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ORIGINAL ARTICLE

The effect of patient transfer type to the operating room on surgical site infection: Concerns versus evidence

El efecto del tipo de traslado del paciente al quirófano sobre la ISQ: inquietudes frente a evidencia

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Abstract

Background: *Concerns about surgical site infection (SSI) give rise to practices and procedures not evidence-based.* **Objectives:** *This study investigates whether the type of patient transfer to operating rooms plays a role in developing surgical site infection.* **Methods:** *Three thousand four hundred and seventy-one patients were divided into two groups: transfer group with stretcher (ST) (n = 1699) and patient bed transfer group (PBT) (n = 1772). The data of the two groups and the SSI rates were comparatively analyzed.* **Results:** *The SSI rate was 2.5% (n = 43) in the ST group and 2.8% (n = 49) in the PBT group, and there was no statistically significant difference. Both types of patient transfer had similar effects on the probability of SSI development. The odds ratio was 1.095 for stretcher transfer while 0.913 for patient bed transfer.* **Conclusion:** *Patients transfer to operating rooms on their beds are comfortable and safe. Furthermore, it has a similar effect to stretcher transfer on the probability of surgical site infection. Therefore, it is safer and cheaper to act based on evidence instead of trusting our concerns.*

Keywords: *Patient transfer. Surgical site infection. Patient bed. Stretcher.*

Resumen

Antecedentes: *las preocupaciones sobre la infección del sitio quirúrgico (ISQ) dan lugar a prácticas y procedimientos que no se basan en pruebas.* **Objetivos:** *Este estudio investiga si el tipo de traslado del paciente a los quirófanos influye en el desarrollo de la infección del sitio quirúrgico.* **Métodos:** *Se dividieron 3471 pacientes en dos grupos: Grupo de transferencia con camilla (ST) (n = 1699) y Grupo de transferencia de cama de paciente (PBT) (n = 1772). Los datos de los dos grupos y las tasas de ISQ se analizaron comparativamente.* **Resultados:** *La tasa de ISQ fue de 2.5% (n = 43) en el grupo ST y 2.8% (n = 49) en el grupo PBT, y no hubo diferencia estadísticamente significativa. Ambos tipos de transferencia de pacientes tuvieron efectos similares sobre la probabilidad de desarrollo de ISQ. La razón de posibilidades fue de 1.095 para el traslado en camilla y de 0,913 para el traslado de la cama del paciente.* **Conclusión:** *El traslado de los pacientes a los quirófanos en sus camas es cómodo y seguro. Además, tiene un efecto similar al traslado en camilla sobre la probabilidad de infección del sitio quirúrgico. Por lo tanto, es más seguro y económico actuar en base a evidencias en lugar de confiar en nuestras preocupaciones.*

Palabras clave: *Traslado de pacientes. Infección del sitio quirúrgico. Cama del paciente. Camilla.*

