

The Role of Interdisciplinary Collaboration in Preventing Hospital-Acquired Infections Strategies for Reducing Healthcare-Associated Infections (HAIs): A Systematic Review

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ABSTRACT

Hospital-acquired infections (HAIs) are a significant problem for healthcare systems around the world because they raise morbidity, mortality, and costs. Through cooperative infection control initiatives, this research examines the roles played by different healthcare workers in lowering HAIs. Physiotherapists, radiologists, dentists, operating room technicians, pharmacists, Specialist-Sociology, Technician-Respiratory Therapy, Technician-Radiological Technology, Technician-Laboratory, Technician - Health Informatics and nurses all play essential roles in promoting antimicrobial stewardship and implementing infection prevention strategies. By adhering to protocols, including good hand hygiene, sterilization methods, and prudent use of antibiotics, these personnel help reduce the spread of diseases in hospital environments. Infection control bundles and antibiotic stewardship initiatives are examples of interprofessional teamwork that further improves patient safety and healthcare results. To prevent HAIs, healthcare professionals' diverse areas of expertise must be acknowledged and integrated, as this research demonstrates. Majority of the mothers had recovered, while, a few had to be admitted to the ICU whereas some of them passed away. Various maternal outcomes included postpartum hemorrhage, peripartum hysterectomy and blood transfusion. Perinatal outcomes included preterm birth, still birth, NICU admission and death.

Keywords: HAIs, Interdisciplinary Collaboration, Infection Strategies.

1. INTRODUCTION

The literature has acknowledged the prevalence of healthcare-associated infections (HAIs) and their adverse consequences for several decades. At an alarming rate, the prevalence of HAIs is still rising. Infections acquired in the continuum of settings where people receive healthcare (e.g., long-term care, home care, ambulatory care) are now referred to as healthcare-associated infections (HAIs), which originated as nosocomial infections, defined as infections linked to admission in acute facilities. HAIs are regarded as an undesired consequence and, because some can be avoided, are considered as a patient safety concern, an unpleasant event, and a measure of the quality of patient care. Agars et al. (2017)

The alarming aspect is that while the frequency of HAIs has grown, the average length of inpatient stays has dropped. Given that hospital stays may be shorter than the incubation time of the infecting microbe (a growing infection) and that symptoms may not appear until days after patient discharge, the true prevalence of HAIs is probably underestimated. For example, the majority of surgical site infections occur within 21 days following the procedure, with between 12% and 84% being discovered after patients are released from the hospital. **CNIS (2023); Emerg (2023)**

Continuous trends of healthcare-associated infections (HAIs) in healthcare settings have been tracked by HAI surveillance since the early 1980s. Despite an alarming rise in microorganism isolates with antimicrobial resistance, national infection control surveillance over the past decade has shown a declining trend in some intensive care unit (ICU) healthcare-associated infections, mainly due to the implementation of published evidence-based infection control strategies. These shifting patterns may be caused by several factors, including rising inpatient acuity of illness, insufficient nurse-to-patient staffing ratios, a lack of system resources, and other pressures that have made it difficult for healthcare professionals to implement evidence-based preventive recommendations consistently. **Dahiya et al (2020)**

Factor Responsible for HAIs

It takes three things for an infection to spread in a medical setting: a susceptible host, an infectious microorganism source, and a way for the microorganism to spread to the host.

Source of Microorganisms

Patients may come into contact with a range of exogenous microorganisms (bacteria, viruses, fungus, and protozoa) from other patients, medical staff, or visitors while receiving treatment. Other reservoirs include inanimate environmental surfaces or contaminated objects (e.g., patient room touch surfaces, equipment, and medications) and the patient's endogenous flora (e.g., residual bacteria residing on the patient's skin, mucous membranes, gastrointestinal tract, or respiratory tract), which may be challenging to suppress. **Lyman et al (2023)**

Host Susceptibility

Some individuals are immune to certain microbial virulence traits or have innate defense mechanisms that prevent them from ever experiencing symptoms of the disease.

Intrinsic Risk Factors

Changes in humoral immune response, cellular phagocytosis, or cellular immune function increase the risk of infection and impair the patient's ability to fight off the infection. The rates of HAI in pediatric and adult intensive care units are around three times greater than those in other hospital departments.

Extrinsic Risk Factors

Incorporate invasive procedures such as surgery, diagnostic or therapeutic interventions (such as implanted foreign bodies, invasive devices, organ transplantation, or immunosuppressive drugs), and exposures of staff. **Calderwood et al (2022)**

Prolonged Hospitalization

The severity of the underlying condition, as well as the presence of risk factors (e.g., age, extrinsic devices, prolonged duration of stay), and the function of host defenses make patients more vulnerable to rapid microbial colonization. **Gad et al (2021)**

Means of Transmission

Contact transmission

Indirect contact can also occur when a healthcare worker touches a doorknob that has been contaminated by an infected patient and then carries the infection to another patient.

