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Research Article

# The Use of Surgical Drains amongst the Orthopaedic Surgeons of Kuwait

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## Abstract

**Background:** The use of surgical drains has been a controversial topic among all surgical specialties and the outcome of its use has conflicting data especially in orthopaedic surgery. The aim of this study was to see if orthopaedic surgeons in Kuwait know the current guidelines and evidence-based practice. The study also aimed to investigate if demography, background, experience as well as subspecialty among orthopaedic surgeons can influence their usage of surgical drains. In addition, to assess their adherence to the international recommendations for the use of surgical drains.

**Method:** An electronic survey was constructed, based on the current evidence from the literature provided by high-level institutions/organizations and Evidence-Based Medicine (EBM) sources. Including evidence from the WHO, CDC and Cochrane reviews. The survey was sent to all orthopedic surgeons in Kuwait (Total of 116), 73 participants responded (63% response rate). In addition the questions also surveyed demographic data regarding subspecialty and technical habits of use.

**Results:** The survey included a total of 73 orthopedic surgeons from different hospitals and subspecialties .It contained a total of 21 questions in which 7 questions were further subdivided into 6 categories. The categories represent 6 items of the current EBM policies, aiming to address the participant's knowledge by point scoring. A total score of 6 (maximum score) is only achieved by 1 surgeon. 4 Surgeons had a score of 0. The majority of surgeons (88%) scored between 1 and 3 points out of 6. All the secondary objectives were statistically insignificant.

**Conclusion:** These results show that orthopedic surgeons in Kuwait are not updated with the current evidence-based practice regarding the use of surgical drains in Orthopedic Surgery.

**Keywords:** Infection; Orthopedic surgery; Surgical drains

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## Introduction

The use of surgical drains was historically recorded by Hippocrates in 460-370 BC; he had used hollow tubes to drain an empyema in the abdomen. However, the surgeon who was firstly accredited with the use of modern surgical drains among orthopedic patients was Ambroise Pare 1510-1590 [1,2].

The use of orthopedic surgical drains has been subject to controversy [3]. On one hand, it is a tool used for evacualting surgical site hematomas, preventing the formation of a cultural medium for infection [3,4]. Infections are a much dreaded complication most surgeons face, and are the management is usually complex [5]. Another complication orthopedic surgeon's fear is compartment syndrome [6]. So they believe drains help reduce the risk of this detrimental emergency [5,6]. On the other hand, the literature also reports that retrograde infection might be introduced. In other words, what comes out can get in. This was seen in old draining systems [7,8]. Yet there is still a considerable risk of this happening when utilizing newer drainage systems [8].

While some orthopedic subspecialties, for instance in spine surgery, prefer the drains, others [7-9]. Others like reconstruction surgery avoid it, for fear of biofilm formation. The results of infections could at times be catastrophic [8,10].

Although there are exceptions, many schools of thought have provided guidelines and protocols for using surgical drains [11]. The most commonly used examples are the National Institute for Health and Care Excellence, and the WHO guidelines for SSI [11,12]. For the purpose of this study we will be using the latter, as it is used as a reference for the surgical drains policy in Kuwaiti Hospitals. The guideline provides details on prophylactic antibiotic use, and time of drain removal timings recommended to reduce the risks of surgical site infections.

The current literature, however, favors moving away from the use of drains and supports trends that minimizes the complications of using this utility when possible [12]. The usage of surgical drains has often led to increased numbers of days spent in hospital post-operatively and number of wound dressings [13]. This would ultimately decrease the cost-effectiveness of healthcare facilities, and inversely affect patient satisfaction rates [13-15]. Another vital issues reported in the literature is the increased need for blood transfusions in patients

who have surgical drains inserted [14,15]. Blood transfusions open the door for unnecessary transfusion related complications and an increase demand for blood that could be utilized elsewhere, especially since it is already a scarce resource. Alternatives to avoid these blood transfusions related issues have been proposed, and the evidence is promising [14,15]. To the author's current knowledge, no studies have been previously done to assess the knowledge of orthopedic surgeons regarding the use of surgical drains.