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Introduction

Surgical site infection (SSI) dramatically decreased after Pasteur published the microbiological theory, and then Joseph Lister introduced the antiseptic approach in 1861. However, surgical site infection is still among the major health concerns of this century. In the United States of America (USA), it is reported that more than 60,000 surgical site infections develop each year[1,2]. "Centers for disease control and prevention (CDC)" predicts that this figure might be 10 times higher than reported[3]. Surgical site infection increases mortality, morbidity, and hospital costs significantly. This situation worries health professionals and health administrators enormously. In a study conducted by Badia et al., it has been reported that insurance systems costs in Europe are at least 2 times more in the hospitals where patients develop surgical site infection compared to the ones with no SSI patients[4]. Due to the concerns about the issue, practices and procedures not based on evidence are seen in many hospitals. Some regulations could negatively impact both healthcare costs and patient comfort. Our study's point of departure is a common practice that transfers patients to operating rooms using different transfer stretchers at several stations. To understand how widely accepted this situation is, making a basic Internet search will be enough: more than 150.000 results and hundreds of different types of stretchers appear on the "Google" search engine if you look for the results of "operating room transfer stretcher." However, according to the literature, neither in reputable international guidelines nor in national guidelines are there evidence-based recommendations about transferring patients to operating rooms on stretchers to prevent surgical site infections. "Asia Pacific Society of Infection Control" (APSIC) manual briefly lists age (> 65), obesity, malnutrition, smoking, immunosuppression, hypoalbuminemia, and prolonged hospitalization as preoperative risk factors for SSI. Perioperative risks are urgent and/or complex surgery, high wound class, insufficient ventilation, heavy operating room traffic, inappropriate skin preparation, inappropriate hand hygiene, inadequate surgical instrument sterilization, inappropriate antimicrobial prophylaxis, unbathed patients before surgery, prolonged operation time, blood transfusion, improper surgical technique, hypoxia, and hypothermia[5]. Sufficient nutrition, administration of the appropriate prophylactic antimicrobial agent, glycemic control (< 200 mg/dL), normothermia, oxygenation, and performing antisepsis are recommended in the first step in CDC's surgical site infection prevention guideline[6]. Wound type, American Society of Anesthesiologists (ASA) score, operation time, hand hygiene, antimicrobial prophylaxis, appropriate skin preparation, normothermia, glycemia control, urgent operation, operation room's closed door, and room traffic intensity are reported as risk factors for surgical site infections in the European guidelines[7].

This study was conducted in an area hospital in Istanbul between 2018 and 2019. To determine the development of SSI, we made a retrospective comparison between 1 year (2019) during which patients were transferred to operating rooms with patient beds and another year (2018) during which patients were transferred to operating rooms with patient transfer stretchers. Moreover, the results were analyzed to determine whether the patient transfer type had a role in developing surgical site infection.

Material and methods

This study was conducted with approval from the ethics committee of an area hospital (Ref No. 2719, Date: February 5, 2021).

At the beginning of 2019, our institution's quality management unit realized patient falls during the patient transfers to operating rooms. Then, they revised the transfer procedures by obtaining the approval of the hospital's infection control committee. Earlier, a patient was first taken from his/her service bed to a transfer stretcher, and (s) he was carried to the operating room's entrance area where (s) he was taken to another (transfer) stretcher and then carried to the room before (s) he was finally put on the operating table. Following the operation, the patient was first taken to a transfer stretcher and brought to the operating room's exit door at the end of the compilation process period. Next, (s) he was taken to another transfer stretcher that came from his/her surgical service and carried to the service where (s) he was finally put on his/her bed. However, after 2019, newly cleaned linens were put on patient beds first, and then patients were directly taken to the operating table on their beds. They were transferred to their services with the same bed at the end of their surgeries. The patients' cots were cleaned according to the standard cleaning procedure.

As part of this study, the data of 1751 patients whose transfers to operating rooms were done with stretchers, and the data of 1817 patients whose transfers to operating rooms were done with their beds were compared. All patients were operated on in the hospital's general surgery clinic. The patients were examined in two groups: the first group was named transfer with stretcher group (ST) and operated in 2018, while the second group was called the transfer with the patient bed (PBT) and operated in 2019.

Related patient data were extracted from the hospital's information management system's electronic database and the patients' files. Hospital ventilation system records and hand hygiene compliance rates were obtained from the hospital's quality management unit. Surgical site infection rates were obtained from the hospital's surveillance records. The formula of "SSI number/number of operations × 100" was used in calculating the SSI rate. The diagnosis of SSI was made by the criteria of "CDC" and Turkey's "National Health Service Associated Infections Surveillance Guide." Cases with perforated appendicitis, diverticulitis perforations, delayed gastric ulcer perforation, abdominal penetrating stab injuries, abdominal gunshot injuries, and abscess drainage were excluded from both groups. As a result, 52 patients from the ST group and 45 patients from the PBT group were excluded from the study. Thus, 1699 patients from the ST group and 1772 patients from the PBT group were included. All patients were operated on in the same operating unit. However, the emergency patients were operated in the unit's operating room allocated to the emergency, while the others were operated in the operating rooms reserved for elective cases.

