Knowledge, Attitudes, and Practices of Medical Students at Qassim University Regarding Infection Prevention and Control: Focus on MRSA Screening and Decolonization

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ABSTRACT

Background: Healthcare-associated infections (HAIs) remain a concern globally due to the rising morbidity and mortality rates combined with the economic burden they impose on health systems including methicillin resistant Staphylococcus aureus (MRSA) Medical students, especially during their clinical rotations, have the potential to foster the spread of MRSA. In Saudi Arabia, the screening of medical trainees and the decolonization of MRSA remains a largely neglected area despite the existence of infection prevention and control (IPAC) practices.

Objective: This study is intended to measure the KAP of medical students at Qassim University in regard to MRSA screening and decolonization IPAC focused on studying the knowledge attitude practices as well as barriers toward compliance with protocols. Furthermore, the study investigates the Jack's principles of feasibility in the context the embedding of MRSA screening protocols into medical curricula.

Methods: A cross-sectional study was conducted, there were 99 responses of medical students from Qassim University which were evaluated and separated according to preclinical grouped years 1-3 and clinical years 4-6. An online survey included questions on demographics, knowledge, attitude, practices, barriers, and suggestions related to IPAC and MRSA. They were descriptively analyzed.

Results: Even though 76.8% one knew that MRSA is an antibiotic resistant bacterium, there were considerable gaps regarding knowledge of it transmission routes, with 12.1% erroneously believing that it is an airborne disease. While 69.7% of the respondents agreed that there should be compulsory screening for MRSA prior to clinical rotations, only 64.6% were willing to undergo decolonization if they were screened positive. Self-reported compliance with hand hygiene protocols was poor as 50.5% reported full compliance. The main obstacles were inadequate training (35.4%) and poor time management (31.3%). The majority of the participants (84.8%) were in support of IPAC certification, and 81.8% in for additional training exclusively focused on MRSA.

Conclusion: The results demonstrate persistent knowledge and practice deficits among medical students in IPAC, suggesting a need for more focused education, the presence of screening for MRSA in high risk rotation, and more widely accepted decolonization identifiers. If formulated, these measures can potentially improve patient safety and limit the spread of MRSA in the medical field.

Keywords: Infection prevention and control, MRSA, medical students, screening, decolonization, Saudi Arabia, healthcare-associated infections.

INTRODUCTION

Healthcare-associated infections (HAIs) remain a concern globally due to the rising morbidity and mortality rates combined with the economic burden they impose on health systems[1]. According to the World Health Organization[2] HAIs are the most preventable cause of patient mortality and increase the necessity for establish a well-structure infection prevention and control (IPAC) policies. Methicillin-resistant Staphylococcus aureus (MRSA) remains one of the most alarming multidrug resistant organisms (MDROs) that cause HAIs[3]. MRSA is highly prevalent and the leading cause of HAIs, which include several other infections such as skin and soft tissue infections, bloodstream infections (bacteremia), pneumonia and surgical site infections[4]. Centers for Disease Control and Prevention (CDC) indicated that as a result of beta-lactam antibiotics resistance, MRSA is associated with increased hospital length of stay, increased healthcare costs due to its resistance to beta-lactam antibiotics and the increased mortality[5].

Saudi Arabian MRSA Analysis

The ICU colonization rates was reported to be 30-40% in Saudi Arabia, which consider a high MRSA prevalence in healthcare settings[6]. A systematic review reported MRSA colonized patients with up to 12.6% among nasal healthcare workers, indicating that such professionals are super carriers in active transmission of MRSA[7]. Moreover, Al-Anazi et al[8] show staggering results for young medical professionals suggesting that medical students may accidently perpetuate MRSA transmission during their clinical rotations.

Obstacles to Successful IPAC Implementation in Saudi Arabia

While there are internationally accepted and locally developed guidelines documents for IPAC policies, some medical institutions in Saudi Arabia still face challenges in effectively implementing MRSA prevention strategies[9]. The primary hindrances to the implementation

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of these policies and procedures are inadequate education and training, lack of standardized screening programs, and low levels of knowledge regarding MRSA and its transmission[10]. Furthermore, unlike the situation in Western countries, cultural practices such as frequent handshaking and high levels of social engagement could be an important reason for being at a greater risk for MRSA transmission in these settings in Saudi Arabia[7].

