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Developing a model to assess optimum infection control workforce in acute care settings

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Infection control

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Background: Little research has been completed to assess the numbers of infection prevention and control personnel employed or optimal size and composition of infection control teams.

Methods: Acute national health hospital organizations in England were requested to provide information about the numbers of infection prevention and control personnel employed and weekly hours contributed by each occupational group under the United Kingdom's Freedom of Information legislation. The relationship between capacity of the infection prevention and control workforce, size of the inpatient population, and routinely collected surveillance data for health care-associated infection were explored.

Results: There were 137 (85%) National Health Service (NHS) hospital organizations that responded. The number of infection prevention and control nurses ranged from 1-16 per organization. A total of 46 (33.6%) reported that they received no clinical microbiology sessions, and for 11 (8%) input was inadequate. An antibiotic pharmacist was reported to be employed in 107 (78.1%) organizations. Few infection prevention and control teams reported receiving the following: 1. managerial support, 2. being represented on committees where decisions about resource allocation were made, or 3. assistance with administration.

Conclusion: Despite the priority that infection prevention and control have received in the United Kingdom over the last 10 years, many infection prevention and control teams appear underresourced.

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Infection prevention and control nurses (IPCNs) were first appointed to work with clinical microbiologists in the National Health Service (NHS) in England in the 1950s,¹ therefore establishing infection prevention and control teams. IPCNs were rapidly employed throughout NHS hospitals in the United Kingdom (UK) and other countries. However, objective approaches to assess numbers of IPCNs required to deliver the service do not appear to be available, and this is true of other infection prevention and control personnel.²⁻⁴

From the Study of Efficacy of Infection Control (SENIC),⁵ it was estimated that health care-associated infections could be reduced by a third if IPCNs and hospital epidemiologists undertook ongoing

surveillance with feedback of infection rates. Optimal performance was achieved when the IPCN was responsible for 250 beds. Impact declined as the number of beds increased, until when responsible for 400 beds, the IPCN was no longer effective.

Although the ratio suggested in the SENIC study⁵ is still regarded as ideal in many circles,⁶ it merits further, more objective examination. Patient populations have aged and increasingly invasive procedures are undertaken with very sick patients, therefore increasing infection risks. There is also greater demand for surveillance and routine audit (eg, hand hygiene, environmental monitoring), adding to the IPCNs' workload. The SENIC study⁵ is unlikely to be repeated because of its scale and cost.⁷ Instead, the optimal number of IPCNs necessary to deliver the service has been addressed through consensus methods. Decisions have been based on practitioners' assessments of the core activities that IPCNs should be required to perform and how long they take.^{2,7-11} The work has been undertaken on behalf of professional bodies and findings, based on the opinions of their members,⁷⁻¹⁰ and do not necessarily reflect the views of practitioners who are not affiliated

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with these professional associations. In the UK, examination of IPCN activities has taken place mainly at the local level.³ The findings indicate that improved workforce planning is essential to enable infection prevention and control teams to function at an optimal level: at present, time is sometimes spent reactively, for example dealing with crises (eg, outbreak situations at the expense of education, policy development and implementation).

In recent years new infection prevention and control posts have been created. Workforce issues in relation to these groups have not been considered.¹² Antibiotic pharmacists have been appointed in many hospitals in the UK, United States, and other countries. They monitor antimicrobial use, provide clinical advice and education on prudent prescribing, and develop antibiotic stewardship policies.¹³ In the United States and South America, infection prevention and control champions have been introduced at the ward level to embed infection prevention and control into clinical practice.¹⁴ In England, all NHS hospital organizations (consisting of ≥ 1 hospitals) are required to appoint a director of infection prevention and control to provide clinical leadership at the executive level. Their role is to provide visible leadership and demonstrate that the organization is striving to improve infection prevention and control to the executive board (a committee of most senior officials responsible for an NHS hospital organization). However, the director of infection prevention and control does not have to be a clinician with expertise in the specialty, and they may have responsibilities additional to infection prevention and control. In England and many other countries, nothing is known about the numbers of infection prevention and control personnel currently employed, how numbers relate to organizational needs, or how numbers relate to reported rates of health care–associated infection.¹²

METHODS

Aims

Aims were to determine numbers of infection prevention and control personnel employed in acute NHS hospital organizations in England, weekly hours contributed by each occupational group and to explore the relationship between capacity of the infection prevention and control workforce, size of the inpatient population, and routinely collected surveillance data for health care–associated infection.