The aim of this study is to identify possible knowledge deficiencies and try to address them. This in turn will improve the current clinical practice. The need for this study is to scan for misconceptions and old practices that our participants still believe to be true, like the risks of infection hematomas, wound dehiscence, and the need for secondary surgery. It is important for our surgeons to know the consequences of malpractice and not keeping their knowledge up-to-date with the current guidelines.

## Methodology

In this study, a descriptive approach was followed to quantitatively measure the level of knowledge of participants about the surgical drains and to establish their technical habits when using the drains.

For this purpose, seven multiple choice questions were included in the survey construct of 21 questions. A total of 7 questions with only one correct answer per question were designed to assess current EBM facts into 6 categories; Hematoma, Seroma and Wound Dehiscence, Blood transfusion, need for secondary surgery, wound infection, wound dressing and length of hospital stay. A point scoring system was used to calculate the surgeons' level of knowledge about surgical drain use. The lowest score was zero and the highest score was six. The scores are also converted into a percentage value for easier analytical perception.

The survey itself was distributed via electronic communication; all 116 targeted participants received the survey 2 times, with a two week interval. Only 73 participants responded (Response rate 63%).

The data analysis was done using SPSS IBM (v. 26) and Graphpad Prism (v. 8). Mann-Whitney U test and Kruskal-Wallis H test are performed to compare the level of knowledge of different demographic groups about the surgical drains, and their routine application among the physicians. The survey being factual based, using yes or no responses, construct validity and reliability of this questionnaire was not necessary.

## Results

In table 1, the demographic characteristics of the individuals who participated in this study are shown. The absolute majority of the participants were male (N=71), and only 2 participants were female (2.7%).

Around 60% of all participants were working in Al-Razi Orthopaedic Hospital, while 23% of them were employed in Al-Farwaniya Hospital. The majority of the participants (64.4%) were between 35 to 44 years old, while 22% of them were older than 45 years old, and the rest were between 22 and 34 years old. In addition, it was shown that around 66% of all participants who worked at the hospitals were Registrars, while around 13% were Specialist or Senior Specialists.

| | Frequency | Percentage | Mean (%) | Median (%) |
|---|---|---|---|---|
| **Gender** | | | | |
| Female | 2 | 2.7 | | |
| Male | 71 | 97.3 | | |
| **Hospital** | | | H (5) = 2.142 | p = 0.829 |
| Al-Adan Hospital | 2 | 2.7 | 28.60% | 28.60% |
| Al-Farwaniya Hospital | 17 | 23.3 | 28.60% | 28.60% |
| Al-Jahra Hospital | 2 | 2.7 | 28.60% | 28.60% |
| Al-Razi Orthopedic Hospital | 44 | 60.3 | 26.30% | 28.60% |
| Military Hospital | 1 | 1.4 | 14.30% | 14.30% |
| Mubarak Al-Kabeer Hospital | 7 | 9.6 | 30.60% | 28.60% |
| **Age Group** | | | H (3) = 2.207 | p = 0.531 |
| 22-34 | 10 | 13.7 | 32.90% | 28.60% |
| 35-44 | 47 | 64.4 | 27.40% | 28.60% |
| 45-54 | 10 | 13.7 | 21.40% | 14.30% |
| 55-64 | 6 | 8.2 | 26.20% | 21.40% |
| **Job Title** | | | H (5) = 4.608 | p = 0.466 |
| Assistant Registrar | 5 | 6.8 | 37.10% | 42.90% |
| Consultant | 3 | 4.1 | 23.80% | 14.30% |
| Registrar | 48 | 65.8 | 26.20% | 28.60% |
| Senior Registrar | 7 | 9.6 | 30.60% | 28.60% |
| Senior specialist | 2 | 2.7 | 21.40% | 21.40% |
| Specialist | 8 | 11 | 26.80% | 28.60% |
| **Speciality Field** | | | | |
| Spine | 6 | 8.2 | | |
| Hand | 7 | 9.6 | | |
| Arthroscopy | 7 | 9.6 | | |
| Arthroplasty | 19 | 26 | | |
| Lower Limb Deformity | 4 | 5.5 | | |
| Upper Limb deformity | 3 | 4.1 | | |
| Foot and Ankle | 11 | 15.1 | | |
| Upper Limb Trauma | 43 | 58.9 | | |
| Lower Limb Trauma | 45 | 61.6 | | |
| Pelvis | 12 | 16.4 | | |
| Paediatric Orthopedics | 15 | 20.5 | | |
| Oncology | 1 | 1.4 | | |

