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Systematic Review

The burden of healthcare-associated infection in Australian hospitals: A systematic review of the literature

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Abstract *Introduction:* Central to all efforts to control and prevent healthcare associated infections (HAIs) is the inherent need to measure the burden of infection and disease, classically referred to as surveillance. Australia does not have a national HAI surveillance system making it very difficult to systematically assess and report on the burden of hospital-acquired HAIs. This systematic review reports the incidence burden of HAIs in Australian hospitals as reported in the peer-reviewed literature from 2010 to 2016.
Methods: Systematic review of the peer-reviewed literature reporting the incidence of HAIs in Australian hospitals between from 2010 to 2016 was identified using MEDLINE and CINAHL databases. The study protocol is registered with PROSPERO (registration number: CRD42016052997).
Results: Of the 844 articles identified in the search, 24 articles were included in this review. Overall, these data suggest 83,096 HAIs per year in Australia, comprising 71,186 urinary tract infections, 4902 *Clostridium difficile* infections, 3946 surgical site infections, 1962 respiratory infections in acute stroke patients and 1100 hospital-onset *Staphylococcus aureus* bacteraemia. This is very large underestimate given the lack of or incomplete data on common infections such as pneumonia, gastroenterological and bloodstream infection, thus potentially missing up to 50%—60% of infections. If that is the case, the incidence of HAIs in Australia may be closer to 165,000 per year.
Conclusion: There is a dearth of peer-reviewed literature reporting the incidence of HAIs in Australian hospitals, making it very difficult to an accurate burden of infection. On the eve

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of a global 'post antibiotic era', the need for national consensus on definitions, surveillance methodology and reporting is paramount.

Highlights

- This systematic review reports on the incidence burden of HAIs in Australian hospitals.
- There are approximately 165,000 HAIs occurring each year in Australia.
- There is a need for improved surveillance and reporting of HAIs in Australia.

Introduction

Healthcare-associated infections (HAIs) are a major patient safety issue in hospitals. While research into infection prevention and control has led to improvements in our understanding of effective HAI prevention strategies [1], HAIs continue to occur and lead to morbidity, mortality and excess healthcare expenditure [1,2]. Unlike most developed countries, Australia does not have a national system to monitor these infections and cannot provide an estimate of the burden of hospital-acquired HAIs. The last national point prevalence study conducted in Australia occurred in 1984 [3]. Healthcare delivery, technology and infection prevention and control initiatives have advanced considerably since this time.

In 2008, Cruickshank and Ferguson [4] estimated that there are about 200,000 HAIs each year in Australia, which if correct makes them the most common complication affecting patients in hospital. There has not been a subsequent evidence-based estimate of the incidence of HAIs in Australia despite HAIs being widely reported as the most common complication affecting patients in hospital globally. The purpose of this systematic review was to explore the burden of HAIs in Australian hospitals by determining the incidence of HAIs in Australian hospitals, as reported in the peer-reviewed literature from 2010 to 2016.

Methods

Protocol and registration

The protocol for this review is registered with PROSPERO, an international prospective register of systematic reviews (available at http://www.crd.york.ac.uk/prospero/ with registration number: CRD42016052997). Ethics approval was not sought because this review used data from published studies.

Search strategy

A systematic search was conducted using the electronic databases MEDLINE (PubMed) and the Cumulative Index to Nursing and Allied Health Literature (CINAHL) to search for articles published between 1 January 2010 and 31 December 2016. The timeframe was chosen to include the most current HAI data. During the 2000s, a number of state and national initiatives were undertaken to reduce HAIs, including the national hand hygiene initiative, development of National Health and Medical Research Council guidelines, revision of hospital accreditation standards, surveillance initiatives and public reporting of some infection data [5–7]. Reference lists of eligible articles relating to these initiatives were reviewed to identify any additional articles.

To identify articles from MEDLINE and CINAHL, the search terms "surveillance", "incidence", "prevalence", "frequency", "rates or statistics" and "performance indicators" were used in combination with "nosocomial infection", "hospital acquired infection", "healthcare associated infection", "cross infection" and "infection". To identify and limit the search to articles from Australian hospitals, the search term "hospital" was used with "Australia", "Australian", "Queensland", "New South Wales", "Australian Capital Territory", "Victoria", "Tasmania", "South Australia", "Western Australia" and "Northern Territory". These terms were applied using an all text search. For the MEDLINE search, the MeSH terms "epidemiology", "cross Infection" and "disease transmission, infectious" were also used.

Inclusion criteria

Articles were eligible if they reported the results of cohort studies, case-control studies, cross-sectional studies, randomised controlled trials or case reports (reporting incidence) of HAI. For this study, cohort studies include studies where a population is followed up to determine whether they subsequently acquire an infection. To be eligible, data collection had to occur after 1 January 2010. Articles were limited to studies conducted in Australian hospitals. For international or multi-centre studies, data from Australian hospitals was included if the data was reported at this level. Where Australia-specific data was not available, the study was excluded.

Exclusion criteria

The following exclusion criteria applied: all grey literature, non-peer reviewed, conference abstracts, papers written in languages other than English, reviews, editorials, commentaries or policy statements.