Respiratory droplets

Sneezing, coughing, talking, suctioning, and bronchoscopy can all produce droplet-sized bodily secretions that contain bacteria. They are propelled a short distance before swiftly landing on a surface. They may be directly placed on the mucosal surface of a susceptible individual (such as the mouth, nose, or conjunctivae) or on environmental surfaces in the vicinity, which a susceptible person may subsequently touch and autoinoculate their mucosal surface. **Abad et al (2021)**

Airborne spread

Varicella, rubeola virus, and tubercle bacilli are examples of small-particle-size microorganisms that can spread to other humans if they are suspended in the air for extended periods.

Common Vehicle

When several persons are exposed to and contract an illness from a standard inanimate vehicle, such as tainted food, drink,

drugs, solutions, devices, or equipment, this is known as standard vehicle (common source) transmission. In a common medium, bacteria can proliferate, but viruses cannot replicate. **Glowicz et al (2022)**

Objective of the Study

The primary aim of this research is to explore the impact of interdisciplinary collaboration (Sociology , Nursing , Respiratory Therapy , Radiological , Laboratory and Health Informatics) on the prevention of hospital-acquired infections and to delineate effective strategies for mitigating healthcare-associated infections (HAIs).

2. RESEARCH METHODOLOGY

Research Design

This present study is based on the pillars of secondary data, i.e., it deals with the exploratory research design, which is concerned with the process of examining as much secondary data as possible to learn about past advancements, the current situation and potential future directions related to HAIs and collaborative efforts of deal with the same. The researcher considered secondary data from previous research, and the responses to the corresponding questions were determined accordingly. Journals of national and international repute were used for the studies. ProQuest Social Science and Humanities, Web of Science, PubMed, Medline, Scopus, and numerous other relevant sources were among the electronic databases accessed.

Time Frame

The study's time scope was from 2015 to 2024, as this period was particularly prone to a high number of medical emergencies worldwide, including those related to COVID-19. The other research was not included in the panel because all of the considered studies were presented or published during this time frame.

Selection Criteria

The researcher gathered approximately 102 papers from various sources, each of which had some connection to the research subject. The researcher has identified some of the inclusion and exclusion criteria necessary to achieve the study's goals, drawing on previous research projects conducted in the same field or region. Since English is among the languages best suited for the study's audience, it was determined early on that all studies would be published or presented in this language. On the other hand, a few keywords were identified, including "Saudi Arabia," "HAIs," "Healthcare-related infections," "Outbreak," "collaboration of medical services," and "Infections," among others. Studies that did not possess these keywords were also excluded. Finally, 63 studies were finalized for the present study.

3. DISCUSSION

Collaborative Approach Towards HAIs

In isolated silos, with nursing, medical, and infection control teams operating independently, traditional techniques for HAI prevention have frequently been used. Redundancies in clinical procedures, irregular adherence to preventive interventions, and gaps in care continuity have resulted from this disjointed approach. **Casini et al. (2023); Assadian et al. (2021)**. For instance, even though a doctor would advise prompt catheter removal, poor process coordination or communication can cause the implementation to be delayed, raising the risk of infection. Furthermore, the scalability and reproducibility of HAI interventions are compromised by variations in infection control procedures among units, even within the same institution. Research shows that by standardizing care procedures and improving real-time communication between clinical teams, interdisciplinary teamwork when organized under evidence-based nursing bundles, yields better results. **Sartelli et al. (2024)**

Usually, these bundles comprise closely related protocols that are applied uniformly throughout patient care episodes and reinforce one another. Interdisciplinary bundles, which bring together experts from respiratory therapy, infectious disease, nursing, pharmacy, and quality improvement departments, provide a coordinated response to challenging HAI issues. **Klompas et al. (2022) and Timsit et al. (2020)** provide a framework for responsibility, delineation of duties, and collective dedication to patient safety. This paradigm reflects a shift in culture toward integrated care and shared responsibility for infection prevention alongside a change in procedure. **Al-Omari et al (2021)**

Included were research that used a range of approaches, such as cohort studies, systematic reviews, meta-analyses, and randomized controlled trials. By manually searching reference lists, more pertinent studies were found.

