

# A Survey on Surgical Site Infections Prevention Guidelines Knowledge and Implementation Level of Trauma Centre Healthcare Professionals

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## Abstract

**Aims/Background** Surgical site infections (SSIs) significantly influence patient safety and healthcare quality, particularly in low- and middle-income countries where the burden is most evident. This manuscript aims to evaluate the awareness and adherence to SSI prevention guidelines among healthcare providers at a tertiary trauma centre situated in Tirana, Albania.

**Methods** This cross-sectional survey was conducted among practising surgeons, residents and nurses of Trauma University Hospital, Tirana. The questionnaire explores awareness, attitudes and practices towards SSI prevention in preoperative, perioperative and postoperative phases.

**Results** The participants demonstrated a high level of patient education about SSI risks (91.9%), but lower adherence to individual prevention practices.

**Conclusion** Despite adequate knowledge, there remains a significant gap in the implementation of SSI prevention guidelines. Strengthening continuous medical education is crucial to addressing systemic barriers, improving compliance with guidelines, and decreasing SSI rates.

**Key words:** Albania; guideline compliance; SSI; SSI prevention; trauma centre

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## Introduction

Healthcare-associated infection (HAI) refers to infections associated with the process of delivering healthcare, and may seriously threaten patients' safety and quality of life (WHO, 2018). Surgical site infections (SSIs), a subset of HAI, include any infection that occurs at the surgical site within 30 days after surgery, or 90 days if an implant is involved (Horan et al, 2008). According to the World Health Organization (WHO, 2018), SSIs can affect up to one-third of surgical patients and are the most common type of HAI in low- and middle-income countries. In the United States of America (USA), SSIs are the second most prevalent HAI (Magill et al, 2014), while in the European region, they were the third most commonly reported HAI in 2018 (Suetens et al, 2018).

In 2016, a study reported a 5% SSI rate among 44,814 patients, who underwent elective surgery (International Surgical Outcomes Study Group, 2016), but

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since most SSIs occur after hospital discharge (Leaper et al, 2015), it is widely acknowledged that the prevalence of SSIs is significantly underestimated. A 2013 European surveillance analysis estimated that the surgical procedure with the highest risk of SSIs was colorectal surgery (9.5%) (Flodgren et al, 2019).

It has been demonstrated for decades that patients who develop SSIs have several times more chance for admission in the Intensive Care Unit, readmission to the hospital, and even twice as likely to face death (Kirkland et al, 1999).

In the USA, the cost of each case with SSI was reported to be approximately \$20,785, utilising one-third of all HAI costs (Anderson et al, 2014; Zimlichman et al, 2013). Consequently, public health structures continuously provide evidence-based clinical guidance to aid healthcare professionals in the implementation of SSI preventive interventions (Berríos-Torres et al, 2017; Harrington, 2014; Plachouras et al, 2018). However, compliance with the prevention guidelines has been constantly reported to be uniformly poor (Davis et al, 2003). As a result, progress in achieving quality improvements, as indicated by a reduction in SSI incidence, can still be slow and sometimes even incomplete (Flodgren et al, 2019).

Despite extensive evidence-based guidelines for SSI prevention, compliance remains suboptimal across many healthcare settings. For instance, Leaper et al (2015) reported poor adherence to SSIs prevention protocols, indicating a significant gap between knowledge and practice. This gap is particularly pronounced in low- and middle-income countries like Albania, where data on SSIs prevention practices is deficient.

In Albania, a small Southeast European country undergoing a prolonged transition to a market economy and democratic standards, information on SSIs is relatively scarce. In this context, the aim of this study was to assess the knowledge level, and adherence of healthcare professionals working at Trauma University Hospital in Tirana, the capital of Albania, with regard to SSIs prevention guidelines and strategies. Identifying knowledge gaps and deficiencies in adherence to the investigated preventive recommendations will help us to better concentrate the institutional educational materials to address any insufficient level of knowledge. Additionally, it will help to disclose the potential drawbacks in an application, allowing for better targeted and more efficient preventive strategy formulation.

