

Impact of Hospital-Acquired Infections (HAIs) on Patient Outcomes

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Introduction

Hospital-acquired infections (HAIs), also known as healthcare-associated infections, represent one of the most significant challenges facing modern healthcare systems worldwide. Such infections are acquired by patients when they undergo any healthcare treatment at a hospital, long-term care facility, or any other form of care-giving institution and were not existent or under incubation when they entered the facilities. HAIs comprise a wide set of infections, such as surgical site infections, central line-related blood infections, catheter-related urinary tract infections, and ventilator-related pneumonia among others. The rate at which HAIs is propagated is incontrovertibly distressing regardless of the improvement in medical technology and infection control procedures.

As indicated by current epidemiological information, it is estimated that about 5-10 percent of patients admitted in hospital facilities develop at least one HAI per episode in hospital admission amounting to millions of affected patients each year in the healthcare systems across the world. This great burden goes way beyond the mere infection rates, causing a chain reaction with dramatic consequences to patient outcomes, delivery of healthcare and economic viability. The complex outcomes of HAIs require the in-depth comprehension that will help to implement systematic approaches to reduce the effect of the connection and enhance the presence of patient safety in every healthcare environment.

Mortality and Morbidity Rates Associated with HAIs

The most devastating consequence of hospital-acquired infections is their direct contribution to increased mortality rates among hospitalized patients. A research conducted repeatedly has shown that the risk of dying among patients who develop HAIs is really high as opposed to those patients who survive their hospital stay without any such development. Mortality is also significantly influenced by the type of infection and in most cases bloodstream infections and pneumonia are sometimes linked to the maximum mortality. Blood stream infections Central line-associated bloodstream infection, FOR example, has a 12-25 per cent mortality level whereas ventilator-related pneumonia may cause death rates greater than 30 per cent among seriously ill groups. In addition to direct mortality matters, HAIs also make morbidity rates considerably high, which results in long-term sickness, complications, and a prolonged recovery period (Wu et al., 2008).

Patients with these infections are also likely to have unnecessary negative effects concerning their treatment course, and they need more interventions, medications, and assistance. Morbidity burden carries along with it the contribution of additional pain, soreness, and limitation

of function that might not be cured even after the acute part of infection is gone. Moreover, HAIs are often leading to the development of secondary complications that could concern sepsis, organ dysfunction, and even adverse events induced by treatments, which lose control of complex clinical situations that greatly undermine patient outcomes and exacerbate their overall management of the underlying conditions preconditioning their initial hospitalization.

Extended Length of Stay and Healthcare Utilization

Hospital-acquired infections create substantial disruptions to normal patient flow and discharge planning, resulting in significantly extended hospital stays that affect both individual patient outcomes and institutional resource management. Literature continues to indicate that patients diagnosed with HAIs remain in hospitals 2-3 times longer as compared to other patients without infections. Not only does this extended stay in a hospital result in a longer amount of time before a patient is able to recover and resume normal daily life, but also exposes them to more nosocomial pathogens and complications related to health care, thus creating a reinforcement of danger and a longer necessitation of care (Bartolo et al., 2022).

The long period of prolonged stay of HAIs, creates a ripple throughout the healthcare structure with a rise in the readmission rates, more intensive care unit use. Patients, who have HAIs, are more often readmitted following within 30 days as a result of the complications, partial treatment, or new infections. These impacts delayed elective surgeries, increased wait times to be admitted to a facility, and a greater strain on healthcare personnel, which ultimately affects the quality of care given to all patients in the health system and explains the institution-wide implication of infection control failure.

Economic Burden on Patients and Healthcare Systems

The financial impact of hospital-acquired infections represents a staggering economic burden that affects patients, families, healthcare institutions, and broader healthcare financing systems. HAIs can lead to the ultimate healthcare costs of the individual patients and families in terms of prolonged subsequent healthcare costs, further medication and special treatment costs or subsequent hospital expenses, as well as lost income due to long-term leaves. A lot of patients end up paying considerably out-of-pocket with coverage insurance especially in the case of the long term and complications arising as it can use up to policy limits and may be treated outside of the proper insurance policy covering them.

The financial burden is always looming even after discharge, especially among those who will need further treatment to deal with other chronic complications. In terms of economic costs on the healthcare system, HAIs add up to billions of dollars a year in direct spending on health costs and indirect expenses (Mouajou et al., 2022). Hospitals incur large economic losses related to prolonged usage of resources, greater staffing needs, and frequently unpaid care because most payer and insurance systems have adopted policies that cut down or eliminate payment to preventable HAIs.

A wider economic effect is the lowered efficiency of the healthcare system, higher insurance rates, and other spending diverted to usage of preventive care or expansion of the available type of services. Research has estimated that an episode of HAIs costs the healthcare system an amount that ranges between 15,000 to 45,000 dollars, and the annual healthcare bills due to HAIs are above 35 billion dollars in the United States where it represents a significant loss of healthcare resources which could be used to enhance patient quality of care as well as broaden access to services.

Quality of Life and Functional Outcomes

Hospital-acquired infections profoundly impact patients' quality of life both during hospitalization and in the post-discharge period, affecting multiple domains of physical, emotional, and social well-being. At the stage of the acute infection, patients suffer greater pain, discomfort, fatigue, and functional impairment, which severely negatively affect their stay at the hospital and recovery. The expressed physical symptoms of HAIs, such as fever, weakness, and organ-specific symptoms, cause a great amount of distress and can disrupt the process of rehabilitation, ambulation, and involvement in self-care tasks, which is necessary in order to feel better. The mortal gains of the quality of life are summed up far beyond the immediate period of infection as far as most patients record long-term damages on their functioning potential and overall health.

