

**Also In This Issue:**

**Tip of the Week to  
Improve Infection Control  
Awareness.....2**

**Virox Update .....3**

**Experimental Evaluation  
of an Automated  
Endoscope Reprocessor  
with In Situ Generation  
of Peracetic Acid  
for Disinfection of  
Semicritical Devices.....4**

**Essential Training for  
Environmental Services  
Staff .....5**

*"The secret of success is  
constancy of purpose"*

Benjamin Disraeli

## The Socio-Economic Burden of Hospital Acquired Infection

Excerpted from a report by the Public Health Laboratory Service, UK

At any one time approximately 1 in 10 patients in acute care hospitals have a hospital-acquired infection (HAI). At the same time, an unquantified number of patients, discharged from hospital into a long term care facility or the community, have an infection related to their recent hospital admission. These infections impose a burden on the secondary, tertiary and primary healthcare sectors, community care services, the patients themselves and those who care for them. These burdens may be both financial and non-financial.

Studies that have estimated the cost of HAI generally focus on the burden to the hospital sector. Little is known about the costs incurred by other sectors of public health services as listed above, the individual patients, their family and friends. These costs become increasingly relevant as the length of hospital stay becomes shorter and patients are discharged home at an earlier point in their recovery. The aim of this research was to provide a more comprehensive assessment of the nature, distribution and magnitude of the costs resulting from HAIs.

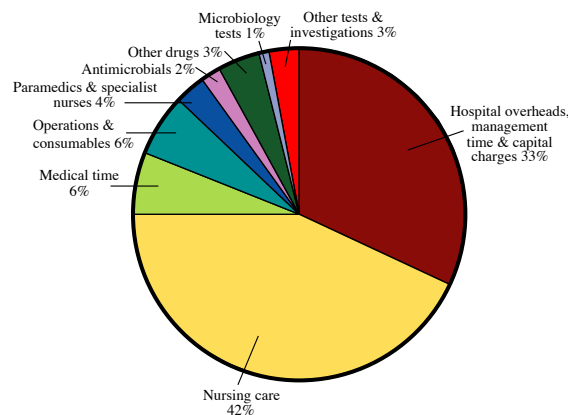
### Research Methods

Adult patients with a minimum in-patient stay of 30 hours were recruited from the general wards of a district general hospital over a 13-month period.

Information on daily resource use was recorded for each patient for the duration of their hospital stay. Patients who presented with signs and symptoms of infection which met the definitions of infection used in this study, and a sample of patients who did not, were followed up post-discharge using a structured questionnaire. This questionnaire provided information on possible surgical wound, chest and urinary tract infections experienced after discharge from hospital; care received from health and community care services, family and friends; personal expenditure on items such as drugs and dressing; time of return to normal activities and, if applicable, employment; and information on the patient's health status following discharge from hospital. Information about care received post-discharge was also obtained from the patients' healthcare records.

Three thousand, nine hundred and eighty (3,980) adult patients were recruited in to the study from the medical, surgical, orthopaedic, urology, gynecology, ear, nose and throat (ENT), and elderly care. Two hundred and fifteen (215) had an infection identified during the in-patient phase; a total of 1,449 patients were selected for follow-up into the community. Of those selected for follow-up, 41 died either before the first questionnaire was sent at four weeks post-discharge, or between the distribution of the first and second questionnaires at eight weeks post-discharge. All 41 patients were excluded from the response rate, although four of these patients had an HAI identified during the in-patient phase.

During the in-patient phase, 7.8% of patients were identified as having acquired one or more HAIs. Nineteen (19) percent of those patients who returned the questionnaire and who did not have an HAI identified during the in-



**Continued on page 6**

## Tip of the Week to Improve Infection Control Awareness

Jackie Daley, Sinai Hospital, Baltimore

Could infection control possibly be as boring, time-consuming and entirely dull as healthcare workers appear to think? Could we find (or create) a tool that would engage and motivate hospital staff to incorporate infection control into their daily activities? At the Sinai Hospital in Baltimore we faced these questions head on and attempted to have a go at a solution.

One of the initiatives that we tried is our "Infection Prevention and Control Tip of the Week". The "Tips" are sent every Monday to staff via e-mail and are posted in hard-copy for those without e-mail access. The information is concise (limited to 1 page), timely (many topics focus on current events impacting infection control), relevant, of interest to all hospital staff (not just clinical staff), colourful, dynamic, and typically humorous.

Each week, the Tip focuses on a topic garnered from current news reports, staff ideas, and/or observations on the units. Topics have

included Tuberculosis, meningitis, respiratory etiquette, and of course various aspects of hand hygiene.

Although production and distribution is simple, and associated costs are minimal, the time and intellectual capacity required to develop a Tip each week - determine a topic, research the topic, find appropriate images, create a visually appealing format - can be substantial. Once begun, the feedback from hospital staff of all ranks was immediately and overwhelmingly positive, sufficiently so that stopping this communication initiative would be a noticeable loss.

They describe the Tips as informative, easy to read, humorous, relevant, and interesting enough to bring home to their families and forward to other colleagues outside the hospital.

Since launching this project, communication and interaction with ICPs has increased among all staff including doctors, nurses, and support and ancillary staff. People comment on the Tips, ask questions generated by the Tips, or provide additional ideas for future Tips.

The Tip of the Week allows us to highlight incorrect practices and behaviour in a non-threatening way, and communicate "breaking news" or current events as they relate to infection control. We have not measured the impact of this program on hospital-acquired infections, but having infection control "in the face" of hospital staff week after week certainly can't be a bad thing.