## Methods

### Study Population

The study was conducted in Trauma University Hospital, Tirana, from 1 to 30 October 2023. This tertiary healthcare facility was chosen because of the high workload, and number of surgeries performed each year on patients being exposed to diverse kinds of trauma. Additionally, cases are referred to this facility from all over Albania, thus ensuring a potentially optimal representation of all population groups. Lastly, the tertiary university status of this health facility demands very high compliance with SSI prevention guidelines, thus being an ideal site for our observational purposes.

We contacted all the practising surgeons in Ear-Nose-Throat (ENT) and maxillofacial surgery, General surgery, Neurosurgery and Orthopedic surgery wards, all residents in the 3rd and 4th years of their residency in the corresponding department, and all the chief nurses of each ward including nurses that prepare the patient for surgery. Informed consent was obtained, and all the contacted healthcare professionals agreed to participate voluntarily.

### Survey Design

The questionnaire contained components arranged to assess the participants' knowledge level of the 2018 WHO SSI Prevention Guidelines, as well as their acceptance and routine application.

### Questionnaire Structure

We built the questionnaire aiming to investigate the actions, and everyday practices' compliance with the relevant SSI prevention guidelines. Our questionnaire is organized in four sections: the participant's data, preoperative, perioperative and postoperative period prevention strategies (**Supplementary Figs. 1,2**).

The preoperative section investigates the physician's opinion regarding the infection risk description to the patients, preoperative recommendations for bathing and chlorhexidine usage during the process, hair removal, the optimization of glycaemia (preoperative blood glycaemia levels to be maintained under 150 mg/dL or 8.3 mmol/L) (**WHO, 2018**), and the recommendation for nutritive formula administration in malnourished cases.

The operative section investigates overall patient and doctor's related policies and practices, the timing of the preoperative antibiotic prophylaxis, hand wash quality and technique, frequency of surgical gloves change during surgery, patient normothermia (the preservation of the patients' body temperature during surgery) recommendations, drape usage, iodine solution wound lavage, secondary soft tissue damage, and patient hyperoxygenation (providing the patient with 80% oxygen during the surgical procedure).

In the postoperative section, we questioned the physicians regarding their preferences in postoperative antibiotic prophylaxis prolongation, and their opinions upon the risk and benefits of aspirative drainage.

### Survey Procedures

After the institutional ethics committee approval, we distributed the questionnaires, and assigned the chief nurses of each department to collect the questionnaires directly from the participants by October, 31.

### Statistical Analysis

The information was entered into a Microsoft Excel database for further analysis. Absolute numbers and corresponding percentages were reported. Chi-square tests were used to assess statistically significant differences among comparison groups. All statistical analyses were performed using the IBM SPSS Statistics for Windows, Version 19.0, software (IBM-SPSS Statistics, Chicago, IL, USA).

**Table 1. Distribution of participants by department and speciality.**

Variable	Absolute number	Percentage (%)
Total	86	100.0
Department/Ward		
ENT and maxillofacial surgery	10	11.6
General surgery	30	34.9
Neurosurgery	9	10.5
Orthopedic surgery	37	43.0
Speciality		
Attending doctor	67	77.9
Resident doctor	6	7.0
Nurse	13	15.1
Work experience		
<10 years	30	34.9
10–20 years	33	38.4
>20 years	23	26.7

ENT, Ear-Nose-Throat.

## Results

### General Information

We collected data from ENT and maxillofacial surgery, General surgery, Neurosurgery and Orthopedic surgery wards (Table 1). More than one-third of the participating staff (43%) was employed at the Orthopedic surgery ward, 34.9% in General surgery ward, 11.6% in ENT and maxillofacial surgery ward, and 10.5% in Neurosurgery ward.

With regard to speciality, the attending doctors accounted for 77.9% of the participants, resident doctors 7%, and nurses comprised 15.1% of the respondents. About one-third of the respondents had less than 10 years of work experience, 38.4% had between 10 and 20 years of work experience, and the remaining 26.7% had more than 20 years of work experience.

