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Antimicrobial Resistance Risk. How to mitigate the risk among healthcare workers in the kingdom of Saudi Arabia

**خطر البكتيريا المقاومة، تقليل خطر انتقالها بين الممارسين
الصحيين في المملكة العربية السعودية**

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introduction:

The health sector:

is at the forefront of fighting an emerging threat antimicrobial resistance (AMR). This phenomenon occurs when microbes, such as bacteria, viruses, and fungi, acquire the ability to withstand the effects of medications designed to eliminate them. The consequences of this resistance are complications in treating infections, leading to detrimental effects (Alsharif, 2021).

Healthcare workers, the very heroes on the frontlines of patient care, are particularly vulnerable to antimicrobial resistance (AMR). The constant exposure to various pathogens creates the perfect environment for resistant strains to emerge and spread (Alsharif, 2021). (Ali et al., 2021) This introductory section sets the stage for a deeper exploration of this critical issue, including the specific risks healthcare workers face, mitigating strategies to be explored, and proactive measures against this rising threat.

As a major international hub for pilgrimages and a leading destination for migrant workers in the Gulf and Middle East region, the Kingdom of Saudi Arabia has accumulated vast experience and expertise in managing various pandemic outbreaks, pandemic has 19-including the MERS virus (Alsharif, 2021). While the COVID undoubtedly presented significant challenges for the Saudi government, it has also prompted a shift in priorities, from a focus on state security to a greater emphasis on human welfare (Alsharif, 2021).

Considering the strategic importance of the healthcare sector in Saudi Arabia, it is crucial to delve into the unique challenges faced by healthcare workers in the kingdom, in order to develop effective strategies to mitigate the risk of antimicrobial resistance and ensure the resilience of the healthcare system. (Al Mansour et al., 2021) This research paper will therefore provide a comprehensive examination of the (2021) the specific risks and vulnerabilities that healthcare workers in Saudi Arabia face in context of antimicrobial resistance, analyze the most effective strategies and interventions that can be implemented to address these challenges.

In conclusion, this study will culminate by proposing a comprehensive suite of be implemented to safeguard the healthcare workforce proactive measures that can and the population at large, with the overarching goal of reinforcing the overall resilience against the looming threat of antimicrobial resistance in the Kingdom of Saudi Arabia.

Problem Statement:

The risk posed by antimicrobial resistance is gaining pace. It is among the most imperative threats to healthcare globally and directly puts a question mark on the role of healthcare workers at the epicenter of this crisis. The constant bombardment of thoroughly diversified ranges of microbes in a healthcare setting provides fertile ground for resistant pathogens to output and transmit.

Kingdome ofSaudi Arabia serves as a hub for both migrant workers and pilgrims, increasing the risk of healthcare staff developing AMR due to frequent contact with different kinds of infections. It reviews the unique vulnerabilities of Saudi Arabian healthcare professionals to antimicrobial resistance to enhance such resilience within other practical strategies and interventions the healthcare system . It also considers that could be applied to help reduce these risks.

The problem manifests in several critical ways:

Increased Difficulty in the Treatment of Infections: If common antibiotics become resistant, treatment for simple infections becomes challenging. This may lead to threatening -prolonged illnesses, increased healthcare costs, and even life .complications.

Transmission risk: Such a health worker may carry AMR pathogens to his patients, especially those with deficient immunity. This then creates a ripple effect, which may further endanger whole populations of patients.

Psychological Stress: The fear of contracting or spreading resistant infections is a persistent one and may prove overwhelming to healthcare workers, leading to being and, -psychological severe stress that can result in manifestations affecting well .hence, burnout.

faceted approach to solve the problem., therefore, the -It thus requires a multi way: protecting healthcare workers and, at the same -treatment for it must be two time, reducing the onset and spread of the AMR pathogen in healthcare facilities.

Significance of the Study:

There is a good number of reasons as to why there is a need to understand the risks of antimicrobial resistance to healthcare workers:

Protection of Patient Safety: AMR threatens patient safety since it makes the involved infections more difficult and costly to treat. Therefore, this research will focus on the assessment of exposure risks for healthcare workers to finally strive for improving patient outcomes.

Curbing the Spread of AMR: Healthcare workers can act as a bridging population in the transmission of resistant pathogens. The risk mitigation strategies taken for this group can break the chain of transmission, hence slowing down the spread of AMR globally.