The groups' age and gender distributions, ASA scores, wound class, albumin levels, blood glucose levels, minimally invasive surgery rates, and operation times were analyzed by comparison. Besides, the distribution of the surgery types (electively or urgently), presence of blood transfusion, the operating rooms' particle class and room project class, and the hand hygiene compliance rates of the hospital were analyzed in the same way.

The term "surgery types" was used to describe whether the surgery was performed urgently or electively. "Minimal invasive surgery rate" was used to express whether the surgery was performed by a laparoscopic or conventional method. "The presence of hyperglycemic state" was used to indicate the patients whose blood glucose levels were above 200 mg/dL. The patients with an albumin level lower than 2.5 mg/dL were accepted as patients with hypoalbuminemia. The term "Class 1" was used for clean wounds, "Class 2" for clean-contaminated wounds, "Class 3" for contaminated wounds, and "Class 4" for dirty wounds.

Statistical analysis

The study's statistical analysis was done with IBM SPSS v.25 statistics program. The Kolmogorov–Smirnov test and the Shapiro–Wilk test were used to verify the normality of the distribution. Mann–Whitney U test and Student's t-test were used to compare the groups. The Chi-square test was used for the comparison of the categorical data. Fishers Exact, Pearson Chi-square test, and logistic regression analysis evaluated the categorical data. The results were evaluated at a 95% confidence interval, and $p < 0.05$ was considered statistically significant.

Results

There were 1699 patients in the ST group and 1772 patients in the PBT group. About 47.5% (808) were female in the ST group, and 52.5% (891) were male. About 49.3% (874) were female in the PBT group, and 50.7% (898) were male. There was no statistically significant difference between the groups regarding gender distribution ($p = 0.298$). The gender distributions of the groups are shown in table 1. There was no statistically significant difference between the age distributions of the groups ($p = 0.072$). The mean age was 44.86 in the ST group and 45.71 in the PBT group. The age distributions of the groups are shown in table 1.

The distribution of the ASA scores between the groups is shown in table 1. There was no statistically significant difference between the ASA scores of the groups ($p = 0.221$). In both groups, the presence of hyperglycemia was analyzed categorically, and no statistically significant difference was observed between the groups ($p = 0.217$). Hyperglycemia was detected in 24.3% of the patients in the ST group and 26.1% of the PBT group patients. The distribution of hyperglycemic states among the groups is shown in table 1. Only three patients in the PBT group had albumin levels below 2.5 mg/dL.

About 4.3% of the cases were operated urgently in the ST group, and 95.7% were elective. In the PBT group, 6.4% of the patients were operated on urgently, and 93.6% were elective. When the distribution of the surgery types was compared, a statistically significant difference was found ($p = 0.005$). The distribution of the surgery types between both groups is shown in

Table 1. Comparison of groups

	ST (n = 1699)	PBT (n = 1772)	p value
Age (Mean/Standard/Standard error)*	44.8693/13.73609/0.33325	45.7128/13.85381/0.32911	0.072
Gender (Male/Female)**	808 (47.5%)/891 (52.5%)	874 (49.3%)/898 (50.7%)	0.298
ASA scores (ASA I/ASA II/ASA III)**	1063 (62.5%)/634 (37.3%)/2 (0.2%)	1138 (64.2%)/634 (35.8%)/0 (0%)	0.222
Hyperglicemia (Precence/Non)**	413 (24.3%)/1286 (75.7%)	463 (26.1%)/1309 (76.9)	0.217
Surgery types (Emergency/Elective)**	73 (4.3%)/1626 (95.7%)	114 (6.4%)/1658 (93.6%)	**0.005**
Operating time (Mean/Standard/Standard error)*	54.9682/19.15227/0.46465	56.5209/21.09678/0.50117	**0.023**
Surgical procedure (non-Lap/Lap.)**	310 (25.8%)/890 (74.2%)	346 (27.2%)/926 (72.8%)	0.441
Wound Classes (Class 1/Class 2/Class 3)**	923 (54.3%)/667 (39.3%)/109 (6.4%)	918 (51.8%)/742 (41.9%)/112 (6.3)	0.292