### Assessing Attitudes and Knowledge of Evidence-Based SSI Prevention Strategies before Intervention

In the preoperative section, we firstly asked the participants, whether they perceived to have appropriately informed the patients regarding infection risk, and whether they recommended various SSI prevention procedures to their patients before the surgery. The results are shown in Table 2. Over 90% of the professionals believed they appropriately informed the patients about SSI risks. However, fewer professionals recommended specific preventive procedures. The most recommended preventive procedure was preoperative surgical site hair removal (86%), followed by preoperative bath (81.4%), and the least recommended were preoperative glycaemia optimization and antibiotic prophylaxis (76.7% each). Less than one-third recommended nutritive formulas for malnourished patients, and only 16.3% recommended using chlorhexidine during bathing. For antibiotic prophylaxis

**Table 2. Attitudes and behaviours of staff with regard to various SSI prevention strategies before the intervention.**

Variable	Absolute number	Percentage (%)
Appropriately informing patients about SSI risks		
No	7	8.1
Yes	79	91.9
Recommending patients preoperative bath		
No	16	18.6
Yes	70	81.4
Recommending patients preoperative body wash with chlorhexidine		
No	72	83.7
Yes	14	16.3
Recommending patients surgical site hair removal		
No	12	14.0
Yes	74	86.0
If yes, what manner *		
Razor	41	55.4
Trimmer	33	44.6
Recommending malnutrition patients nutritive formulas		
No	59	68.6
Yes	27	31.4
Recommending patients preoperative glycaemia optimization		
No	20	23.3
Yes	66	76.7
Antibiotic prophylaxis		
No	20	23.3
Yes	66	76.7
If yes, how long before **		
1 day before intervention	23	35.4
2 hours before intervention	24	36.9
30 minutes before intervention	18	27.7
For how long do you wash your hands before intervention?		
<30 seconds	1	1.2
30–60 seconds	38	44.2
>60 seconds	47	54.7

\* Only among those recommending preoperative surgical site hair removal (n = 74).

\*\* Only among those recommending antibiotic prophylaxis before intervention (n = 66). Any discrepancies with the total number are due to missing information.

SSI, Surgical site infection.

laxis, 35.4% recommended it one day before surgery, 36.9% two hours before, and 27.7% thirty minutes before surgery. More than half (54.7%) spent over 60 seconds for surgical hand preparation before intervention, while for 44.2% of the participants it took 30–60 seconds (Table 2).

In general, there were no statistically significant differences in attitudes and SSI prevention practices based on department, speciality, and work experience.

**Table 3. Attitudes and behaviours of staff regarding preoperative bath, glycaemia optimization, and chlorhexidine bath prevention strategies according to department, speciality, and work experience.**

Distribution of preoperative bath strategy recommendation according to department				
Variable	Total number	Absolute number	Percentage (%)	<i>p</i> -value*
Department/Ward				
ENT maxillofacial surgery	10	6	60	0.018
General surgery	30	28	93.3	
Neurosurgery	9	9	100	
Orthopedic surgery	37	27	73	
Distribution of preoperative glycaemia optimization strategy recommendation according to speciality				
Variable	Total number	Absolute number	Percentage (%)	<i>p</i> -value*
Speciality				
Attending doctor	67	56	83.6	0.007
Resident doctor	6	2	33.3	
Nurse	13	8	61.5	
Distribution of chlorhexidine bath strategy recommendation according to work experience				
Variable	Total number	Absolute number	Percentage (%)	<i>p</i> -value*
Work experience				
<10 years	30	10	30	0.003
10–20 years	33	5	15.2	
>20 years	23	0	0	

\* *p*-value according to Fisher's exact test.

However, a few differences were significant. For instance, all Neurosurgery staff recommended preoperative baths compared to 93.3%, 73%, and 60% of General surgery, Orthopedic surgery, and ENT and maxillofacial surgery staff, respectively ( $p = 0.018$ ). Additionally, a higher proportion of attending doctors (83.6%) recommended preoperative glycaemia optimization compared to 61.5% of nurses, and 33.3% of resident doctors ( $p = 0.007$ ). Finally, we found an inverse relationship between work experience and chlorhexidine bath recommendations: 30% of staff with <10 years of experience recommended it, compared to 15.2% with 10–20 years, and 0% with >20 years of work experience ( $p = 0.003$ , Table 3).