Optimization of Health Care Resources Allocation: AMR increases health costs through additional days of hospitalization and expensive drugs. Therefore, this study effective interventions that would protect health care workers and, at -identifies cost to optimize the same time, reduce the transmission of AMR in health care settings resource allocation.

A healthier workforce can be fostered by reducing psychological effects that is expected that this current negatively impact healthcare workers due to AMR. It study will, therefore, create a better and safer work environment for health strengthening professionals by helping in curtailing stress at work and further enjoyment of work.

based practices whereby the findings of -It can aid in the development of evidence based protocols -this study are basically applied in initiating and executing evidence and guidelines toward the effective management of the risk of AMR in healthcare workers. This study accrues relevant knowledge for changing clinical practice care across all health settings variability to enhance patient.

By investigating and tackling the exact challenges that healthcare workers face, this study gives itself an excellent opportunity to significantly contribute to combating antimicrobial resistance in the world at large.

Study Aims:

Specifically, this study intends to comprehensively investigate the risk of AMR among healthcare workers for possible intervention and control. In pursuit of this aim, the following key objectives will be focused on: Assess the Prevalence of AMR Risk Factors: Identify a range of possible risk factors that put healthcare workers at

increased risk of exposure to and transmission of AMR. These might include but not be limited to the following: pattern of prescription for antibiotics, adherence to infection control practices, places within healthcare facilities, etc. Assess the Impact of AMR on Health Care Workers: A study into all possible effects of the exposure of In that respect, this may relate to the estimation .health workers to AMR will be done of the extent of infection by the antimicrobial resistance within a health setting, studying the psychological impact due to the risk of acquiring an AMR, or analyzing to this hazard. Design efficacious interventions that the possibility of burnout related minimize the threat of AMR for healthcare workers where risks are identified. This may include focused educational programs on AMR awareness, best practices and offenses, hand hygiene compliance enhancement strategies and exploring PPE specifically designed to reduce the transmission of AMR. Disseminate Knowledge and Good Practice: The study aims to disseminate the research findings among all relevant stakeholders, from healthcare professionals to policymakers to public health based -organizations. This would go a long way in building up some evidence guidelines and interventions with which AMR risk might be effectively controlled inside healthcare settings.

Study questions:

Prevalence And Risk Factors Of Antimicrobial resistance:

What is the prevalence of risk factors of AMR among different groups of the healthcare worker populations, such as doctors, nurses, and technicians, in Saudi Arabian healthcare facilities?

How are facility-driven antibiotic prescribing practices related to the AMR risk among healthcare workers?

Effect of AMR on healthcare workers

How common are AMR infections among the healthcare workers studied in Saudi Arabia?

Is there any association between psychological distress, say, stress or anxiety, and burnout from exposure to AMR pathogens and healthcare workers?

What are the perceptions and attitudes of health workers concerning risks associated with AMR? What are the perceived roles of health workers in preventing and spreading AMR?

Mitigation and Education:

Which health education interventions be most effective in bringing about changes in knowledge, attitude, and practices on AMR prevention and control among health workers?

Are specific types of PPE associated with a reduced risk of the transmission of AMR to healthcare workers?

What has been the effect of implementing comprehensive, evidence-based antibiotic stewardship programs on AMR rates toward housemen?

Dissemination and Collaboration:

Which methods are known to be successful in the dissemination of research findings and best practices to reach out to stakeholders (healthcare workers, public health organizations, and policymakers) regarding the mitigation of AMR risks?

How can interaction and exchange of knowledge among institutions be more effective for helping to lower this global risk of AMR among healthcare workers? These revisions aim for conciseness and direct relevance to your core research goals.

Study Assignments:

AMR for further study on the risk of acquiring Here are some possible assignments by healthcare workers:

Literature Review:

Conduct an integrated review of the literature on AMR risk in healthcare workers. Search for recent studies in academic databases using relevant search terms such as antimicrobial resistance," "healthcare workers," "infection control," "antibiotic " ".stewardship," and "psychological impact

Using the results of these studies as a guide, analyze and summarize key findings against themes identified, including knowledge gaps.

its implications for your study Summarize the research in this area to date, along with.

Data collection:

Depending on the scope of the ,study and ethical considerations it may collect data from healthcare workers directly. These are:

Questionnaires: Design and implement questionnaires among healthcare workers to establish current knowledge, attitude, and practice concerning AMR.

depth interviews to be conducted with health workers in order to -Interviews: In secure a better understanding of their experiences concerning risks of AMR and the impact.