*Student t-test, **Chi-square. In bold: statistically significant.
Non Lap: conventional surgery; Lap: laparoscopic surgery; ST: transfer with stretcher; PBT: transfer with the patient bed; ASA: American Society of Anesthesiologists

table 1. In addition, a statistically significant difference was found when both groups' operation durations were compared (p = 0.023). The mean operation duration in the ST group was 54.96 min and 56.52 min in the PBT group. The comparison of the operation durations between the groups is shown in table 1.

Laparoscopic surgery was indicated in 1200 patients in the ST group, but 74.2% underwent laparoscopy. On the other hand, in 1272 patients in the PBT group, laparoscopic surgery was indicated, but 72.8% had a laparoscopy. There was no statistically significant difference between the groups in that respect (p = 0.441). Table 1 shows the distribution of the patients who were operated on laparoscopically.

The distribution of wound classes between the groups is shown in table 1. There was no statistically significant difference between the groups regarding wound classes (p = 0.292).

Two units of blood were transfused preoperatively to two patients in the ST group and three patients in the PBT group.

Both groups' operating rooms were compared in particle class and room class. No difference was found between them. Table 2 shows the data of the room-based distribution of the operating room ventilation system between the groups.

While the hospital handwashing ratio was 84% in the ST group, it was 87.3% in the PBT group.

Surgical site infection developed in 43 patients with a rate of 2.5% in the ST group. In the PBT group, 49 patients developed surgical site infection with a rate of 2.8%. Of the ST group patients who developed surgical site infection, 11 were urgently, and 32 were electively operated on. Of the operated patients in the PBT group, 16 underwent surgery urgently, and 33 were elective. No statistically significant difference was found when the groups were compared according to the development and non-development of surgical site infection (p = 0.667). The distribution of surgical site infections among the groups is shown in table 3.

Multi logistic regression analysis was performed to understand whether the parameters affected the probability of SSI development. Table 4 shows the results of the analysis. It was observed that wound Class III increased the probability of surgical site infection by 2.6 times compared to wound Class I, emergency surgeries increased the probability of surgical site infection 2.9 times compared to elective surgery, and hyperglycemia increased the probability of surgical site infection 2.3 times. It was observed that the effects of gender and ASA score, and the transfer type of the patient on the probability of surgical site infection were not statistically significant. The types of patient transfer had similar effects on the probability of SSI development. In the analysis, the odds ratio was 1.095 (95% CI: 0.723-1.659) for stretcher transfer according to patient bed transfer.

Limitations

The most important limitation of the study is that it is a retrospective study. Furthermore, since the assignment of the groups was carried out in two different periods and the hygiene conditions in addition to the transfer could be different at the 2 times of data collection, it was thought that this could lead to assignment bias between the groups. However, in the

Table 2. Evaluation of operating room ventilation system between groups

	Emergency room		Elective room 1		Elective room 2		Elective room 3	
	ST	PBT	ST	PBT	ST	PBTT	ST	PBT
Particle class	ISO 7	ISO 7	ISO 7	ISO 7	ISO 7	ISO 7	ISO 7	ISO 7
Room class	Class 1B	Class 1B	Class 1B	Class 1B	Class 1B	Class 1B	Class 1B	Class 1B

ISO 7 is a common clean cleanroom classification.
ST: transfer with stretcher; PBT: transfer with the patient bed

Table 3. Distribution of surgical site infections between the groups (p = 0.667) (Chi-square)

Transfer type	Non SSI	SSI	Total
ST (n = 1699)	1656 (97.5%)	43 (2.5%)	1699 (100%)
PBT (n = 1772)	1723 (97.2%)	49 (2.8%)	1772 (100%)
Total	3379 (97.3%)	92 (2.7%)	3471 (100%)