### Assessing Attitudes and Knowledge of Evidence-Based SSI Prevention Strategies During Intervention

The results of the investigation of the attitudes and practices of the professionals during the surgical procedure are shown in Table 4. Over 90% of the professionals believed secondary tissue damage could affect SSI risk, but only 39.3% felt the same about oxygenating the patient with 80% O<sub>2</sub> during surgery. The measures m-

Table 4. Attitudes and behaviours of staff with regard to various SSI prevention strategies during the intervention.

Variable	Absolute number	Percentage (%)
Are the solutions for washing hands and preparing the operative field of the right standard?		
No	34	39.5
Yes	52	60.5
Do you believe that frequently changing gloves more than 5 times/hour during surgery has a positive effect on reducing infections?		
No	30	34.9
Yes	56	65.1
Do you think that warming the patient's body during surgery has a positive effect on reducing infections?		
No	44	51.2
Yes	42	48.8
Do you use "drape" to isolate the surgical area?		
No	41	47.7
Yes	45	52.3
Do you think that the use of "drape" reduces the risk of wound infection?		
No	17	19.8
Yes	69	80.2
Do you think that irrigation with iodine solution before closing the wound affects the risk of wound infections?		
No	19	22.1
Yes	67	77.9
Do you think that secondary soft tissue damage affects the risk of operative wound infections?		
No	7	8.1
Yes	79	91.9
Do you think that oxygenating the patient with 80% O <sub>2</sub> during surgery affects the risk of infections? *		
No	51	60.7
Yes	33	39.3

\* Any discrepancies with the total number are due to missing information.

**Table 5. Interdepartmental discrepancies regarding attitudes and behaviours of staff with regarding to SSI prevention strategies during the intervention.**

Participants believing in “the hand washing and operative field preparation solutions inadequacy” according to departments				
Variable	Total number	Absolute number	Percentage (%)	<i>p</i> -value*
Department/Ward				
ENT maxillofacial surgery	10	5	50	0.010
General surgery	30	6	20	
Neurosurgery	9	2	22	
Orthopedic surgery	37	21	56.8	
Participants believing in “frequent glove change” reducing SSI incidence according to departments				
Variable	Total number	Absolute number	Percentage (%)	<i>p</i> -value*
Department/Ward				
ENT maxillofacial surgery	10	2	20	0.010
General surgery	30	23	76.7	
Neurosurgery	9	5	55.6	
Orthopedic surgery	37	26	70.3	
Participants believing in “80% oxygenation” reducing SSI incidence according to departments				
Variable	Total number	Absolute number	Percentage (%)	<i>p</i> -value*
Department/Ward				
ENT maxillofacial surgery	10	5	50	0.021
General surgery	30	17	56.7	
Neurosurgery	9	1	12.5	
Orthopedic surgery	37	10	27.8	
Transparent drape usage distribution according to department/ward				
Variable	Total number	Absolute number	Percentage (%)	<i>p</i> -value*
Department/Ward				
ENT maxillofacial surgery	10	6	60	<0.001
General surgery	30	8	26.7	
Neurosurgery	9	9	100	
Orthopedic surgery	37	22	59.5	

\* *p*-value according to Fisher’s exact test.

ost frequently perceived to lower infection risk, were the use of transparent drapes (80.2%), irrigation with iodine solution before closing the wound (77.9%), frequent glove changes during surgery (65.1%), and warming the patient's body during surgery (48.8%).