Data collection

All acute NHS hospitals organizations in England were requested their key information about infection prevention and control personnel under the UK Freedom of Information Act.¹⁵ Requests were made to the lead IPCN in the organization by e-mail. Freedom of Information legislation in the UK gives right of access to all types of recorded information held by UK public authorities. Similar legislation exists in many other countries, permitting access to datasets that would otherwise not be available. NHS hospital organizations were requested to provide data on the number of infection prevention and control personnel employed, categories of staff, and number of weekly working hours contributed by each occupational group. In the UK, clinical microbiology time is recorded as the number of sessions worked each week, and 1 session represents 4 hours. Clinical microbiology time was therefore collected in terms of clinical sessions. The data were collated on a template developed for the study, extracted into a Microsoft Excel (Microsoft, Redmond, WA) spreadsheet, and checked for accuracy independently by 2 data collectors. Size of the inpatient population was calculated as the number of acute bed days (acute bed occupancy \times days in the time period). Data for acute bed days

were obtained from the public health authorities (Public Health England).

Sample

Data were requested from all 161 acute NHS hospital organizations in England. Surveillance data for methicillin-resistant *Staphylococcus aureus* (MRSA) bloodstream infections and *Clostridium difficile* infections were retrieved from Public Health England. These are the only surveillance data routinely reported to the public health bodies by NHS hospital organizations in England.

Analysis

Data were inspected initially to identify the number of IPCNs in each acute NHS hospital organization. In each, the number of additional occupational groups represented was determined. These were categorized into 1 of 5 groups: clinical microbiologist, director of infection prevention and control, senior nurse manager, antibiotic pharmacist, and administrative and surveillance support.

A model of the infection prevention and control team workforce was constructed according to the availability of expertise contributed by each occupational group. NHS hospitals in England are required to employ at least 1 IPCN, and this represented the most basic model. IPCNs in the UK are not always employed on a full-time basis.

Availability of expertise from each additional group was entered (ie, +1 for availability of expertise of 1 extra occupational group, +2 for 2 groups) up to a maximum of +5, representing the greatest availability of expertise. Availability of the clinical microbiologist's time was categorized as adequate (at least 1 session for every weekday) and not adequate (< 1 session for every weekday). Adequate clinical microbiology input was rated as +1.

RESULTS

Responses were obtained from 137 (85%) NHS hospital organizations. This was considered a satisfactory response rate, and reminders were not sent. Although the Freedom of Information request was made to the same member of staff in each organization, it was likely that they frequently passed the request to another member of staff, and the amount of detail provided varied. The number of working hours per week reported for IPCNs in an NHS hospital ranged from 30–644. In 15 (10.9%) organizations, a single IPCN was reported to take responsibility for infection prevention and control. The largest organization reported that they employed up to 16 IPCNs, in some cases with evidence of division of labor. Some IPCNs in large teams were dedicated to educational roles or special projects, usually related to surveillance. The model most frequently identified consisted of a single IPCN supported by 2 additional sources of expertise; however, the type of additional support varied. In 3 (2.1%) organizations, the infection prevention and control team was composed of representation from all possible occupational groups.

Of the NHS hospital organizations, 91 (66.4%) reported receiving clinical microbiology support. There were 80 (58.4%) that reported receiving ≥ 5 sessions of clinical microbiology input each week. There were 107 (78.1%) that reported receiving the support of an antibiotic pharmacist.

A nurse manager was reported to provide support for the infection prevention and control team in 23 (16.7%) NHS hospital organizations. In 25 (18.2%) organizations, there was leadership from a senior IPCN or clinical microbiologist. In the remaining organizations the director of infection and prevention role was presumably a member of staff not working directly with the infection

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