ST: transfer with stretcher; PBT: transfer with the patient bed; SSI: surgical site infection

Table 4. The effect of parameters in the probability of developing SSI (n = 3471) (multi logistic regression analysis)

	p value	OR	95% CI for OR	
			Lower	Upper
Gender (According to male)	0.473	1.185	0.747	1.879
ASA II (According to ASAI)	0.193	1.527	0.807	2.889
Wound Classes II (According to Wound Class I)	0.849	0.861	0.185	4.016
Wound Classes III (According to Wound Class I)	**>0.05**	**2.610**	**1.609**	**4.233**
Hyperglicemia (According to non-hyperglicemia)	**0.015**	**2.324**	**1.177**	**4.587**
Emergency surgery (According to elective surgery)	**0.012**	**2.963**	**1.275**	**6.884**
Conventional surgery (According to laparoscopic surgery)	**0.023**	**2.125**	**1.147**	**4.455**
Transfer with stretcher (According to patient transfer with bed)	0.668	1.095	0.723	1.659

In bold: statistically significant. SSI: surgical site infection; OR: odds ratio; CI: confidence interval; ASA: American Society of Anesthesiologists

observational evaluation, it was determined that the hygiene conditions were similar.

Discussion

Surgical site infections are infections in the incision line or on the deep tissues and organs that occur 30 days after a surgical procedure or within a year after an implant operation. The incidence of SSI could be up to 20%, depending on the surgical procedure, the surveillance criteria used, and the data collection quality. The responsible pathogens in many SSIs arise from the patient's endogenous flora. The causative pathogens depend on the type of surgery; the most frequently isolated organisms are *Staphylococcus aureus*, coagulase-negative Staphylococci, Enterococcus spp., and *Escherichia coli*[8,9].

Nowadays, surgical site infections are still debated, increasing morbidity and mortality. Most of the time, factors related to patients and surgery types affect the risk of developing SSI. Even if epilation, skin preparation, and preoperative antibiotic prophylaxis are used to reduce SSI, there are many risk factors related to the surgical application, such as blood loss during surgery, surgery under emergencies, and the duration of the operation[10]. Therefore, it is thought that there might be numerous risk factors concerning the issue, and they are still under investigation. It has even been studied whether the development of surgical site infection is associated with seasons and warmer weather[11].

It is highly controversial whether the risk of developing surgical site infection is related to gender. Aghdassi et al. described 10-year surveillance results, saying that gender may pose a risk for surgical site infection for specific procedures. While examining the underlying risk factors for SSI, they stated that there might be differences between male and female patients, but more information is needed to explain the differences fully[12]. No statistically significant difference was found in gender distributions between the groups in our study. Our study observed that gender did not change the probability of surgical site infection, and there was no statistically significant difference in its effect.

Advanced age is a risk factor associated with increasing the SSI rate in many studies. In the Asia

Pacific Society of Infection Control (APSIC) guideline, it is stated that age up to 65 is a risk factor for the development of surgical site infection[5]. Besides, CDC expressed in its guideline that age is a risk factor that increases patient-related surgical site infection[9]. No statistically significant difference was found in our study between the groups' age distributions (p = 0.072).

ASA scores and Charlson comorbidity index (CCI) have a strong influence on the increase of surgical site infection rates if there are 'Class 1' and 'Class 2' wounds[7,13]. In the CDC guideline, it has been reported that ASA score increases surgical site infection along with prolonged surgery time and wound class. Its level of evidence is reported to be "Category IB"[9]. No statistically significant difference was observed in our study between the groups' ASA scores (p = 0.221). In a study Carvalho et al. conducted, they have discovered that patients in the ASA II, ASA III, and ASA IV groups are at the risk of developing surgical site infection[14]. Our study observed that ASA scores did not change the probability of surgical site infection, and there was no statistically significant difference in its effect.