Despite that 80.2% of the participants believed in the effectiveness of transparent drapes in lowering SSI risk, only 52.3% reported using them for surgical wound isolation. Several statistically significant differences in SSI prevention attitudes and behaviours were noted (Table 5). Higher proportions of Orthopedic surgery (56.8%) and ENT maxillofacial surgery (50%) professionals believed that hand washing and operative field preparation solutions were substandard compared to about 20% from other wards ( $p = 0.010$ ). More General surgery (76.7%) and Orthopedic surgery (70.3%) professionals believed that frequent glove changes could lower infection risk compared to 20% of ENT and maxillofacial surgery, and 55.6% of Neurosurgery professionals ( $p = 0.010$ ). All Neurosurgery professionals used transparent drapes versus 60% of ENT and maxillofacial surgery, 59.5% of Orthopedic surgery, and 26.7% of General surgery professionals ( $p < 0.001$ ). However, there were no significant differences across departments, in the belief that transparent drape usage lowers infection risk. Lastly, higher proportions of General surgery (56.7%) and ENT maxillofacial surgery (50%) professionals thought that 80% oxygenation of the patient during surgery lowers infection risk, compared to 27.8% of Orthopedic surgery, and 12.5% of Neurosurgery professionals ( $p = 0.021$ ). Regarding speciality, significantly more attending doctors (58.2%) and nurses (46.2%) reported using transparent drapes compared to 0% of resident doctors ( $p = 0.021$ ).

### Assessing Attitudes and Knowledge of Evidence-Based SSI Prevention Strategies after the Intervention

The final section of the questionnaire investigated the attitudes and practices of the professionals after the surgical intervention. The results are shown in Table 6. Almost all (98.8%) of the professionals recommended continuing prophylactic antibiotics after surgery. Of these, 31.8% recommended it for 72 hours, 57.6% for 5 days, and 10.6% for longer periods. Over 40% of professionals believed that placing a drain increased infection risk, and 32.5% felt that there was a need to extend antibiotic prophylaxis due to the drain presence (Table 6).

There were no statistically significant differences in attitudes and behaviors regarding post-surgery SSI prevention strategies based on department, speciality, or work experience (Table 7).

## Discussion

In our study, although over 90% of participants were confident in informing the patients regarding SSI risks, they scored lower in adherence to several well-established prevention strategies. Preoperative bathing is a widely known and accepted prevention strategy, but unfortunately not applicable for 1 in 5 of our survey participants. Concerning the previously recommended usage of chlorhexidine soap (IHI, 2012), the WHO's Guideline Development Group (GDG) panel did not issue a current recommendation regarding it. A better knowledge and adherence to previo-

**Table 6. Attitudes and behaviours of staff with regard to various SSI prevention strategies after the intervention.**

Variable	Absolute number	Percentage (%)
Do you recommend the continuation of prophylaxis with antibiotics in the post-intervention phase?		
No	1	1.2
Yes	85	98.8
If yes, how long? *		
72 hours	27	31.8
5 days	49	57.6
>5 days	9	10.6
Do you think that the placement of the drain increases the risk of infection and therefore the need for prolonged prophylaxis?		
No	49	57.0
Yes	37	43.0
Do you think there is a need to extend the prophylaxis with antibiotics due to the placement of the drain? *		
No	52	67.5
Yes	25	32.5

\* Any discrepancies with the total number are due to missing information.

**Table 7. Distribution through department, speciality and work experience of attitudes and behaviours regarding post-surgery SSI prevention strategies.**

Investigated strategy	Participants recommending the continuation of antibiotics prophylaxis after surgery (%)	Participants believing that drain placement increases risk for SSIs (%)	Participants recommending prolongation of prophylaxis due to drain placement (%)
Total percentage (%)	98.8	43	32.5
Department/Ward*			
ENT maxillofacial surgery	100.0	60.0	60.0
General surgery	96.7	56.7	40.0
Neurosurgery	100.0	33.3	22.2
Orthopedic surgery	100.0	29.7	21.2
Speciality*			
Attending doctor	98.5	40.3	35.0
Resident doctor	100.0	66.7	25.0
Nurse	100.0	46.2	23.1
Work experience*			
<10 years	100.0	30.0	39.3
10–20 years	97.0	45.5	29.6
>20 years	100.0	56.5	27.3

\* All differences are not statistically significant ( $p > 0.05$  in all cases).

us guidelines in the past can be easily implied. Most organisations and entities recommend the use of plain and antimicrobial soap ([Health Protection Scotland, 2015](#); [NICE, 2013](#)).

