What do infectious diseases physicians do? A 2-week snapshot of inpatient consultative activities across Australia, New Zealand and Singapore

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Abstract

The practice of an infectious diseases (ID) physician is evolving. A contemporary understanding of the frequency and variety of patients and syndromes seen by ID services has implications for training, service development and setting research priorities. We performed a 2-week prospective survey of formal ID physician activities related to direct inpatient care, encompassing 53 hospitals throughout Australia, New Zealand and Singapore, and documented 1722 inpatient interactions. Infections involving the skin and soft tissue, respiratory tract and bone/joints together accounted for 49% of all consultations. Suspected/confirmed pathogens were primarily bacterial (60%), rather than viral (6%), fungal (4%), mycobacterial (2%) or parasitic (1%). *Staphylococcus aureus* was implicated in 409 (24%) episodes, approximately four times more frequently than the next most common pathogen. The frequency of healthcare-related infections (35%), immunosuppression (21%), diabetes mellitus (19%), prosthesis-related infections (13%), multiresistant pathogens (13%) and non-infectious diagnoses (9%) was high, although consultation characteristics varied between geographical settings and hospital types. Our study highlights the diversity of inpatient-related ID activities and should direct future teaching and research. ID physicians' ability to offer beneficial consultative advice requires broad understanding of, and ability to interact with, a wide range of referring specialities.

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Introduction

The practice of an infectious diseases (ID) physician is evolving from a primarily academic speciality based in large teaching hospitals to practice in more diverse settings [1]. However, training and research priorities are often set by academic physicians based at large teaching centres, and the clinical profile at these hospitals may not reflect that seen by the wider workforce. To date, most studies of ID consultative activity have been retrospective in design and describe the experience of a single centre [2–4] or comparisons of two practice settings [5–7]. The only published prospective nationwide study of ID physician activity was undertaken in Canada more than two decades ago and therefore may not reflect the current challenges faced by our profession [1]. We aimed to prospectively measure the frequency and diversity of

formal inpatient-related activities undertaken by ID physicians across three countries over a 2-week period.

Methods

Setting

ID training is conducted under the auspices of the Royal Australasian College of Physicians (RACP), with training opportunities available in Australia, New Zealand and Singapore. ID registrars in training typically work for 3 years at hospitals with at least 1.0 full-time equivalent ID physician. In all three countries, the majority of secondary and tertiary healthcare is delivered by hospitals funded or subsidized primarily by government ('public hospitals'), with a smaller proportion delivered by hospitals funded from private health insurance ('private hospitals'). All three countries are highly urbanized but only five Australian cities, the city/nation of Singapore and Auckland, New Zealand, have more than a million inhabitants. Paediatric care is delivered by specialist paediatricians in referral paediatric hospitals as well as general hospitals serving both adult and paediatric patients.

Study design

We conducted a survey of ID physicians' activity related to direct inpatient care. Respondents were recruited at the Australian Society for Infectious Diseases (ASID) annual meeting and via an established mailing list of ID physicians. A web-based data entry system (Survey Monkey, Palo Alto, CA, USA) was developed to collect de-identified data from hospitals in Australia, New Zealand and Singapore over a 14-day period in August 2012. One or more ID registrars or physicians were registered as respondents in each participating hospital. They completed an on-line form comprising demographics and clinical details for every patient seen who met the criteria for formal ID consultation or ID inpatient admission.

Definitions

A formal ID consultation had to fulfill the following criteria: (i) a consultation was requested by another inpatient team or by local institutional rules (e.g. the prescription of restricted or expensive antimicrobial agents automatically triggered an ID consult); (ii) an ID registrar and/or physician examined the patient and made a medical record entry. An ID inpatient admission was defined as a patient being admitted or transferred under the care of an ID physician either within an inpatient ward or within a Hospital in the Home (HITH) unit (equivalent to Outpatient Parenteral Antimicrobial Therapy). Only the first episode of care was counted for any given patient during the study period. Patients were excluded in the following situations: (i) telephone advice only, (ii) informal consultations where the patient was not seen, (iii) outpatient clinics, (iv) antibiotic stewardship rounds or antibiotic approvals, and (v) other regular ID advisory rounds (e.g. in the Intensive Care Unit (ICU) or transplant wards). Immunosuppression was considered present if the patient was receiving immunosuppressive therapy (including the equivalent of $\geq$0.5 mg/kg/day of prednisone, monoclonal antibodies or other biological agents or cytotoxic chemotherapy), or had a primary immunodeficiency disorder, hyposplenism or human immunodeficiency virus (HIV).

Infections were defined as either community onset, non-healthcare-associated (onset <48 h since admission to hospital), community onset, healthcare associated (onset <48 h since admission to hospital but contact with HITH, haemodialysis or outpatient chemotherapy within last 30 days, hospital admission within the last 90 days, or living in a long-term care facility) or nosocomial (onset $\geq$48 h after admission to hospital) [8]. In Australia, regional (vs. metropolitan) hospitals were defined as those located outside of state/territory capital cities. In New Zealand, metropolitan hospitals were defined as those providing a broad range of tertiary level services. Paediatric patients were defined as those $\leq$16 years of age. Foci of infection were classified into categories corresponding to the Australian national antibiotic prescribing guidelines [9].

Statistical methods

Each patient was labelled with a unique code which identified the respondent, the hospital and a non-identifiable number for the patient. Data were analysed using Stata 12.1 (Statacorp, College Station, TX, USA). Continuous data were summarized using median and interquartile range and were compared using the Mann–Whitney *U*-test. $p < 0.05$ was considered significant.

Ethical approval

In Australia, approval was obtained from the ethics committee of the Northern Territory Department of Health and the Menzies School of Health Research (HOMER-2011-1638), with letters of support from directors of each participating department. Multi-site ethical approval was obtained in New Zealand (MEC/12/EXP/028) and Singapore (NHGDSRB 2012/00455).

Results

Ninety-one ID physicians at 53 hospitals participated in the survey, including 36 of the 53 (68%) RACP-accredited training