



## Knowledge, Attitude and Practice of Hospital Acquired Infection Prevention Among Medical Students at Alkhoms Faculty of Medicine Elmergib University 2025

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المعرفة والمواقف والممارسات المتعلقة بالوقاية من العدوى المكتسبة في المستشفيات بين طلاب  
الطب في كلية الطب البشري الخمس، جامعة المرقب 2025

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### Abstract

**Background:** Medical students' knowledge, attitude and practice (KAP) regarding hospital acquired infections (HAIs) pose a significant risk to patient safety, as HAIs are a significant cause of morbidity and mortality worldwide. This study aims to evaluate KAP of medical students at Alkhoms faculty of medicine regarding HAIs prevention and control.

**Methods:** descriptive cross sectional design study using a Self-administered online questionnaire sent to all students at Alkhoms faculty of medicine Elmergib University at Alkhoms city Libya in April and May 2025.

**Results:** among all 374 targeted students only 127 responded with 34% response rate. 80.3% of participants aged less than 28 years and 74% of them were females. The level of knowledge was good among 85% of participants, but there were some gaps in their attitude regarding the availability of HAIs prevention facilities and regarding hand hygiene performance.

**Conclusion:** low response rate highlights the weak compliance of faculty students regarding medical research and performance evaluation. Our participants kknowledge regarding HAIs was good, but that was not the case with their attitude and compliance. more training programs and knowledge sessions regarding HAIs prevention should be performed, more resources should be allocated by hospital administrators regarding hand hygiene materials and facilities availability.

**Keywords** HAIs Prevention, Medical Students, Elmergib University, Alkhoms, Libya.

### المخلص

**المقدمة:** تُشكل معارف طلاب الطب ومواقفهم وممارساتهم (KAP) فيما يتعلق بالعدوى المكتسبة في المستشفيات (HAIs) عاملاً إختطاراً مهماً لسلامة المرضى، حيث تُعد هذه العدوى سبباً رئيسياً للإمراض والوفيات في جميع أنحاء العالم. تهدف هذه الدراسة إلى تقييم معارف ومواقف وممارسات طلاب الطب في كلية الطب البشري الخمس فيما يتعلق بالوقاية من العدوى المكتسبة في المستشفيات ومكافحتها.

**المنهجية:** دراسة وصفية مقطعية باستخدام استبيان إلكتروني ذاتي التعبئة أُرسِل إلى جميع طلاب كلية الطب البشري بجامعة المرقب في مدينة الخمس، ليبيا، خلال شهري أبريل ومايو 2025.

**النتائج:** من بين 374 طالبًا مستهدفًا، استجاب 127 طالبًا فقط، بنسبة استجابة بلغت 34%. كان 80.3% من المشاركين دون سن 28 عامًا، و74% منهم من الإناث. كان مستوى المعرفة جيدًا لدى 85% من المشاركين، ولكن وُجدت بعض الثغرات في مواقفهم فيما يتعلق بتوافر مرافق الوقاية من العدوى المكتسبة في المستشفيات، وفيما يتعلق بممارسات نظافة اليدين.

**الخلاصة:** يُشير انخفاض معدل الاستجابة إلى ضعف التزام طلاب الكلية بالبحث الطبي وتقييم الأداء. كان لدى المشاركين معرفة جيدة بالعدوى المكتسبة في المستشفيات، لكن ذلك لم ينعكس على سلوكهم والتزامهم. لذا، ينبغي تنظيم المزيد من البرامج التدريبية والجلسات التوعوية حول الوقاية من هذه العدوى، كما ينبغي على إدارات المستشفيات تخصيص المزيد من الموارد لتوفير مواد ومرافق النظافة الشخصية.