**Table 1:** Demographic Characteristics of the participants – Mean and median total score (%) of the seven guideline questions are also calculated for each grouping along with Kruskall-Wallis H test to determine differences between different demographic groups; the results are reported as H (df) and p value.

Furthermore, it could be described that the most common subspecialty among the participants were Upper (61.6%) and Lower (59%) Limb Trauma with Arthroplasty (26%) at third place.

When it comes to the level of knowledge about the surgical drains, the mean and median of total score were calculated. The mean was 1.904 (±1.082) while the median was 2. The maximum observed score (6) obtained only by one participant, and the lowest grade (0), was scored by 4 participants. Around 88% of all participants reached a total score between one and three. According to the Kruskall-Wallis H test which was performed to determine total score differences between various demographic groups, no significant difference could

be established between different groupings in the level of knowledge about the surgical drains (p>0.05). In table 2, the total score is broken down into the 7 questions, and the frequency of correct and wrong responses for each question is calculated.

| General Guidelines about Surgical Drains | Correct | | Wrong | |
|---|---|---|---|---|
| | Frequency | % | Frequency | % |
| Do you think drains increase or decrease the risk of haematoma/seromas or wound dehiscence? | 10 | 13.70% | 63 | 86.30% |
| Does the usage of drains increase or decrease the need for transfusions? | 10 | 13.70% | 63 | 86.30% |
| Do you think drains increase or decrease the requirements for secondary surgery? | 30 | 41.10% | 43 | 58.90% |
| Do you think drains increase or decrease the risk of wound infections? | 11 | 15.10% | 62 | 84.90% |
| Does removing the drain before 5 days post-op decrease the risk of infection? | 11 | 15.10% | 62 | 84.90% |
| Do you think drains increase or decrease the requirement for wound dressings? | 32 | 43.80% | 41 | 56.20% |
| Do you think drains increase or decrease the requirement for stay in hospital? | 35 | 47.90% | 38 | 52.10% |
| **TOTAL** | | **27.20%** | | **72.80%** |

**Table 2:** General Guideline questions about using surgical drains – the questions are multiple choices and only one is correct. The percentages of correct and wrong answers for each question are illustrated in this table.

### The relationship between experience and level of knowledge about surgical drains

In order to measure the level of association between experience in the orthopaedic field and the level of knowledge about the evidence-based practice of surgical drains, the Spearman correlation coefficient calculated was -0.278 ($p < 0.001$). Unfortunately, the results showed a negative correlation between the level of theoretical knowledge about the surgical drains and experience of the participants in orthopaedic field.

### Habits &complications using surgical drains

As shown in Figure 1, it is indicated that 54.8% of all participants use surgical drains frequently, while 5.5% always use drains during surgery. Forty Eight percent of all participants reported that drains rarely cause unnecessarily prolonged hospital stay, while 28.8% reported occasional prolongation.