Diabetes appears to be an independent risk factor for SSI development[15]. In CDC's 2017 guideline, blood glucose level was recommended to be kept under 200 mg/dL[6]. When the levels of HbA1c (glycosylated hemoglobin) are 8% and above, it is also defined as chronic hyperglycemia and diabetes[16]. In some studies, HbA1C values with 8% and above have been reported to be threshold values for developing surgical site infection in orthopedic and cardiac surgery[17,18]. The guideline of APSIC recommended keeping HbA1C (values) below 8% preoperatively to avoid surgical site infection and says its level of evidence is category IIIC[5]. In the CDC guideline, preoperatively, controlling hyperglycemia is recommended as category IB in evidence level[9]. The effect of hyperglycemia on surgical site infections could be multifactorial. Furthermore, diabetes increases comorbidity. In our study, no statistically significant difference was observed between the groups in (terms of) the presence of hyperglycemia (p = 0.217). In multi logistic regression analysis, it was observed that hyperglycemia increased the probability of surgical site infection 2.3 times.

It is reported in the literature that a long operation time increases the risk of SSI. Cheng et al. recommended that hospitals focus on shortening the operation time, given its importance for health-care economics[19]. Carvalho et al. have also emphasized that long operating times are a risk factor for surgical site infections[14]. A statistically significant difference was found between the groups' operation durations in our study. The mean operation time in the ST group was 54.96 min, and it was 56.52 min in the PBT group. Hence, the operation duration was longer in the PBT group. However, the literature has reported that prolonged operation time increases (the risk of) surgical site infection along with high ASA score and contaminated wound class[5,9].

Surgical site infection is one of the most common complications after an emergency abdominal surgery[10,20]. When the distribution of the surgery types between the groups was compared, a statistically significant difference was found in our study. This difference was thought to be the significantly higher number of emergency surgical operations in the PBT group. Our study observed that emergency surgeries increased the probability of surgical site infection 2.9 times compared to elective surgery.

In particular, minimally invasive surgeries are fundamental in preventing surgical site infection[9]. Golub et al. analyzed their surveillance data, showing that laparoscopic operations have lower SSI risks than open operations in appendectomy cases[21]. This condition is also valid for laparoscopic colectomies[22]. Therefore, it is clear that laparoscopic surgeries differ from open surgeries significantly in SSI development because they are a lot less likely to lead to surgical site infections[23]. There was no statistically significant difference between the groups in this regard (p = 0.441).

According to the literature, a higher SSI rate is observed in the patients with comorbidities in clean and clean-contaminated wound class than those without comorbidities[13]. In the guideline of APSIC, the increased wound class category is reported to be a pre-operative risk factor[5]. In CDC's guideline, the role of determining wound class in surveillance is at Category II in terms of the level of evidence[9]. As mentioned above, ASA score increases surgical site infection, prolonged surgery time, and contaminated wound class, and its level of evidence is reported to be "Category IB"[9]. No statistically significant difference was found between the groups concerning wound classes (p = 0.292).

Low serum albumin levels are significantly associated with the development of surgical site infections, especially in elderly patients. In particular, serum albumin levels should be closely monitored in patients with comorbidities before and after surgeries[24]. In our study, three patients in the PBT group had albumin levels below 2.5 mg/dL. On the other hand, the literature has reported that perioperative blood transfusion is associated with the development of surgical site infection[25-27]. Furthermore, among SSI risk factors, blood transfusion has been shown both as a perioperative and a post-operative risk factor in the guideline of APSIC[5]. In our study, two units of blood transfusion were applied perioperatively to two patients in the ST group and three patients in the PBT group.

Surgical site infection rates are greatly affected by the facility's structural features and systems and the quality of operating rooms determined by health-care professionals' management and behavior[28]. However, according to the meta-analysis performed to determine laminar airflow systems' role in preventing SSI in general and cardiovascular surgeries, there was no statistically significant difference between the two operation types under the system[5]. In some studies, a statistically significant relationship was found only in the patients who underwent knee arthroplasty. Therefore, in the guideline of APSIC, no evidence-based recommendation is presented for laminar flow[5]. Moreover, Bischoff et al. suggested that the laminar flow model is not installed in new operating rooms[29]. In our study, both groups' operating rooms were compared in room pressure, supplied airflow rates, air changes, relative humidity, temperature, particle class, and room class. No statistically significant difference was found between them.