The Necessity of MRSA Screening For Medical Students

Many countries have created screening procedures for MRSA for patients and healthcare professionals who are at high risk, but medical students are usually overlooked[11]. MRSA screening of a preclinical phase of medical students has been found to reduce nosocomial infection rates, thus improving infection control practices at the hospital level[12]. With Saudi Arabia's high prevalence of MRSA, "medical students rotating in ICUs, surgical wards, and even in the immunocompromised patient ward would benefit from targeted screening and decolonization strategies," that should help in reducing the transmission rates[13].

Study Aim

This study aims to assess medical students knowledge, attitudes, and practices (KAP) regarding IPAC and MRSA screening, explore barriers to IPAC adherence, and evaluate the feasibility of introducing MRSA screening and decolonization protocols into Saudi medical education and clinical settings.

METHODS

Study Design and Setting

The cross-sectional study was done at the College of Medicine, Qassim University in Saudi Arabia. The study set out to evaluate the medical students' knowledge, attitudes, and practices (KAP) on infection prevention and control (IPAC) with emphasis on MRSA screening and decolonization. The subjects involved were students from preclinical (Years 1–3) and clinical (Years 4–6) medical students.

Sample Size and Data Collection

A 99 medical students were the subjects of this study. Information was obtained within a period of two weeks using an online survey facilitated by Google Forms. Information was sought regarding the students' demographics, knowledge, attitudes, practices, perceived barriers, and suggestive measures towards IPAC education improvement and MRSA screening protocols.

Survey Instrument

1. Demographics: Information on gender, year of study, and whether the respondent has ever attended formal IPAC training sessions.
2. Knowledge: Understanding with respect to MRSA transmission, colonization, and prevention.
3. Attitudes: Beliefs and opinions of students towards IPAC measures, MRSA screening, willingness to comply with decolonization procedures, and concern.
4. Practices: Self-reported compliance with IPAC policies including hand hygiene, PPE use, and MRSA screening participation.
5. Barriers: Challenges reported by students in adopting IPAC measures and MRSA screening participation.
6. Recommendations: Student suggestions for improving IPAC and MRSA screening education and initiatives.

10 students were surveyed in the pilot stage of the study. They provided feedback on the study to assist in improving the clarity and reliability of the instrument. Minor changes were made to the study based on their recommendations.

Data Processing

Responses from surveys completed in Google Forms were transferred to Microsoft Excel for basic data cleaning and structuring. Analysis was done under SPSS (Version 27). Demographic and other pertinent factors such as knowledge, attitude, practices, and barriers were summarized using descriptive coding as frequencies and percentages.

Ethical Considerations

The study was approved by the Institutional Review Board (IRB) of Qassim University. Participation was voluntary, and informed consent was obtained from all participants prior to data collection. To ensure confidentiality, no identifying information was collected, and all data were stored securely.

RESULTS

The study assessed the knowledge, attitudes, and practices (KAP) of medical students regarding infection prevention and control (IPAC), with a focus on MRSA screening and decolonization strategies. A total of 99 medical students participated, with results categorized into demographics, knowledge, attitudes, practices, barriers, and recommendations.

1. Demographics

Gender Distribution:

- 59.6% were male, while 40.4% were female.

Academic Year Distribution:

- 60.6% were preclinical students (Years 1-3).
- 39.4% were clinical students (Years 4-6).

Formal IPAC Training:

- Only 25.3% of students reported receiving prior formal IPAC training.
- A significant 74.7% had never received structured IPAC education before their clinical exposure.

2. Knowledge of IPAC and MRSA

2.1 General Knowledge on MRSA

- 76.8% of students correctly identified MRSA as an antibiotic-resistant bacterium.
- However, 10.1% mistakenly believed MRSA was a viral infection, and 4.0% thought it was fungal, indicating gaps in basic knowledge.

2.2 MRSA Transmission Awareness

- 70.7% correctly stated that MRSA spreads through direct contact with contaminated surfaces or individuals.
- However, 12.1% incorrectly believed MRSA was airborne, and 7.1% thought it was spread through contaminated water.
- 10.1% of students were unsure about MRSA transmission routes, highlighting a lack of awareness of MRSAs primary mode of spread.

2.3 Knowledge of MRSA Carrier Prevalence

- 28.3% correctly estimated that 10-20% of healthy individuals may carry MRSA asymptomatically.
- However, 43.4% responded with "I dont know", demonstrating a major knowledge gap.
- 17.2% overestimated the prevalence at more than 30%, while 11.1% underestimated it at less than 5%.

2.4 Purpose of MRSA Screening
- 50.5% correctly selected "All of the above", recognizing that MRSA screening helps detect infections, identify carriers, and prevent transmission.
- However, 29.3% thought screening was only for identifying asymptomatic carriers, and 9.1% believed it was only for detecting active infections.

