from the corresponding author on reasonable request.

Peer review

This article was peer-reviewed by four independent and anonymous reviewers.

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Conflicts of interest

There are no conflicts of interest.

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Appendix 1: Survey Questionnaire

Awareness questions
- Have you ever heard about SSI?
  - Yes
  - No
- Do you know anyone have been diagnosed with SSI?
  - No one
  - Family member
  - Relative, Colleague or Friend
  - Other
- Did health care worker discuss SSI with you before the surgery?
  - Yes
  - No
- Have you ever given any educational material by health care workers?
  - Yes
  - No
- Have you ever learned about SSIs outside hospital?
  - Yes
  - No
- Do you wash your hand before handling the site of surgery?
  - Yes
  - No

Knowledge questions
- What is SSIs?
  - Infection of skin in where the surgery cut done
  - Infection of deep organs
  - Infection of skin and deep organs at the site of surgery
  - Redness and pain that is seen at the suture site
- Which of these signs and symptoms of surgical site infections do you know? (please select all you know)
  - Redness
  - Delayed healing
  - Fever
  - Pain
  - Tenderness
  - Warmth
  - Drainage
  - All of above
  - None of the above
  - I don’t know
  - The participant will get 1 point for each selection and full score for all of above (7/7). Zero point was considered for 'None of the above' and 'I don’t know' responses.
- Which of these considered as risk factors? (please select all you know)
  - Age
  - Prolonged hospitalization
  - Smoking
  - Malnutrition
  - Corticosteroid and other immunotherapy
  - Obesity
  - Diabetes mellitus
  - Renal failure
  - Anemia
  - All of above
  - None of the above
  - I don’t know
  - The participant will get 1 point for each selection and full score for all of above (9/9). Zero point was considered for 'None of the above' and 'I don’t know' responses.
- Do you think that SSIs is preventable?
  - Yes
  - No
- How can SSIs be prevented? (you can select more than one answer)
  - Clean hands
  - Preoperative prophylactic antibiotics
  - Stop smoking 4 weeks before surgery
  - Keep the wound clean and dry
  - Shaving the site of surgery
  - All of above
  - None of the above
  - I don’t know
  - The participant will get 1 point for each selection and full score for all of above (5/5). Zero point was considered for 'None of the above' and 'I don’t know' responses.
- Do you think that SSIs can be treated?

Contd...

Appendix 1: Contd...

Yes
No
If yes, what is the first-line treatment?
No need for treatment because it is self-limiting
Sutures removal, drainage, debridement and wound dressing
Use antibiotics only
Open the wound, debridement and use antibiotics
If you have thick hair on the site of surgery and you are asked to remove it what do you use?
Razor
Hair clipper
Scissor
Other

Any yes answer the participant will get 1 score. 1 point will be given for each (yes) selected by participant, 1 point will be given if participant selected any of the highlighted answers, 0 points are given if the participant selected either (none of the above) or (I do not know). SSIs - Surgical site infections