Data Analysis:

Analyze the data which has been obtained, using the applied method.

Study the impact of an antibiotic stewardship program on the risk of AMR among healthcare workers. Dissemination of Findings:

The results of the research, together with the methodology applied and the conclusions, should be summarized in a report. Such a report could be prepared for reviewed journal or presented at a -submission for publication in some reputable peer proper conference. Develop educational materials or presentations to share the findings with healthcare workers and relevant stakeholders. Consider developing an public to help build awareness of the risk of article or blog posting to the general AMR in healthcare settings. Note that this is just some suggestion for the study case basis through research -by-assignments. Specific tasks will depend on a case design, available resources, and ethical considerations.

Previous studies:

Antimicrobial resistance in Saudi Arabia. An urgent call for an immediate action(Hosam M Zowawi 1PMID: 27570847 PMCID: PMC5039611 DOI: 10.15537/smj.2016.9.16139)

Abstract

Antimicrobial resistance (AMR) is increasingly being highlighted as an urgent public and animal health issue worldwide. This issue is well demonstrated in bacteria that are resistant to last-line antibiotics, suggesting a future with untreatable infections. International agencies have suggested combating strategies against AMR. Saudi Arabia has several challenges that can stimulate the emergence and spread of multidrug-resistant bacteria. Tackling these challenges need efforts from multiple sectors to successfully control the spread and emergence of AMR in the country. Actions should include active surveillance to monitor the emergence and spread of AMR. Infection prevention and control precautions should also be optimized to limit further spread. Raising awareness is essential to limit inappropriate antibiotics use, and the antibiotic stewardship programs in hospital settings, outpatients, and community pharmacies, should regulate the ongoing use of antimicrobials.

High incidence rate of methicillin-resistant *Staphylococcus aureus* (MRSA) among healthcare workers in Saudi Arabia, 2014.(Iyer, A., Kumosani, T., Azhar, E., Barbour, E., & Harakeh, S.. Title of the article. *Journal of Infectious Diseases and Control*, 3589. <https://doi.org/10.3855/jidc.3589>)

Abstract

Introduction: Nosocomial infections are normally hospital acquired. Nasal carriage of *Staphylococcus aureus* (*S. aureus*) is very common and may be transmitted via a hand-to-nose route. The objective of the present study was to screen healthcare workers for the colonization of their nasal cavities with MRSA.

Methodology: The study group included hospital staff such as nurses, doctors, and technicians. The control group included university students. For isolation, nasal swabs were taken from the volunteers and cultured on mannitol salt agar media selective for *S. aureus*. Suspected colonies were confirmed by PCR using specific primers for the coagulase and *mecA* gene. Typing of the coagulase-positive strains was done using restriction fragment length polymorphism (RFLP).

Results: The results indicated an incidence rate of 76% among healthcare workers. This is in comparison with students who served as control and were negative for MRSA. Using RFLP, four different types of MRSA were confirmed.

Conclusions: The results of this study are alarming. Effective control measures must be formulated and implemented to avoid indiscriminate use of antimicrobials and the spread of these infectious agents in the region.

Ten-year resistance trends in pathogens causing healthcare-associated infections; reflection of infection control interventions at a multi hospital healthcare system in Saudi Arabia, 2007–2016

Abstract

Background: Studying temporal changes in resistant pathogens causing healthcare-associated infections (HAIs) is crucial in improving local antimicrobial and infection control practices. The objective was to describe ten-year trends of resistance in pathogens causing HAIs in a tertiary care setting in Saudi Arabia and to compare such trends with those of US National Health Surveillance Network (NHSN).

Methods: Pooled analysis of surveillance data that were prospectively collected between 2007 and 2016 in four hospitals of Ministry of National Guard Health Affairs. Definitions and methodology of HAIs and antimicrobial resistance were based on NHSN. Consecutive NHSN reports were used for comparisons.

Results: A total 1544 pathogens causing 1531 HAI events were included. Gram negative pathogens (GNP) were responsible for 63% of HAIs, with a significant increasing trend in *Klebsiella* spp. and a decreasing trend in *Acinetobacter*.