Each healthcare worker has a distinct role to play in infection control and prevention initiatives, and the reviewed literature emphasizes the value of interdisciplinary collaboration in lowering HAIs. Operating room technicians maintain sterility during surgeries, while dentists use infection control techniques during dental procedures. **Anderson et al. (2014)**. Radiologists preserve the cleanliness of imaging equipment, nurses oversee infection control procedures, physiotherapists promote early mobilization to reduce infection risks, and pharmacists monitor antimicrobial stewardship programs. To apply evidence-based practices and reduce the burden of HAIs in healthcare settings, these professions must collaborate. **Aziz et al (2016)**

Role of Dentists

Since dental operations involve contact with saliva, blood, and aerosols that can transmit germs, dentists play a crucial role in preventing the transmission of diseases. During every dental procedure, standard precautions must be taken to prevent the spread of infection from one patient to another through contaminated surfaces and equipment. These include safe injection techniques, the use of personal protective equipment, disinfecting dental tools and equipment, and practicing good hand hygiene and sharps handling. There are also specific standards for disinfecting dental water systems, which can harbor bacteria and cause aerosol sprays and splatter to infect patients. **Barlam et al. (2016)**

To prevent water contamination, the CDC recommends cleaning water lines, using chemical germicides, and maintaining sterile water sources. These recommendations should be followed by dentists to prevent the transmission of diseases like Legionnaires' disease through dental water. **Bruminhent et al. (2020)**

Role of Operating Room

Engineers Working with instruments, equipment, and specimens in the sterile surgical field, operating room technologists support surgical procedures (Association of Surgical Technologists, n.d.). Because breaches might result in surgical site infections, maintaining sterility is essential. To maintain a sterile field, technicians must follow guidelines for hand hygiene, use of surgical gear, and traffic patterns. Every tool and piece of equipment must be checked for effectiveness and sanitized by established procedures. To prevent contamination, specimens must be handled carefully. Counting instruments both before and after surgeries lowers the possibility that patients would have foreign bodies remaining in them. To ensure timely repairs, technicians should closely monitor procedures and notify surgeons of any lapses in sterility. **Givens et al (2018)**

Suggests that to prevent infections, they should also ensure that antibiotic prophylaxis is administered appropriately. When specimens are handled carefully, there is less chance of germs being transferred to technicians through cuts or splashes. **Edmond et al. (2015)** Technicians who follow all of these preventative procedures guarantee surgical field safety and fewer SSIs.

The Role of Pharmacists

Pharmacists play a key role in antimicrobial stewardship initiatives that encourage the prudent use of antibiotics. Pharmacists can help prevent antibiotic overuse and ensure patients use the most affordable, narrow-spectrum antibiotics by consulting with doctors and conducting prospective audits of antibiotic prescriptions. Antibiotic resistance is lessened as a result. By promoting the responsible use of antibiotics, pharmacists can help reduce the incidence of HAIs. **Cleveland et al. (2016)** The growth of microorganisms resistant to antibiotics can result from the overuse and abuse of antibiotics, making the treatment of HAIs more challenging. Together with prescribers, pharmacists can ensure that antibiotics are used sensibly and only when necessary.

Additionally, pharmacists can help in the tracking and reporting of antibiotic-related adverse drug events (ADEs). ADEs have the potential to raise medical expenses and lengthen hospital stays. **Gilbert et al (2020)**

The Role of Radiologists

Physicians who specialize in diagnosing and treating illnesses using imaging technologies are known as radiologists. Radiologists can help with infection control initiatives even if their contribution to lowering HAIs might not be as apparent as that of other medical specialists. By making sure that imaging equipment is thoroughly cleaned and disinfected in between patient uses, radiologists can contribute to the reduction of HAIs. Infections can spread through the use of contaminated imaging equipment. **Crabtree et al. (2020)** Radiographers can reduce the risk of HAIs related to imaging processes by adhering to the proper cleaning and disinfection protocols. Providing prompt and precise infection diagnoses is another way radiologists may help reduce HAI. Infections can be prevented from spreading, and the likelihood of complications decreases with early detection and treatment. **Anderson et al (2022)**

The Role of Nurses

In hospital settings, nurses play a critical role in preventing and managing healthcare-associated infections (HAIs). Implementing evidence-based infection control methods and promoting a safety-oriented culture are exceptional opportunities for nurses, who are the primary caregivers in healthcare settings. They can quickly identify infection sources and take the necessary precautions due to their direct patient engagement and continuous bedside presence. Hand hygiene is the cornerstone of infection control, and nurses play a crucial role in ensuring that hand hygiene guidelines are followed. They set an example for coworkers and patients, highlighting the importance of this measure and exhibiting appropriate methods. Nurses also help patients and their families prevent infections by teaching them about hand cleanliness. **Formalejo et al (2021)**

In addition to practicing hand hygiene, nurses supervise the use of personal protective equipment (PPE) and aseptic techniques during invasive procedures, as well as other infection control measures. **Landon et al. (2023)** Early intervention and therapy are made possible by their careful use of clinical assessments to identify patients who are at risk for HAIs. In

addition, nurses actively participate in surveillance efforts, working alongside infection control teams to track infection rates and provide guidance for preventative measures.