3. Attitudes Toward IPAC and MRSA Screening

3.1 Perceived Importance of IPAC Measures
- 71.7% of students considered IPAC "very important" in reducing healthcare-associated infections (HAIs).
- 24.2% stated that IPAC is "important" but not critical.
- Only 4.0% considered IPAC "somewhat important", and none thought it was unimportant.

3.2 Support for Mandatory MRSA Screening
- 69.7% strongly agreed that MRSA screening should be mandatory before clinical rotations.
- 23.2% agreed, but did not consider it essential.
- 5.1% were neutral, and 2.0% disagreed, suggesting that while most students acknowledge the value of screening, a small portion remains hesitant.

3.3 Willingness to Voluntarily Undergo MRSA Screening
- 66.7% of students stated they would voluntarily get tested for MRSA.
- However, 22.2% refused, and 11.1% were unsure, highlighting potential resistance to voluntary MRSA screening programs.

3.4 Compliance with MRSA Decolonization if Found Positive
- 64.6% stated they would fully comply with decolonization protocols.
- 18.2% said they would not follow decolonization, and 17.2% were unsure, indicating a gap in understanding the importance of decolonization measures.

3.5 Perception of IPAC Effectiveness in Reducing MRSA Transmission
- 58.6% strongly agreed that IPAC measures, including MRSA screening, significantly reduce HAIs.
- 26.3% agreed, while 9.1% were neutral and 6.1% disagreed, reflecting some skepticism about IPAC effectiveness.

4. IPAC Practices Among Students

4.1 Hand Hygiene Compliance
- 50.5% of students reported always practicing proper hand hygiene before and after patient contact.
- 34.3% reported frequently doing so, while 12.1% admitted to occasional adherence.
- 3.0% rarely followed proper hand hygiene protocols, raising concerns about IPAC compliance in clinical environments.

4.2 Experience with MRSA Screening
- 69.7% of students had never participated in or observed MRSA screening.
- Only 30.3% had prior exposure to MRSA screening, suggesting a lack of hands-on training in screening procedures.

4.3 Adherence to IPAC Protocols
- 40.4% of students reported always following IPAC measures.
- 28.3% followed IPAC frequently, while 24.2% followed IPAC sometimes, and 7.1% rarely followed IPAC protocols.

4.4 Precautions When Encountering a Suspected MRSA Case
- 67.7% stated they would follow proper contact precautions (e.g., gloves, gowns, isolation measures).
- 22.2% believed that standard precautions were sufficient.
- 10.1% said they would not take any additional precautions, suggesting potential non-compliance with recommended IPAC measures.

5. Barriers to IPAC Adherence

- 5.1 Main Barriers Identified by Students
- 35.4% reported insufficient training as the biggest challenge to IPAC compliance.
- 31.3% stated that lack of time was a major barrier.
- 17.2% cited limited access to PPE, while 16.2% believed their institution placed low emphasis on IPAC.

5.2 Confidence in Managing MRSA Risks
- 55.6% of students lacked confidence in managing MRSA risks.
- 44.4% reported feeling adequately prepared.

5.3 Challenges in Implementing MRSA Screening in Hospitals
- 52.5% of students believed logistical challenges hinder MRSA screening programs.
- 47.5% disagreed, stating there were no major barriers to implementation.

6. Recommendations for Improving IPAC and MRSA Screening

6.1 Preferred IPAC Resources
- 29.3% preferred access to IPAC guidelines and protocols.
- 28.3% favored regular workshops and seminars.
- 22.2% believed mentorship would help, while 20.2% supported microbiology lab training.

6.2 Frequency of IPAC Training
- 38.4% preferred IPAC training before clinical years.
- 23.2% preferred annual training, while 21.2% preferred semester-based training.

6.3 Support for Scenario-Based IPAC Training
- 65.7% supported training through real-life simulations.
- 21.2% opposed it, and 13.1% were unsure.

6.4 Support for MRSA-Specific Training
- 81.8% agreed that MRSA-specific training should be introduced, with 55.6% strongly agreeing.

6.5 Support for IPAC Certification
- 84.8% supported IPAC certification for medical students.
- 15.2% did not favor certification.

DISCUSSION

These outcomes correspond with previous studies, offering important knowledge gaps regarding MRSA, its IPAC practice compliance, and attitudes toward MRSA screening. While a substantial number of students (69.7%) strongly agreed that screening for MRSA should be done prior to clinical rotations, only 64.6% reported that they would adhere to decolonization protocols. This gap indicates that although students accept the fact that MRSA poses a serious threat to the public, there is little motivation or education regarding decolonization methods[14].