**الكلمات المفتاحية:** الوقاية من العدوى المكتسبة في المستشفيات، طلاب الطب، جامعة المرقب، الخمس، ليبيا.

## INTRODUCTION

Hospital-acquired infections (HAIs) are a significant cause of morbidity and mortality worldwide, and they pose a significant threat to patient safety, and preventing them requires a proactive approach from all healthcare professionals, including medical students, to possess adequate knowledge and adhere to infection control practices [1]. Understanding medical students' knowledge, attitude and practice toward HAI prevention is crucial for developing effective educational strategies and improving compliance with infection control protocols [2]. This study examines medical students' knowledge, attitude and practice toward HAI prevention and the factors influencing their engagement in infection control measures.

Multiple studies indicate varying levels of knowledge among medical students regarding HAIs. A systematic review by Nair et al. (2019) highlights that while students are generally aware of the risks associated with HAIs, gaps exist in their understanding of specific prevention measures such as hand hygiene and personal protective equipment (PPE) use, they also found that while most students recognized the significance of hand hygiene and infection control, many perceived these measures as time-consuming or secondary to clinical tasks. the study found that while most students acknowledged the importance of hand hygiene, only 60% adhered to proper handwashing techniques consistently [3]. A study conducted by Alp et al. (2016) in Turkey found that only 54% of medical students correctly identified all key elements of infection prevention, and they reported that despite positive attitudes toward infection prevention, some students demonstrated complacency, believing that HAIs were primarily the responsibility of hospital staff rather than medical trainees. They found that medical students often neglected personal protective equipment (PPE) use, with only 45% following recommended guidelines [4].

Despite the knowledge of infection control measures, adherence remains suboptimal. In a cross-sectional study, Ahmed et al. (2021) reported that while 80% of medical students acknowledged the importance of hand hygiene, only 56% practiced it consistently, and identified a lack of reinforcement from senior clinicians as a major factor contributing to reduced enthusiasm for HAI prevention measures [5]. Similarly, studies by Sax et al. (2017) found that medical students were less likely to follow proper donning and doffing procedures for PPE, increasing the risk of pathogen transmission, they revealed that students often felt discouraged from consistently following hand hygiene protocols due to the absence of strict institutional enforcement, and emphasized that students were more likely to comply with hand hygiene protocols when they observed senior clinicians demonstrating proper practices [6]. Time constraints, limited resources, and inadequate training have also been cited as obstacles to positive attitudes and compliance [7].

Several factors influence medical students' adherence to HAI prevention, including education, hospital environment, and role modelling by senior clinicians. According to a study by Collins et al. (2020), students who received formal infection control training demonstrated significantly higher compliance with hand hygiene guidelines compared to those who did not, and the presence of structured infection prevention training significantly improved students' confidence in their ability to prevent HAIs, thus they suggested that simulation-based training could improve PPE adherence among students [7]. Additionally, a study by Lee et al. (2018) found that only 50% of students consistently wore gloves, gowns, and masks when required. And they suggested that lack of supervision and reinforcement of infection control measures contribute to poor adherence among students. The study also suggested that students exposed to role models who prioritized infection control were more likely to develop positive attitudes toward adherence [8].

Enhancing medical students' attitudes and practice toward HAI prevention requires a multifaceted approach. A study by Johnson et al. (2019) demonstrated that simulation-based training not only improved knowledge but also fostered a sense of responsibility and engagement among students and they found that students trained through hands-on workshops demonstrated better compliance than those who received only theoretical instruction, and they demonstrated that simulation-based training significantly improved medical students' hand hygiene compliance and PPE usage [9]. Additionally, Allegranzi and Pittet (2019) highlighted the role of institutional policies in promoting adherence to infection control measures integrating infection control education throughout the medical curriculum and reinforcing positive behaviours through mentorship can encourage long-term commitment to HAI prevention [10].

## METHODOLOGY

**Study design:** The study was designed as a descriptive cross-sectional study investigating the level of knowledge, attitude and practice of medical students at faculty of medicine Elmergib university regarding HAIs prevention, and its association with demographic and academic factors among the students.