Role of Physiotherapists

Physicians who specialize in assisting patients in recovering from illnesses, injuries, and disabilities are called physiotherapists or physical therapists. Although their contribution to lowering HAIs may not be as widely acknowledged as that of other medical specialists, physiotherapists can nonetheless play a significant role in infection control initiatives. **Scarpaci et al. (2023)**. Physiotherapists can contribute to the reduction of HAIs by encouraging patients to mobilize early. Extended bed rest can raise the risk of complications, including HAIs such as pneumonia and UTIs. Physiotherapists can help lower the risk of these infections by supporting and encouraging patients to walk and exercise as soon as possible following surgery or illness.

Role of Specialist-Sociology

Role of the Specialist in Sociology The Specialist in Sociology is critical in building relationships between people and medical teams in the hospital. By fostering effective communication between patients and health workers, the specialist helps the latter increase compliance with preventive care and cut down on health-care-associated-infections (HAIs). They also examine social and psychological elements that might potentially impact on patients' as well as health care provider's behaviour, contributing to the effectiveness of preventive interventions.

Role of Technician-Respiratory Therapy

The RTT is an integral part of the HC team in all respiratory infectious elements. The risk of infection is far lower doing so when cleaning and sterilizing the ventilators as well as other respiratory equipment being used on patients. Technicians provide support to the practice of respiratory care protocols (venting and PPE compliance).

Role of Technician-Radiological Technology

By Naomi Veach Rad Techs are infection control personnel by cleaning appliances on patients before moving on to the next one. Dirty radiograph equipment could certainly be a means of an infection and compliance with cleaning and disinfection can help prevent this. Technologists simplifies early and accurate diagnosis of infection which may prevent their transmission and reduce complications.

Role of Technician-Laboratory

Laboratory Technicians are a key player in the management of healthcare associated infections- mainisting in proper laboratory sample management. This includes strict observance to routine procedures when handling biological samples, and sterilization of instruments, and reporting of findings from the laboratory on time that will promote early detection of the infection. Related wor Techs will facilitate the monitoring the infection rates by studying the data to find the patterns and take the required actions.

Technician's Role - Health Informatics

Health Informatics Technician The Health Informatics Technician contributes to the improving of infection control programs by gathering, analyzing, and reporting on information in all medical units. Surveillance of infection rates, sites of transmission, and source of infection and prevention interventions can be accomplished through health information systems. Moreover, technicians could develop tools to support implementation of infection control practices and managing resources.

Collaborative Efforts

Effective infection control requires cooperation across healthcare professionals, even if each one makes a distinct contribution to lowering HAIs. In addition to improving patient outcomes, inter-professional collaboration lowers healthcare expenses. The use of infection control bundles is a prime example of teamwork in reducing HAIs. When evidence-based strategies are combined, bundles consistently and collectively improve patient outcomes. For example, hand cleanliness, maximal barrier precautions during insertion, chlorhexidine skin antisepsis, optimal catheter site selection, and a daily line review may all be part of a central line-associated bloodstream infection (CLABSI) bundle. **Knobloch et al. (2021)** Diverse healthcare personnel must work together to implement infection control bundles.

Pharmacists assist in selecting the appropriate antiseptic agents, while nurses oversee the uniform application of bundle components. Doctors, including radiologists, handle the insertion and management of central lines, while physiotherapists help with patient mobilization to reduce difficulties. Antibiotic stewardship programs are another example of cooperative efforts to lower HAIs. **Tascini et al. (2024)** suggest that to improve patient outcomes, prevent antibiotic resistance, and reduce healthcare expenses, these strategies maximize the use of antibiotics (**Salamat et al., 2018**). To ensure that antibiotics are used appropriately, pharmacists often lead antibiotic stewardship initiatives, collaborating closely with prescribers. However, cooperation between different medical specialists is necessary for good antibiotic stewardship. Operating technicians ensure that surgical prophylactics are administered correctly, while nurses collect cultures and monitor patients

for signs of infection. Cawcutt et al (2022)

4. CONCLUSION

Dental experts, operating room technicians, pharmacists, radiologists, nurses, and physiotherapists must collaborate to address the complex issue of reducing healthcare-associated infections (HAIs). From supporting the prudent use of medicines to following appropriate infection control procedures, each of these experts has a distinct responsibility to play in preventing and controlling infections. Interprofessional teamwork, however, is the most effective strategy for reducing HAIs. Healthcare providers can enhance patient outcomes and create a safer environment by collaborating and implementing evidence-based policies, such as antibiotic stewardship programs and infection control bundles. As healthcare systems continue to struggle with HAIs, all medical personnel must understand their part in infection control and collaborate to put prevention and management measures into action. This will enable us to provide our patients with the best care possible while reducing the burden of HAIs.

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