Methicillin-resistant *Staphylococcus aureus* (27.0%) was consistently less frequent than NHSN. Vancomycin-resistant *Enterococci* (VRE, 20.3%) were more than doubled during the study, closing the gap with NHSN. Carbapenem resistance was highest with *Acinetobacter* (68.3%) and *Pseudomonas* (36.8%). Increasing trends of carbapenem resistance were highest in *Pseudomonas* and *Enterobacteriaceae*, closing initial gaps with NHSN. With the exception of *Klebsiella* and *Enterobacter*, multidrug-resistant (MDR) GNPs were generally decreasing, mainly due to the decreasing resistance towards cephalosporins, fluoroquinolones, and aminoglycosides.

Conclusion: The findings showed increasing trends of carbapenem resistance and VRE, which may reflect heavy use of carbapenems and vancomycin. These findings may highlight the need for effective antimicrobial stewardship programs, including monitoring and feedback on antimicrobial use and resistance.

A Comprehensive Analysis of Multidrug-Resistant Microorganisms Associated with Occupational Infection Risk in Health Workers, 2019)

This study examines the occupational risk of multi-drug resistant infections, highlighting the risks encountered by healthcare personnel.

A thorough examination of MRSA carriage in healthcare personnel in non-outbreak environments in the US and Europe - BMC Infectious Diseases, 2014)

This study examines the frequency of MRSA transmission in healthcare professionals from a range of backgrounds, including physicians and nurses.

A systematic review, 2014) MRSA carriage among healthcare professionals in non-outbreak settings in Europe and the United States

The MRSA carriage rates among healthcare professionals are also compared between the US and Europe in this study.

Picton-Barnes and associates, 2020 This review examines illnesses linked to healthcare in many medical fields, including the possibility of developing multi-drug resistant bacteria.

These studies highlight the increased risk healthcare workers face due to their constant exposure to various pathogens, including those resistant to antimicrobials.

The theoretical principles of the study:

This study on antimicrobial resistance (AMR) risk in healthcare workers will be grounded in several key theoretical principles:

Social Cognitive Theory: SCT postulates that individual behavior is an interaction of personal, environmental, and behavioral factors. Guided by this framework, the study will investigate how healthcare workers' knowledge and attitudes, coupled with access to resources around infection control, influence their practices and, hence, their risk of exposure to AMR ,eventually.

Risk Perception Theory: The perception of risk goes a long way to clarify much of the behaviour under study. The perception that healthcare workers have of the risk of AMR and how these perceptions influence their adherence to recommended practices in mitigating that risk will be discussed.

Methodology and research methods:

This study set out to determine the risk of antimicrobial resistance among healthcare workers methods approach. It would be a quantitative method in data collection to deeply understand the phenomenon under study.

Survey Method:

administered questionnaire will be designed to obtain information on-A self knowledge, attitudes, and practices regarding AMR among healthcare workers. Healthcare workers targeted in this study come from all levels of the selected healthcare facility, for example: ICU, emergency room, and general ward. These will be measured through:

Knowledge about AMR and transmission routes.

Attitudes toward infection control practices and antibiotic stewardship.

reported adherence to recommended practices. Perceived risk of being exposed -Self to AMR.

Data Analysis:

The data collected from each administered survey will then be analyzed statistically to establish trends and possible relationships between variables. Part of this may indicate the relations that exist among demographic data of healthcare workers, departmental backgrounds, or experiences with their knowledge, attitude or reported practices relating to AMR.

Study tools:

In this regard, proposed research on AMR risk in healthcare workers is informed by the data collection tool based on the chosen method approach.

Survey Software Platforms:

Such online survey platforms can also distribute the survey electronically and collect the data, runnable digital storage of the data that is, in turn, well secured from unwanted access, and automated analytics tools that analyze collected data.

Survey Instrument:

The latter may be based on a self-administrated survey, forming the principal means for collecting quantitative data in this study.

A questionnaire for this study will be designed, focusing on these critical areas of AMR risk.

Knowledge on AMR and its mode of transmission.

One deals with attitudes towards infection control practices and antibiotic stewardship.

Self-reported compliance with recommended practice on hand hygiene, use of PPE, and waste disposal.

Perceived risks of exposure to AMR.

The survey design should consider:

Clarity and readability of questions to be understood by participants.

A question format, for example, multiple choice, through which various data points can be captured.

Geographic boundaries of the study:

This study will focus on healthcare workers employed at healthcare facilities throughout the Kingdom of Saudi Arabia.

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