**Study site:** Faculty of medicine Elmergib university Alkhoms city western region of Libya.

**Study population:** medical students at faculty of medicine Elmergib university.

**Sample size:** 127 participants.

**Study period:** April 2025.

**Sampling method:** All students of faculty of medicine at the clinical stage, the fourth, fifth and sixth (internship) year of medical training were targeted. Where the students at these years starts their clinical training at the Alkhoms teaching hospital departments. All students at Alkhoms faculty of medicine Elmergib university at the year 2025, registered at clinical stage at fourth, fifth and sixth year were targeted in the study, 135 students at fourth year, 154 students at fifth year and 85 students at sixth year, a total of 374 students. Out of all targeted 374 students only 127 responded to our questionnaire, who form about 34% of the total targeted population.

**Study instrument & Data collection:** A Self-administered questionnaire link on google forms was sent to all students through closed groups of telegram application. The questionnaire had 4 parts. The first part investigated the demographic and academic criteria of participants. The rest three parts investigated the level of knowledge, attitude and practice consecutively. The last three parts of the questionnaire were adopted from a questionnaire used by Paudel et al. (2016) in their study that aimed to understand the level of KAP among the nursing students regarding HAIs in the Western Region of Nepal [11].

**Data analysis:** Data collected through online questionnaire was downloaded as an excel spreadsheet, transferred to SPSS software which used for data analysis. Microsoft excel was used to create graphical charts.

## RESULTS

In this study 374 students were targeted, only 127 of them responded by filling the questionnaire online at a response rate of 34% which considered a very low response rate. Among all participant students 80.3% aged less than 28 years old while the rest aged more than 27 years old. 74% percent of all participant students were females and 26% males, as shown in table 1.

**Table 1. Participants Demographic characteristics.**

Factor	Frequency	Percentage
	N	%
<b>Age</b>		
Regular $\leq 27$	102	80.3
Repeater $> 27$	25	19.7
<b>All</b>	127	100%
<b>Sex</b>		
Male	33	26.0
Female	94	74.0
<b>All</b>	127	100%

Table 2. shows that 40.2%, 27.6% and 32.3% of all participants were at sixth, fifth and fourth year students respectively. Among all pparticipants 54.3% claimed that their academic grade is high while 45.7% said they have an average academic grade. 56% of participant students were regular students with no repeated years and 44% of them repeated some academic years.

**Table 2.** Participants Academic characteristics.

Factor	Frequency	Percentage
<b>Year of study</b>		
Fourth	41	32.3
Fifth	35	27.6
Sixth	51	40.2
<b>All</b>	127	100%
<b>Grade</b>		
High	69	54.3
Average	58	45.7
<b>All</b>	127	100%
<b>Study years</b>		
Regular ≤9	71	55.9
Repeater >9	56	44.1
<b>All</b>	127	100%
<b>Intended speciality</b>		
Medical speciality	63	49.6
Surgical speciality	64	50.4
<b>All</b>	127	100%

Only 52.8% of the participants had knowledge about gloves role in HAIs. While 87.4% have good knowledge about skin microbiome and its role in HAIs. Most of the correspondents (98.4%) were well aware of hand washing and its role in decreasing HAIs risk. Also 97.6% are aware of the fact that even if the hands are not visibly dirty we have to wash them before patient contact, about 72.4% understand the fact that the use of soap and water for cleaning visibly non dirty hands is as effective as the use of alcohol-based antiseptic, despite 98.4% are familiar with gloves use with anticipated body fluid exposure and 91.3% of them recognise the importance of usage of gloves even if no body fluids are involved, only 59.8% know the role of keep rubbing hand till dry when using alcohol-based antiseptics. All of our participants were familiar with the fact that hand hygiene should be done before and after direct patient contact, and 96.9% of them aware of gloves change for every patient even if they are not visibly dirty is mandatory and crucial in preventing HAIs. In summary, the overall knowledge was good for 85% of the participants and moderate for 15% of them.