Unfortunately, hand hygiene compliance rates do not appear quite good in the literature. The percentage of its practice around the world is below 50. However, one of the best weapons in reducing the risk of contamination is washing hands[30,31]. In our study, while the hospital's hand hygiene compliance rate was pretty good in both groups.

There is no doubt that surgical site infection significantly increases mortality, morbidity, and hospital costs. Naturally, this situation worries health professionals and health managers excessively. In a study conducted by Badia et al., it has been reported that insurance systems costs in Europe are at least 2 times more in the hospitals where patients develop surgical site infection than those with no SSI patients[4]. However, it should not be forgotten that laminar flow systems, which do not have any prospective evidence, have given way to high health-care costs in the recent past due to our concerns. However, when the literature is examined, it is seen that this high-cost technology is no longer recommended to prevent surgical site infections[5,9,29].

Similarly, wearing overshoes before surgeries were once strongly advised to prevent SSI, but it is not practiced anymore. There is no evidence that the patient's transfer to the operating room with his/her bed or the stretcher exchange system increases the risk of surgical site infection in the manuals and the studies on this subject. The CDC, APSIC, and European guidelines do not provide any recommendations about the issue[5,9]. Although it has been told in some studies that bed linen may have increased the risk of "hospital infection," it is unknown whether it poses a risk for SSI[32]. The relationship of bed linens with (the development of) surgical site infections does not go beyond our assumptions. Despite the evidence, patients are transferred to operating rooms on stretchers in many hospitals. In our opinion, this is an unnecessary practice and affects patient comfort adversely. However, it seems the health-care industry has benefitted from this practice considerably.

A simple "Google" search about operating room transfer stretchers reveals more than 150 thousand results and hundreds of transfer stretchers (Date of access; January 30, 2021). Our study observed that surgical site infection developed at 2.5% in the ST group and 2.8% in the PBT group. Although the groups were similar to each other in terms of the factors mentioned in the literature and the PBT group was more prone to SSI due to (higher number of) emergency surgery patients and long operation times, there was no statistically significant difference between the groups in terms of development of SSI. Both types of patient transfer had no effects on the possibility of SSI development. However, it is safer and more comfortable to transport the patient with her/his bed.

This article criticizes the patient transfer technique with a stretcher, which is traditionally accepted by health-care providers, from a different perspective. Many health-care providers seem to have unconditionally accepted patients' transfer to the operating room on a stretcher. This acceptance is based on the assumption that transferring the patients by the patient bed will increase the wound infection. However, in our study, it was revealed that there was no significant increase in wound infection rates. Furthermore, patient transfer with a stretcher brings along patient-related problems such as post-operative pain, patient dissatisfaction, and discomfort, negatively affecting the employee's health in the long-term and skeletal system deformities. On top of all this, transfer stretchers also place an additional burden on the health system, which is sufficiently financially burdened. Therefore, the ultimate goal of this study is to revolutionize the use of stretchers, which are widely used in patient transfer and impose a financial burden on health institutions.

Conclusion

It is relatively comfortable and safe to transfer patients to operating rooms on their beds. Besides, there is no evidence that it increases the risk of surgical site infection. Nevertheless, surgical site infections are still on health professionals' agenda as it plays a role in mortality and morbidity. Hence, it is natural to worry about the issue. However, it is safer and cheaper to act based on evidence instead of trusting our concerns.

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Conflicts of interest

The authors declare that they have no conflicts of interest.

Ethical disclosures

Protection of human and animal subjects. The authors declare that no experiments were performed on humans or animals for his study.

Confidentiality of data. The authors declare that they have followed the protocols of their work center on the publication of patient data.

Right to privacy and informed consent: The authors have obtained the written informed consent of the patients or subjects mentioned in the article. The corresponding author is in possession of this document.

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