HOSPITAL INFECTION CONTROL – ARE WE SERIOUS?

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INTRODUCTION

The World Health Organization offers several definitions of a nosocomial infection/hospital-acquired infection:

An infection acquired in hospital by a patient who was admitted for a reason other than that infection. An infection occurring in a patient in a hospital or other health care facility in whom the infection was not present or incubating at the time of admission. This includes infections acquired in the hospital but appearing after discharge, and also occupational infections among staff of the facility. As a general timeline, infections occurring more than 48 hours after admission are usually considered nosocomial. Nosocomial infections are also divided into two classes, endemic or epidemic. Most are endemic, meaning that they are at the level of usual occurrence within the setting. Epidemic infections occur when there is an unusual increase in infection above baseline for a specific infection or organism.

Nosocomial infections occur worldwide, both in the developed and developing world. They are a significant burden to patients and public health. They are a major cause of death and increased morbidity in hospitalized patients. They may cause increased functional disability and emotional stress and may lead to conditions that reduce quality of life. Not only do they affect the general health of patients, but they are also a huge burden financially. The greatest contributors to these costs are the increased stays that patients with nosocomial infections require. The increased length of stay varies from 3 days for gynecological procedures to 19.8 days for orthopedic procedures. Other costs include additional drugs, the need for isolation, and the use of additional studies. There are also indirect costs due to loss of work.

THE HISTORY OF HAI’S

Hippocrates made the relatively profound statement “Primum non nocere” that - If you wish to become a physician, always follow the maxim, first do no harm (Carrick 2000). It is obviously the case that modern medicine bears little resemblance to that practiced two millennia ago, but the maxim clearly still applies.

Nearer to the present day, Florence Nightingale paraphrased Hippocrates’ words with the phrase “It may seem a strange principle to enunciate as the very first requirement in a hospital that it should do the sick no harm”. (Nightingale F 1859). In the context of this dissertation her words were particularly poignant as she was referring to the infections that were rife in her hospital due to the sanitary arrangements.

At almost exactly the same time that Nightingale was writing, on the other side of Europe, Dr Ignaz Semmelweis (Semmelweis, 1861) was coming to the realization that it was hospital staff who were largely responsible for the dreadful death toll of puerperal fever in the maternity units that he was responsible for. His seminal observation was that puerperal fever claimed the lives of 25% of the mothers who delivered in hospital but only 5% of those who delivered at home. (Playfair, 1847).

By a complex series of exclusion experiments he was able to discover that by getting the hospital staff to wash their hands between seeing the patients he reduced the death rate by a staggering 96%. In a measure that echoes across the centuries, his insistence on all his colleagues washing their hands
between patients made him very unpopular and subsequently marginalised by his clinical colleagues. (Birte Twisselmann 2003)

**HAI IN THE 20TH – 21ST CENTURY**

The present era of healthcare-associated infections (HAI) started with the Center for Disease Control and Prevention (CDC) in the USA. It started the National Nosocomial Infection Surveillance System (NNIS) in 1950s and the **SENIC project in 1974**. It was observed that one-third of healthcare-associated infections were preventable through effective infection control and prevention of approximately 6% of HAIs offset the cost of an infection control program in a 250-bed hospital. Many guidelines were produced by Healthcare Infection Control Practices Advisory Committee (HICPAC). In 1999, Institute of Medicine published a report “To err is human: Building a Safer Health System”. There were two important findings in this document. First over half of all adverse events in hospitals are due to medical errors and second the annual cost associated with these errors was estimated to be 17-20 billion US $. In 2005, hospitals started contributing data to **National Healthcare Safety Network**. There are many current Quality Initiatives.

**However, the Consumer’s Union has been by far the most influential through their push for mandatory reporting of hospital-acquired infections.**

Agency for Healthcare Research and Quality (AHRQ) promotes patient safety; improve quality of healthcare and Evidence-based Practice Centers. “Bundle” measures are the most recent initiative to improve healthcare. Since 2005, various member countries of the world have signed the pledge of **WHO’s First Global Patient Safety Challenge**. Introducing low-cost measures, such as hand hygiene, staff education and inclusion of basic principles of infection control in medical and paramedical curricula can reduce healthcare-associated infections. The human and economic toll of healthcare-associated infections is high

**THE SOCIETAL IMPACT OF NOSOCOMIAL INFECTIONS**

An US study estimates that bloodstream nosocomial infections are the eighth leading cause of death, assuming a nosocomial infection rate of 5%, of which 10% are bloodstream infections, and an attributable mortality rate of 15%. In absolute numbers, if the overall attack rate was 5%, and 25 million patients were admitted each year, 1.75 million people would acquire nosocomial infections each year. If 10% of these were bloodstream infections, 175,000 would get these serious infections each year. If the attributable mortality rate of nosocomial infections is 20% and the infection rate is 5%, an estimated 350,000 life years would be lost annually. Another source reports an incidence of 2 million new cases of nosocomial infections per year, leading to an estimated 20,000 deaths per year. They also estimate that nosocomial infections more than double the mortality and morbidity risks of any patient admitted to a hospital. The costs to society can also be studied in terms of dollars spent. Assuming an incidence of 2 million nosocomial infections per year, the estimated added expenditure is in excess of $2,000,000,000 per year.

As a public health problem, nosocomial infections will become increasingly important in the future. Healthcare is becoming more and more complex and technology driven. Crowding and population size are increasing, and impaired immunity is becoming more frequent. New microorganisms will develop, and existing microorganism will develop even greater resistance.