**Table 3.** Participants knowledge on HAIs prevention.

	Question	n	%
<b>K1</b>	Gloves provide complete protection against acquiring/transmitting infection (false)	67	52.8
<b>K2</b>	Healthcare-associated pathogens can be found on normal, intact patient skin (true)	111	87.4
<b>K3</b>	Washing your hands with soap or an alcohol-based antiseptic decreases the risk of transmission of hospital acquired pathogens (true)	125	98.4
<b>K4</b>	If my hands are not visibly dirty, there is no need to wash my hands prior to patient contact (false)	124	97.6
<b>K5</b>	Use of an alcohol-based antiseptic for hand hygiene is as effective as soap and water if hands are not visibly dirty (true)	92	72.4
<b>K6</b>	Gloves should be worn if blood or body fluid exposure is anticipated (true)	125	98.4
<b>K7</b>	When using alcohol-based antiseptics, I should keep rubbing my hands until dry (true)	76	59.8
<b>K8</b>	There is no need to wash hands before doing procedures that do not involve bodily fluids (false)	116	91.3
<b>K9</b>	Hand hygiene should be performed before and after direct patient contact (true)	127	100.0
<b>K10</b>	I can wear the same pair of gloves for multiple patients as long as there is no visible contamination on the gloves (false)	123	96.9

**Table 4.** Summary of participants knowledge on HAIs prevention.

Total knowledge scores		
	N	%
<b>Good</b>	108	85.0
<b>Moderate</b>	19	15.0
<b>Poor</b>	0	0.0

Regarding correspondent's attitude, we found that 66.9% of them found hand hygiene agents not available, 88.2% of them found that towels to dry hand after washing them were not always available and 55.9% of them only found gloves available when needed. 30.7% of participants only found sinks not available while 43.3% of them state that the sinks are inconveniently located. Regarding participant's attitude towards hand hygiene 40.9% of them often forget to perform hand hygiene, 9.4% only declare that hand hygiene interferes with HCW-patient interactions, 70.9% of them state that hand hygiene agents cause irritation and dryness, 75.6% received training regarding hand hygiene, 76.4% of the students declare that their supervisors emphasize the importance of hand hygiene and 70.9% of them identified that if they perform hand hygiene they are less likely to transmit infection to patients. 28.3% of the students' state that they have tiny risk of obtaining infection from the patients, and only 31.4% of them would feel uncomfortable in prompt HCW to perform hand hygiene.

**Table 5.** Participants attitude on HAIs prevention.

	Question	n	%
A1	Hand Hygiene agents are not always available.	85	66.9
A2	Clean towels to dry my hands after washing are not always available.	112	88.2
A3	Gloves are always available when needed.	71	55.9
A4	Sinks are inconveniently located.	55	43.3
A5	Sinks are not available	39	30.7
A6	Hand hygiene agents cause irritation and dryness.	90	70.9
A7	Hand hygiene interferes with HCW-patient interactions	12	9.4
A8	I often forget to perform hand hygiene.	52	40.9
A9	I have a very low risk of acquiring infections from my patients.	36	28.3
A10	If I perform hand hygiene, I am less likely to transmit infections to my patients.	90	70.9
A11	Prevention of HAIs is a valuable part of HCWs role.	125	98.4
A12	I have received training about the importance of hand hygiene	96	75.6
A13	The importance of hand hygiene is emphasized by my clinical supervisors.	97	76.4
A14	I would feel uncomfortable reminding a HCW to perform hand hygiene.	40	31.5

Concerning student's attitude towards hand hygiene 51.2% wash their hand before and 68.5% after patient contact. Majority of the students (99.2%) wash their hand if they look dirty, while 97.6% of them wash hands after going to toilets and all of them wash after contact with blood or bloody fluids. Most of participant students (93.7%) wash their hands before and 94.5% of them wash their hands after caring for a wound, while only 63% of them wash their hands after taking off their gloves.