Preoperative antibiotic prophylaxis has been a consolidated preventive strategy since many decades ago ([Dellinger et al, 1994](#)), and the panel suggest its application within 120 minutes prior to incision ([WHO, 2018](#)). [Forbes et al \(2008\)](#) reported that the recommended administration within 60 minutes before surgery took place in only 5% of the cases, and [Hedrick et al \(2007\)](#) reported only baseline compliance regarding the recommended onset of appropriate antibiotic prophylaxis, in colorectal surgery. According to a multicentric study carried out in 13 Dutch hospitals, adherence to hospital guidelines for antibiotic prophylaxis was achieved in only 28% of patients ([Davis et al, 2003](#)). Similarly, in our study, the application of this strategy within the recommended time interval, was reported in only half of the participants, and these results underline the needs for the inclusion of such topics in future continuous medical education events. Likewise, for approximately half of the participants, it takes less than 60 seconds to prepare their hands for surgery, and it will take serious action to promote the 2–5 min recommended time of “WHO guidelines on hand hygiene” ([WHO, 2009](#)).

Many nutritional formulas containing combinations of arginine, glutamine, omega-3 fatty acids or nucleotides, have been prescribed over the years for underweight patients applying for surgery ([Mainous and Deitch, 1994](#)), and the low positive rate (<35%) of the participants favouring it, emphasizes the needs to improve preoperative patient evaluation protocols.

[Hedrick et al \(2007\)](#) reported that 36% of colorectal surgery patients had core temperatures below 36°C post-anesthesia. [Forbes et al \(2008\)](#) reported similar results regarding hypothermia during anesthesia. Similarly, the low (39.3%) overall rate of hyperoxygenation application may be due to the fact that in common everyday practice, both hypothermia and hyperoxygenation management are generally considered part of anesthesiology.

GDG panel has not issued any recommendation regarding double-gloving, glove changing during the operation, or the usage of specific types of gloves during surgery ([WHO, 2018](#)). The higher proportions of professionals from the General surgery and Orthopaedics Departments who favour frequent glove changes during surgery can be attributed to the more physically demanding nature of their procedures. Earlier recommendations suggest not to use the same gloves for more than 90 minutes, because a longer usage significantly increases the risk of perforation and contamination ([Partecke et al, 2009](#); [Thanni and Yinusa, 2003](#)).

Even though, core supplies and all other surgical means and instrumentation, have been made available and reachable relying on the surgeon’s individual preferences, still more than half of the Orthopaedics and ENT wards feel unconfident, regarding the quality of the hand washing solutions. Further personnel involvement even in product trademark selection politics becomes crucial. Similar rationale might be suggested regarding the moderate employment of the surgical transparent drapes. The insufficient accessibility to the product, might be the cause that, even in the event when 4 out of 5 professionals believe in the benefit of drapes, these

drapes are still used in less than half of the cases. Other suggested motives might be: failure to comply due to limited operative time, congested schedules etc.

In this study conducted at Trauma University Hospital, Tirana, Albania, compliance with the SSI prevention guidelines varied. The overall adherence rate showed both strengths and weaknesses. As an example, pre-surgical removal of hair was recommended by 86% of healthcare professionals, whereas only 16.3% recommended chlorhexidine baths in our study. This situation in Albania is similar to that observed in other countries. For instance, a study in India, a low-middle income country, showed different rates of adherence to preoperative antibiotic prophylaxis in a tertiary care university hospital ([Gurunthalingam et al, 2023](#)). In Ethiopia, a study reported more than half of the participating nurses to have inadequate knowledge regarding the prevention of SSIs, the adherence to the recommended practices was low, and with considerable gaps in areas like proper hand hygiene, and timely antibiotic administration ([Teshager et al, 2015](#)).