**BURDEN OF HEALTHCARE ASSOCIATED INFECTION (HAI)**

**HAI Fact Sheet (WHO)**

- HAI are the most frequent form of adverse event in healthcare delivery worldwide
- Hundreds of millions of patients are affected by HAI worldwide each year, leading to significant mortality and financial losses for health-systems.
- Of every 100 hospitalized patients at any given time, 1 in 10 in developing countries will acquire at least one HAI.
- The endemic burden of HAI is also significantly higher in low- and middle-income than in high-income countries, in particular in-patients admitted to intensive care units and in neonates

**HAI in high-income countries:** At any given time, the prevalence of HAI in these countries varies between 3.5% and 12%

The estimated rate in USA was 4.5% in 2002, corresponding to 9.3 infections per 1000 patient-days and 1.7 million affected patients, with 99,000 deaths annually. The direct medical cost of HAI ranged from $28-45 billion.

The European centre for Disease Prevention and Control reports an average prevalence of 7.1% in European countries. The cumulative incidence of infection an adult high-risk patients is 17.0 episodes per 1000 patient-days

**HAI in low- and middle-income countries:** limited data, often of low quality, are available from this group of countries. At any given time, the prevalence of HAI varies between 5.7% and 19.1%. Average prevalence is significantly higher than high-in low-quality studies (15.5% vs 8.5%, respectively)

**HAI data from India:** HAI surveillance is a highly demanding and challenging task and settings with limited resources experience many constraints to evaluate the burden. In low and
middle income country regular monitoring of HAI occurrence may be unfeasible at national level thus, Ministry of Health & Family Welfare (MOHFW) is unable to report the burden. In addition the limited number of studies in these settings has been published in the scientific literature.

A review of studies performed revealed an extremely fragmented picture of the endemic burden of HAI in India. The limited no. of studies with broad scope, together with a lack of national surveillance systems, significantly hamper any attempts to estimate the burden of HAI in the country at regional/ national level. Studies from single hospitals cannot be considered representative of the endemic epidemiology of HAI in the country. In particular most of these studies were conducted in private hospitals, which represent a specific type of context and not the broad range of healthcare settings in India. Consolidated data on device associated infection from India has been published as a part of the INICC study (Annals of Internal Medicine 2006). All the hospitals were private, corporate hospitals, and fails to reflect the actual scenario.

Challenges in India

• The disparate health systems, wherein the public hospitals are free, too few and overloaded, the majority of healthcare (80%) lies in private hands in the form of large corporate hospitals, smaller nursing homes and day care clinics which are profit making.

• The overwhelming number of sick people with a huge dearth of trained, skilled healthcare professionals (nurse to patient ratio being 1:100 & doctor: patient = 1:900)

• Care is individualized and concentrates on curative medicine

• Lack of systems approach and poor underdeveloped public health facilities

• The arrogant hierarchy which pushes the clinical prac-
The main solutions and perspectives for improvement identified by WHO Clean Care is Safer Care are:

- Identifying local determinants of the HAI burden.
- Improving reporting and surveillance systems at the national level.
- Ensuring minimum requirements in terms of facilities and dedicated resources available for HAI surveillance at the institutional level, including microbiology laboratories' capacity.
- Ensuring that core components for infection control are in place at the national and health-care setting levels.
- Implementing standard precautions, particularly best hand hygiene practices at the bedside.
- Improving staff education and accountability.
- Conducting research to adapt and validate surveillance protocols based on the reality of developing countries.
- Conducting research on the potential involvement of patients and their families in HAI reporting and control.

THE WAY FORWARD

In a democratic country like ours we can choose to:

Have tubular vision and -

- Enjoy the new technologies as they become available
- Create state-of-the-art hospitals, without putting the systems in place
- Use 7 antimicrobials as empiric therapy (to cover our back)
- Take pride in creating Guinness records of 20 angioplasties or joint replacements in a day
- Bask in the glory of numbers and not the outcome

If we are as serious and far-sighted, we should -

At the organization level –

i. Set up the Infection Control Program with a multidisciplinary committee to guide the processes and monitor the outcome.

ii. Surveillance of healthcare associated infections and antimicrobial resistant pattern (using standardized international methods), to measure the burden of the disease

iii. Implement practical evidence based, low cost and simple preventive strategies first.

iv. Antimicrobial stewardship programs and other interventions to reduce the development of MDROs

v. Do studies that include analysis of economic, behavioral, communication and organizational strategies that optimize the implementation of and adherence to the best practices

At state / national level:

i. Promote funded research projects through ICMR, DBT and state agencies.

ii. Produce more trained infection control professionals: nurses, hospital epidemiologists and public health personnel.

iii. Promote growth of microbiology laboratories and involve the Clinical Microbiologists in decision making

iv. Regulatory bodies to monitor the quality of drugs, and over the counter sale of antibiotics.

v. Develop state laws for compulsory HAI reporting.

vi. Physicians should be made responsible for HAI and condition of their patients.

vii. Empowerment of Hospital Infection Control Committees

IN CONCLUSION

- We must change the culture of clinical care in India

- This will come by mandatory reporting of HAI and it is the consumer who must push for it.

- Clinicians, health system leaders, payers, purchasers, and above all, patients need to demand care that is proven to be effective as a condition of delivering, paying for, or receiving it.

- A time has come, when we need to move together, move towards preventive medicine than curative medicine

REFERENCES