**Table 6.** Participants practice on HAIs prevention (Hand hygiene performance).

	Question	n	%
P1	Before Patient Contact	65	51.2
P2	After Patient Contact	87	68.5
P3	If they look or feel dirty	126	99.2
P4	After going to the toilet	124	97.6
P5	After contact with blood or bodily fluids	127	100.0
P6	Before caring for a wound	119	93.7
P7	After caring for a wound	120	94.5
P8	After removing gloves	80	63.0

## DISCUSSION:

Understanding hospital acquired infection prevention measure and applying them in daily routine of medical student's approach in hospitals is a cornerstone in improving our clinical practice and minimizing HAIs, by conducting this study we aimed to spot the light in points of strength and weakness in KAP of our new generation of physicians toward HAIs. Our results showed that the overall knowledge of students was remarkably good in line with systematic review by Nair et al. (2019) which highlighted that while students are generally aware of the risks associated with HAIs. A misunderstanding of gloves role has been found as about half of the participants think that gloves provide complete protection against HAIs, the findings that emphasized by Nair et al. (2019)

and Alp et al. (2016) who found that medical students often neglected personal protective equipment (PPE) use [3,4].

Although the good level of knowledge among our participants regarding HAIs prevention, there are some weakness points to be discussed as knowledge gaps, among these gaps we found that about 40% of participant students do not know that we have to rub hands till they dry when using an alcohol-based antiseptic for hand hygiene, and third of them doesn't recognise that using soap and water is as effective as alcohol-based antiseptics in hand hygiene when the hands are not dirty.

In term of student's attitude towards HAIs The availability of hand hygiene agents and gloves should be discussed with the administrators in departments as 66.9% of the student didn't found the agents while 55.9% did get their gloves when needed, Also the facilities for proper hand hygiene should be taken in consideration as about 30% of the students didn't get sinks when needed or located in unconventional place in 43.3%, and More efforts should be done to remind the students of hand washing by more educational programs and more illustration banners where needed as 40.9% of the students forgot to perform hand hygiene when needed. These findings are in some extent compatible with literature by Paudel IS et. al. (2016) who said that most of their correspondents (66%) identified that hand hygiene agents (alcohol based hand sanitizer or soap & water) were not readily available, 68% (79 out of 117) identified that clean towels to dry their hands after washing are not always available, 50% identified that the sinks were inconveniently located [11].

regarding students practice there was a defect regarding washing hands before and after patient care, only 52.2% washed their hands before patient contact, and 68.5% wash after patient contact, and who wash their hand after gloves removal were only 63%. Regarding washing hand when they feel or look dirty or after usage of toilet or contact with body fluids or after and before caring of a wound was excellent and most of them were over 93% in percentage.

Our findings emphasize the findings of a cross-sectional study, by Ahmed et al. (2021) who reported that while 80% of medical students acknowledged the importance of hand hygiene, only 56% practiced it consistently, and identified a lack of reinforcement from senior clinicians as a major factor contributing to reduced enthusiasm for HAI prevention measures [5]. Similarly, our results were in line with previous findings of Sax et al. (2017) who found that medical students were less likely to follow proper donning and doffing procedures for PPE, they revealed that students often felt discouraged from consistently following hand hygiene protocols due to the absence of strict institutional enforcement, and emphasized that students were more likely to comply with hand hygiene protocols when they observed senior clinicians demonstrating proper practices [6].

## **CONCLUSION:**

Unfortunately, the percentage of participants response from the targeted population in our study was low and much less than expected which may highlight the weakness in the medical research approach and compliance in our college.

Although the percentage of the candidates were low, their knowledge regarding HAIs was excellent, but that was not the case with their attitude and compliance. However, more training programs and knowledge sessions regarding HAIs should be performed in regular basis to overcome some shortage of KAP of hospital acquired infections of future physicians due to the importance of lowering HAIs to minimum for better health and medical practice.

On the other hand, more efforts should be done by administrators regarding hand hygiene agents and sinks availability and future established infrastructures, as there was some shortage of hand hygiene agents and sinks or they were unavailable to the candidates in substantial percentage.

This study can be a baseline for further ones to improve our KAP regarding HAIs and for better practice and health, although the results were statistically insignificant in some of the domains, they can give us clue for which parts we should highlight and give more efforts and time to upgrade, what shortage we have and which points we need to ameliorate in future studies.

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## **Compliance with ethical standards**

### *Disclosure of conflict of interest*

The authors declare that they have no conflict of interest.

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