It is apparent that, the SSI guideline-adherence challenges in Albania are similar to those faced by other low- and middle-income countries. Such obstacles include financial and human resource constraints, lack of institutional support, and limited training opportunities. Similarly, problems and barriers in SSI guideline dissemination were reported as part of the findings from a Nigerian study, which called for continuous education among others to increase compliance rates among clinicians ([Brisibe et al, 2014](#)). These facts underline that, despite geographical variations in specific adherence levels and practices, the underlying issues and the need for targeted interventions are consistent across different countries. The innovative governmental project on the sterilization of surgical instruments, launched in 2016 to address such issues in Albania, has proven effective in shortening both preoperative preparation and surgical procedure duration. All these measures are expected to significantly impact the overall SSI incidence, in future observations.

Unfortunately, significant incompatibilities were reported regarding the prolongation of antibiotic prophylaxis postoperatively, where more than half of the participants prescribed it on an average of 5 days. Considering that, the panel (with moderate confidence) recommends the discontinuation of antibiotic prophylaxis after the completion of the intervention ([WHO, 2018](#)), we need to determine whether non-compliance is intentionally or due to a knowledge gap. For 40% of our participants, surgical drains increase the risk for SSIs, and we derived the same ratio of professionals agreeing to extend the prophylaxis to cope with the risk.

The continuation of antibiotic prophylaxis postoperatively when a drain is used, is still considered sound medical practice, but this practice is not evidence-based ([WHO, 2018](#)). Former studies have investigated the adverse effects of drains and the increased risk of SSIs associated with their usage ([Berliner et al, 1964](#); [Smith et al, 1982](#)), but GDG panel suggests the discontinuation of any antibiotic prophylaxis for the purpose of preventing SSIs in presence of wound drains. Discouraging this practice becomes imperative, due to the escalating antibiotic resistance problem, of the last decades ([Tenover and Hughes, 1995](#)).

There is ample scientific information, that emphasizes the disconnection between the understood and accepted scientific evidence, and its translation into an

applicable form of everyday practice (CIHR, 2012; van Kasteren et al, 2003). In a similar scenario, only 20% of the participants adapted less than half of the investigated guidelines, and certain guidelines were adapted by no more than 23% of the participants (Araújo and Oliveira, 2023). With current educational materials and strategies this “knowledge translation to practice” process can be insufficient, it faces many barriers (Davis et al, 2003), and unquestionably new mechanisms need to be embraced.

A systematic review of 48 papers in 2021, reported significantly low adherence rates of the surgical antimicrobial prophylaxis (SAP) application guideline, and tried to classify such adherence barriers as either institutional or personal (Hassan et al, 2021). The Predisposing, Reinforcing, Enabling Constructs in Educational Diagnosis and Evaluation (PRECEED) model was suggested by Pathman et al (1996), and it provided a guidance system to compliance improving strategy selection. To select the most appropriate strategy for implementation, the Pathman’s model emphasized the importance of a previous “needs assessment” process, to identify the level of knowledge translation for the particular problem of interest (Jacobson et al, 2003). It is clear that, for a subsequent more efficient control of SSIs, there is still need for a progressive understanding of risk factors, and the application of such knowledge in successful preventive strategy formulations (Pinchera et al, 2022; WHO, 2022).

Despite a regular, but incomplete institutional delivery of such strategies and/or relevant information, we anticipated better compliance relying on the individually self-acquired knowledge fraction. Further thorough studies are required in order to determine factors, that could potentially contribute to acceptance and implementation, of either passively disseminated or actively acquired knowledge.

Our results, together with a better understanding of these modifiable factors could help develop more elaborate approaches, and strategies for a better prevention of SSIs. In this line, several actionable recommendations based on the survey findings are proposed to enhance adherence to SSIs Prevention Guidelines at Trauma University Hospital, Tirana, Albania. For instance, standardizing preoperative practices such as mandatory bathing before operation, proper hair removal using trimmers, and nutritional support for malnourished patients are very important. Furthermore, they should involve the consistent use of transparent surgical drapes, and standardized timing for onset of the antibiotic prophylaxis before incision. There should be clear guidelines on the duration of antibiotic prophylaxis as part of postoperative care. Continuous medical education sessions, workshops, and seminars should focus on SSIs prevention’s best practices, while monitoring and feedback mechanisms will continuously assess compliance and identify areas for improvement. There is need for institutional support that might include, among others, the aspect of developing and enforcing policies, that are in line with international guidelines, providing resources for necessary supplies and training, etc. These could be achieved by the establishment of a multidisciplinary committee responsible for guideline adherence and quality improvement.