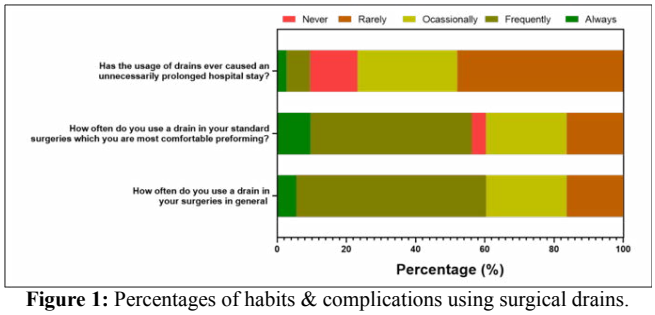


**Figure 1:** Percentages of habits & complications using surgical drains.

### Technical habits of using drains

According to the results of the survey (Table 3), 51% of all participants use closed drain systems, while only 2.8% of them use open drain systems. Multilayer drains were used by 30.1% of the participants. In addition, the most common drain size which was used in surgeries was Medium size drain (61.6%). Large drains were used by 28.8% of the participants. Seventy four percent used only one drain for the same location. The majority (75.3%) reported that they use different incisions to insert the drain, while 24.7% use the same incision. With regards to the location of the drain, the answers of the participants were quite heterogenous. The drain was inserted below the incision in 43.8% of the time, while 27.4% placed the drain above the incision, and 28.8% parallel to it. However, approximately all of the participants (91.8%) indicated to secure the drain with suture. When it comes to using antibiotics, 67.1% of the participants unnecessary to specifically use prophylaxis for drain usage. Second (52.1%) or the third (38.4%) post-operative day are reported by participants to be the most common time to remove the drain. After removal of the drain, the patients are normally discharged within the same day (28.8%) or most commonly after 24 hours (53.4%).

## Discussion

This survey study looked into the current practice of using surgical drains in orthopaedic surgery in Kuwait, and what the current evidence regarding this topic suggests, compared to whether the surgeons in Kuwait are adherent to it. The main 6 categories that we used to compare benefit vs no benefit differences were:

### Hematoma, seroma and wound dehiscence (no difference)

A retrospective study by the Journal of Neurosurgery: Spine (n=1799) found no statistical significance with regards to Hematomas, Seromas and wound Dehiscence [11,16]. The most current studies were done by breast surgeons post-mastectomy. Their conclusion is reflected in the WHO guidelines and A Cochrane review [17]. It is worth noting that the participants of the previous studies had a higher risk of bruising. This in turn resulted in a large number of surgeons refraining from using surgical drains altogether in their practice [18,19].

### Blood transfusion (increase)

The orthopaedic literature has a long history of inquisitive research regarding the use of postoperative surgical site drains [16,20]. For instance, in total joint arthroplasty and some spinal surgeries, surgical site drains were associated with increased rates of transfusion [11-13]. These results are supported by a Cochrane review [20-22]. Of our study cohort, an alarming 86% of them did not know this.

### Secondary surgery (no difference)

Both the Journal of Neurosurgery: Spine and Cochrane review analysis both confirmed that not using a surgical drain didn't increase the odd of a secondary surgery or return to the theatre [17-20]. Yet about 60% of our participants thought the contrary.

### Wound infection(no difference)

A large percentage of our participants believed that drains reduce the risk of infection. Yet, all hospital policies enforce a minimum of 3 doses of prophylactic antibiotic rule for all surgeries in Kuwait, despite evidence showing that 1 prophylactic dose is enough.

There are no clear guidelines for antibiotic use when patients have surgical drains inserted. This is why educating our surgeons on evidence is necessary, since most surgeons practice based on their acquired experience and not EBM.