The after-discharge implications of HAIs could be chronic pain, diminished mobility, thinking, and continued exhaustion that hinder reinstatement to work, societal life, and autonomy (Melariri et al., 2024). Psychological effects are no less eminent, as the majority of the patients develop some anxiety, depression, and post-traumatic stress connected to their experience of being infected and spending extensive amounts of time in the hospital. The psychologic blow is catalyzed by worrying over repeated infections, health expenses, and doubt over future health condition. These deficits in the quality of life tend to continue months or even years even after the patient has been initially infected or infected in the first place, having long term effects on patient satisfaction, functional independence, and on satisfaction with life that goes far beyond the clinical outcomes often measured in medical journals.

Vulnerable Populations and Disparate Impacts

Certain patient populations experience disproportionately severe consequences from hospital-acquired infections due to underlying health conditions, compromised immune systems, or demographic factors that increase their susceptibility and worsen outcomes. Older patients, especially above 65 years, are at higher risks of developing complications and repairing mortally to HAI diseases as their immune system wears out, has several morbidities, and diminished physiological reserves. When exposed to nosocomial pathogens, immunocompromised patients (chemotherapy patients, organ transplant patients, and HIV/AIDS victims) are more prone to severe infections, lengthy treatment, and treatment failure.

Another at-risk group is presented by critically ill patients in the intensive care units, with the HAI rates and mortality rate being much higher than in the general medical populations (Sheng et al., 2005). The combination of invasive devices, prolonged hospitalization, and underlying illness severity creates a perfect storm for infection development and poor outcomes. Moreover, HAI outcomes are even worse in patients with chronic illnesses like diabetes or chronic kidney disease and cardiovascular disease because of the delay in healing and impaired immunity, as well as an elevated baseline frailty. The socioeconomic determinants also make contributions to the divergent influences where the patients with lower income will have a later diagnosis, less sufficient treatment, and more complicated to control the complications after discharge, and this fact proves the connection between the healthcare-related infections, on the one hand, and the health equity barriers that can be mitigated through a specific intervention issue, on the other hand.

Antimicrobial Resistance Development and Treatment Challenges

Hospital-acquired infections serve as a significant driver of antimicrobial resistance development, creating increasingly complex treatment challenges that compromise patient

outcomes and threaten the effectiveness of existing therapeutic options. Close exposure to patients with sickbeds and the extensive use of antibiotics intensifies the hospital environment, which creates the best scenario in selection and transmission of resistant microorganisms. There are exposures to several rounds of broad-spectrum antibiotics mostly given out to patients with HAIs that provide a selective pressure in favor of resistant bacterial strains. It is not just an effect on the treatment success of individual patients, but it is also part of a larger epidemic of antimicrobial resistance that is a threat on global health security.

HAIs multidrug-resistant organisms make treatment extremely complex and aggravate consequences of getting no right treatment, applying many treatments and failing as well as minimal remedies to tame the problems (Bartolo et al., 2022). Resistant infections usually compel these patients to use more costly, less efficacious and more toxic alternative antibiotics entailing more side effects, longer duration of treatments and an elevated failure to respond to treatments. The development cycle of resistance is reinforced by failing to achieve the first treatment leading to the need of supplementary antibiotic courses, which in turn contributes to the development of resistance.

Long-term Health Consequences and Chronic Complications

The impact of hospital-acquired infections extends far beyond the acute infection period, with many patients experiencing lasting health consequences that persist for months or years after initial treatment. Chronic complications may include persistent organ dysfunction, such as chronic kidney disease following severe sepsis, pulmonary fibrosis after pneumonia, or cardiac complications following bloodstream infections. These late effects have a major implication on the functional capacity, dependence, and the health status of the patients, in many cases, necessitating continuing medical care and specialized needs that not only rake up healthcare expenditure and quality-of-life issues long after the original hospital stay but also continue to create healthcare expenditure and quality of life issues even after the initial hospitalization. Other patients end up with chronic or recurring infections, which are quite hard to eliminate and get rid of, thus providing constant complications and health challenges to the patients that are bound to stay and need continuous observation and care (Glance et al., 2011).

Complications The complications that occur after the infection can be chronic pain disorders, brain injury, and the higher risk of further infections because of the damage of the immune system or the body structure. Psychological effects described by long-term consequences of norovirus outbreaks are also anxiety of being in healthcare environment and fear of having further infections, and development of post-traumatic stress syndrome that may influence patients to refuse getting the required medical help in the future.

Conclusion

Hospital-acquired infections indicate an urgent issue that goes toes and beyond mere figures on infections and causes profound and permanent consequences on patient outcomes on numerous dimensions of health and well-being. All the evidence used in this analysis shows that HAIs are one of the leading factors that enhance the levels of mortality and morbidity, lengthen the patient stays, and lead to a massive economic cost to the patients, individual families, and the healthcare facilities. The quality-of-life effects is no less devastating, as patients have immediate and long-term dysfunctional impairments, emotional trauma and poor satisfaction with life, which is likely to last years after the original infection.

These findings emphasize the essential health equity issues that rising inequalities adversely affect and also raise significant concerns regarding the development of antimicrobial resistance that will compromise the ability to cure all patients in the future as well. Most worrisome perhaps would be the long-term health impacts of HAIs and their prolonged implications on post-hospitalization demands and complications on healthcare systems and patients that are experienced many years later. These evidences highlight the paramount need of multifactorial infection prevention and control interventions, effective surveillance and capacity to invest in the research to advance the development of more effective prevention and treatment methods.

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