### Study Limitations

As an observational study, it is not possible to draw causal conclusions about the factors behind the findings. Therefore, any relationship or trend should be interpreted with caution. Secondly, our study is limited to the staff of a tertiary trauma centre in Albania, which might be different from other health facilities offering surgical intervention, thus limiting the generalization of the findings. However, a key strength of this study is that it shed light for the first time on the usage and adherence to internationally recognized SSI prevention strategies in Albania.

In conclusion, the actual research found that, despite healthcare professionals have a wide knowledge foundation on SSI prevention guidelines, there exists a significant difference in their application at daily practice at Trauma University Hospital, Tirana, Albania. Even though routine preoperative practices, such as hair removal and glycaemia optimization are commonly recommended, chlorhexidine bathing and hand hygiene are not recommended appropriately. Moreover, during and after surgery, such factors as using transparent surgical drapes, and perpetuation of the postoperative antibiotic prophylaxis varied considerably. These results indicate a need for focused interventions like standardizing SSI prevention strategies, intensifying educational campaigns, strong monitoring and running feedback systems, just to mention a few. Application of these approaches will close the gap between knowing and doing, thereby improving patient outcomes and reducing SSIs prevalence rate in this area. This article has pointed out, how critical it is to have institutional support, and policy formulation for the widespread and effective implementation of evidence-based SSI prevention strategies.

### Conclusion

There is a need to promote active learning and incentivise passive distribution of knowledge in healthcare facilities providing surgical interventions. Further research should focus on improving knowledge transfer structures, targeting both personnel and institutional practice environments.

Involvement of the health professionals in the establishment of relevant policies is crucial to optimise materials and methods towards better SSI preventive strategies. In addition, there is a need to improve compliance with existing regulations, and routine application of all the acquired up-to-date guidelines.

## Key Points

- There were wide gaps between knowledge and practice according to the findings in this article, suggesting that the level of awareness may be relatively high, but the implementation of recommended SSI preventive measures could be inconsistent.
- The most important finding related to the fluctuant compliance to pre-operative, peri-operative, and postoperative guidelines, with major differences relating to pre-operative glycaemia optimization and chlorhexidine bathing.
- Moreover, significant differences were noticed in attitudes and practices by department, speciality, as well as years of work experience, indicating that targeted interventions aimed at enhancing professionals' adherence to the recommended guidelines, would be beneficial.
- This paper underlines the need for on-going education, effective guideline dissemination, and development of strategies, that can improve practical implementation of SSIs prevention protocols.

## Availability of Data and Materials

All data included in this study are available upon request by contact with the corresponding author.

## Author Contributions

ErisN, ST, ET, ErvinN and AK designed the review article. ErisN and ErvinN performed the literature search and drafted the article. All authors were involved in critical revisions of the article. ET provided supervision and advice on article content. All authors contributed to the important editorial changes in the manuscript. All authors read and approved the final manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

## Ethics Approval and Consent to Participate

We confirm that the study was conducted in accordance with the World Medical Association Helsinki Declaration. The study protocol was reviewed and approved by the Ethics and Conduct Committee of the Trauma University Hospital, Tirana, under protocol number 2635. All participants provided verbal informed consent prior to their involvement in the study, and all data were anonymized to ensure the privacy and confidentiality of the participants.

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## Conflict of Interest

The authors declare no conflict of interest.

## Supplementary Material

Supplementary material associated with this article can be found, in the online version, at <https://www.magonlinelibrary.com/doi/suppl/10.12968/hmed.2024.0333>.

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