| | Frequency | Percentage |
|---|---|---|
| **How often do you use a drain in your surgeries in general?** | | |
| Always | 4 | 5.5 |
| Frequently | 40 | 54.8 |
| Occasionally | 17 | 23.3 |
| Rarely | 12 | 16.4 |
| **How often do you use a drain in your standard surgeries which you are most comfortable preforming?** | | |
| Always | 7 | 9.6 |
| Frequently | 34 | 46.6 |
| Never | 3 | 4.1 |
| Occasionally | 17 | 23.3 |
| Rarely | 12 | 16.4 |
| **What type of drain system do you use?** | | |
| Active drain systems | 12 | 16.4 |
| Closed drain systems | 37 | 50.7 |
| Closed drain systems; Active drain systems | 9 | 12.3 |
| Closed drain systems; Passive drain systems | 1 | 1.4 |
| Open drain systems; Closed drain systems; corrugated drains | 1 | 1.4 |
| Open drain systems; Closed drain systems; Passive drain systems; corrugated drains | 1 | 1.4 |
| Passive drain systems | 12 | 16.4 |
| **What size drain do you usually use?** | | |
| Large | 21 | 28.8 |
| Medium | 45 | 61.6 |
| Small | 7 | 9.6 |
| Where do you place the drain? | | |
| Above the incision | 20 | 27.4 |
| Below the incision | 32 | 43.8 |
| Parallel to the incision | 21 | 28.8 |
| **On average, by which post-operative day do you remove the drain?** | | |
| Day 1 | 1 | 1.4 |
| Day 2 | 38 | 52.1 |
| Day 3 | 28 | 38.4 |
| Day 4 | 3 | 4.1 |
| Day 5 | 3 | 4.1 |
| **How soon after the removal of the drain do you discharge your patient?** | | |
| After 24 hours | 39 | 53.4 |
| After 48 hours | 10 | 13.7 |
| More than 48 hours | 3 | 4.1 |
| Same day | 21 | 28.8 |
| **Has the usage of drains ever caused an unnecessarily prolonged hospital stay?** | | |
| Almost always | 2 | 2.7 |
| Frequently | 5 | 6.8 |
| Never | 10 | 13.7 |
| Occasionally | 21 | 28.8 |
| Rarely | 35 | 47.9 |
| **Do you think drains increase or decrease the risk of prosthetic infections?** | | |
| Decrease | 17 | 23.3 |
| Increase | 15 | 20.5 |
| No effect | 18 | 24.7 |
| Not sure | 23 | 31.5 |

**Table 3:** Technical habits and opinions about the usage of surgical drains.

The WHO SSI guidelines produced a pooled analysis. This analysis showed that there is insufficient evidence to ascertain if prolonged antimicrobial prophylaxis is either beneficial or harmful SSI [11,22]. However,the current recommendations advocate against the use of prophylactic antibiotics in patients beyond 24 hours [11]. As this will cause and increase in the rate of Clostridium Difficile infections and acute kidney injuries. It has also been established that there is insufficient evidence that the date of drain removal does statistically increase of decrease the risk of SSI [11].

The Cochrane review and the Journal of Neurosurgery: Spine both published and they both concluded that there was no difference in infection rate among patients who had a surgical drain when compared to patients who didn't [11,19,20]. The Cochrane review further declared that the correlation between wound healing and drain usage was statistically insignificant [11,23].

### Wound dressing (increase)

The majority of the studies reached a consensus that the requirement for regular dressing was increased among patients with surgical drains more than 2-folds, but this didn't attribute to neither an increase nor decrease in the surgical site infection risk [11,15,24]. Although our study did not aim to measure the frequency of dressing exchange, about 40% of the participants in this study had knowledge of this.

#### Length of hospital stay(increase)

Opposing evidence was available from the WHO SSI guidelines and a Cochrane review. WHO used an non-orthopaedic metanalysis and suggested an increase in hospital stay [11,14-16]. The evidence from Cochrane review was based on 5 orthopaedic studies that were small in number and weak in design [11,15,25]. There is however, no current evidence that states otherwise. The vast bulk (approximately 50%) of our participants were aware of this fact and have witnessed this increased length of hospital stay in their practice.

In brief, the orthopaedic surgeon should justify its use as per Guideline Development Group (GDG). Their survey acknowledged in their survey that drains are painful and uncomfortable to patients and patients wish them taken our early. Even for patients who developed seromas that required a return to the hospital and aspiration [7,25,26].

## Conclusion

The approach to the use of surgical drainage systems is not a "one size fit all," and it should be on a case by case manner. However, there is a deficiency of knowledge amongst the Kuwaiti Orthopaedic surgeons that merit for defensive medicine and probable malpractice. Orthopaedic surgeons in Kuwait should adhere with the current evidence-based approach to the usage of surgical drains.

## Limitations

The small number of participants reflected on the accuracy of the data; however the response rate was relatively higher than expected.

Other important topics were not surveyed nor taken into account, such as prolonged antibiotics used, Venous Thromboembolism (VTE), and hospital acquired infection (non-wound related). This was due to different hospital policies which the authors could not standardize for the purpose of this study.

## Conflict of interest: None

## Source of Support: None

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