Another significant finding was the proportion of medical students who claimed that they had never received formal IPAC training – 74.7%. This is aligned with international studies that highlight most medical schools around the world is lacking infection control well-structured education[14]. Moreover, a national study recently conducted in Saudi Arabia further supported these findings showing many medical trainees not having adequate knowledge of MRSA screening and decolonization further indicating the necessity comprehensive IPAC training[16].

Comparison with Existing Literature

Similarly, the lack of knowledge and compliance with IPAC guidelines identified in this study was found in other studies conducted in Saudi Arabia and rest of the world. According to Al-Anazi et al[8] and Balkhy et al[7], employees working in healthcare settings where effective IPAC training was lacking, faced greater risks of engaging in behaviors which could facilitate MRSA transmission.

The findings in this study also coincide with the global pattern of the existence of HAIs despite the improvement of infection prevention strategies. A large study conducted in the United States showed that HAIs are a significant issue in healthcare, with Staphylococcus aureus, including MRSA, being among the most commonly cited infectious agents[17]. These results underscore the persistent issue for hospitals to develop and implement adequate surveillance, prevention, and intervention programs.

Research in fact shows that HAIs can be greatly reduced if medical trainees are routinely screened for MRSA[12]. European and North American studies highlight the fact that preclinical medical training should include screening for MRSA, which will certainly be useful in Saudi Arabia for medical students, especially those who join high-risk departments[13].

Implications for IPAC Training and Policy

This study prove the importance of incorporating an organized IPAC training module along with an MRSA screening policy into the educational curriculum of a medical school. According to WHO[18], breaching upon structured hand hygiene education creates the strongest impact in a system trying to reduce nosocomial infection. In addition, to this Stewardson et al[19] describes that Hand hygiene education, training, along with simulation based IPAC programs results into sustained compliance rates.

To ensure there is mitigation of risks for MRSA transmission, it is important that:

1. Organized IPAC workshop sessions are made compulsory prior to a medical student commencing with clinical rotations.
2. Targeted MRSA screening programs are carried out within certain identified departments in the hospitals with high risk patients.
3. Standardization of decolonization protocols to ensure carriers of MRSA do not contribute to nosocomial infection.

Khan et al[20] suggests that hospitals that do not apply organized IPAC training modules tend to show increased rates of nosocomial infections. With Saudi Arabia's cultural context of regular handshaking, medical institutions are bound to increase risks and transmission of MRSA. Medical institutions should enforce rules revolving around proper hand hygiene alongside real IPAC training scenario[19].

Limitations of the Study

The study covers these limitations which are important to emphasize:

- Cross-sectional study designs capture knowledge, attitudes, and practices at a single point in time, hindering longitudinal shifts in adherence to IPAC over time.
- Participants could be subjected to bias in this study by over-reporting compliance to infection prevention and control policies.
- The research was completed at one institution, so the results may not be applied to other medical faculties in Saudi Arabia.

Recommendations for Future Research

Further research is required in order to enhance IPAC measures in Saudi hospitals. The research should:

- Implement longitudinal studies that seek to understand the effect of IPAC training on MRSA screening adherence over time.
- Extend the research to other regions of Saudi Arabia by incorporating more medical schools.
- Utilize direct observation measurement approaches in order to assess compliance with IPAC protocols without self-reporting bias.

CONCLUSION

The results of this study indicate the need to improve IPAC education, MRSA screening, and MRSA decolonization procedures among medical students in Saudi Arabia. As there is a high burden of MRSA in Saudi hospitals, the absence of systematic MRSA-screening among students rotating in higher risk specialty areas is a patient safety concern.

FINAL SUGGESTIONS

1. Integrate IPAC training into the curricula of medical schools as one of the methods for improving MRSA prevention knowledge.
2. Implement specific MRSA screening requirements for medical students on rotation at the ICUs and surgical wards.
3. Create decolonization protocols for MRSA positive students for use before patient care activities in high risk departments.
4. Enhance compliance with hand hygiene through monitoring and scenario-based training assistance.

By implementing these recommendations, Saudi Arabia can enhance its IPAC strategies, reduce MRSA transmission risks, and improve healthcare quality for both patients and healthcare workers.

Authorship Contribution: All authors share equal effort contribution towards (1) substantial contributions to conception and design, acquisition, analysis and interpretation of data; (2) drafting the article and revising it critically for important intellectual content; and (3) final approval of the manuscript version to be published. Yes.

Potential Conflict of Interest: None

Competing Interest: None

Acceptance Date: 25-02-2025

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