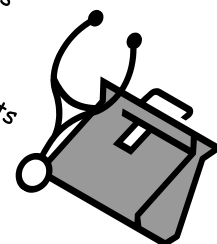
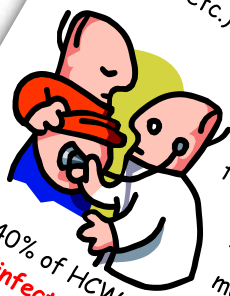
### Infection Prevention Tip of the Week January

## The Gift that Keeps on Giving

Picture this: A healthcare worker (HCW) enters the room of a **patient with MRSA or VRE** and takes the vital signs. She records the results in the patient's chart, and talks to the patient for a moment, throws out the gloves, washes her hands and moves on to the next room where she puts on a new pair of gloves and puts the stethoscope in her ears to begin the next examination.

**Has the HCW compromised her patient's outcomes?** You tell us:

- \*Nurse's gloves become contaminated with MRSA **42% of the time** after touching the surfaces in an MRSA patient's room (for example the bedside table, the light switch, a vent, manipulating lines, etc.). In these cases, **the nurses did NOT have any contact with the patient.**
- \***70% of the rooms of patients** either infected or simply colonized **the environment** (this included floor, bed linens, blood pressure cuffs, overbed tables
- \***65% of HCWs' gowns were contaminated** morning care for patients with MRSA
- \***40% of HCWs' gowns were contaminated with MRSA**
- \***4 out of 5 studies reported lower rates of VRE recovered when HCWs used**



## Virox Update

### **Virox Technologies Inc. announces partnership with STERIS Corporation with the launch of an endoscope compatible Accelerated Hydrogen Peroxide High Level Disinfectant**

Expanding our global reach with a view to establishing AHP as a new standard in sterilization, it is with great pleasure that we announce the formation of a new, global, strategic alliance partnership with the Steris Corporation. Similar to Virox Technologies, Steris is an acknowledged leader in the global fight against infection and contamination. Steris serves researchers and professionals in the pharmaceutical, medical device manufacturing, defence and healthcare industries. Steris is capable of addressing infection control needs with fully integrated programs that offer a portfolio of products, services and equipment. Steris has the scope and reach to take AHP medical device cleaners and sterilants to the global marketplace.

The partnership between Steris and Virox Technologies Inc. will see the introduction of ready to use, flexible endoscope compatible, high level disinfectants, as well as instrument cleaners based on AHP. Compared to existing aldehydes, other high level disinfectant chemicals, and enzymatic cleaners the introduction of AHP represents an entirely new level of instrument decontamination. The first AHP high level disinfectant and chemosterilant product intended for heat sensitive medical devices (flexible and rigid endoscopes) will be sold under the name Secure HLD and may be used as a cold soak or for use in AER's (Automatic Endoscope Reprocessors).

### **Virox Maintains Sponsorship of the Sick Kids Partnerships in Pediatric Patient Safety Symposium**

As patient safety drive our product development, Virox has renewed its sponsorship of the Sick Kids Partnerships in Pediatric Patient Safety Symposium. The 2006 Symposium was held in June and included an impressive list of guest speakers. We look forward to supporting the 2007 event.

### **Virox – JohnsonDiversey Partnership wins prestigious Canadian American Business Achievement Award**

As a result of the Virox partnership with JohnsonDiversey both companies have been awarded the prestigious Canadian American Business Achievement Award. This award is bestowed to a Canadian and American company whose joint enterprise demonstrates excellence in cross-border business and trade relationship. An international panel of judges selects the recipients using rigorous criterion that examines sustained profitability, job creation, financial strength, environmental responsibility, corporate synergy, exceptional imagination and extraordinary innovation.



Stephen Harper, Prime Minister of Canada, Randy Pilon, President, Virox Technologies Inc.

### **JohnsonDiversey cleaning system first to earn indoor air quality certifications**

The Greenguard Indoor Air Quality Certification Program is a testing initiative for low-emitting products and materials, based upon verifiable emissions standards. The Greenguard Environmental Institute, which oversees Greenguard certification, was founded with the goal of establishing a truly third-party, product certification program, and to provide specifying and procurement professionals with a resource for low emitting products. Greenguard Certification is a voluntary program available to all manu-

facturers and their suppliers. For more information, please visit [www.greenguard.org](http://www.greenguard.org). The certifications also include several of the Accelerated Hydrogen Peroxide formulations.

### **2007 Virox Speakers Series**

The popular Virox Speaker Series will be continuing in 2007. If you are interested in receiving an invitation to the events, please contact Nicole Kenny at 1-800-387-7578 x118 or by email at [nkenny@virox.com](mailto:nkenny@virox.com).

### **Website Update: [www.virox.com](http://www.virox.com)**

MEMBER SECTION! Do you want to be sure you get all the updates on Virox and AHP developments? Interested in being included on all of the invitations to all Virox FREE education seminars? Log on to [www.virox.com](http://www.virox.com) and click the Member's Sign-Up icon to enroll!

We pride ourselves on being a resource tool to the infection control community so please check out our website frequently as new links will be posted regularly.

## **Conference & Education Winter Schedule**

Virox representatives will be participating in the following functions during the upcoming months:

**March 8 – 10** – BC Dental Association in Vancouver

**March 14 – 18** – Association of Medical Microbiology & Infectious Diseases Canada (AMMI) in Halifax

**April 14 – 17** – SHEA in Baltimore

**April 24 – 26** – Interphex in New York

**April 30–May 2** – OANHSS in Toronto

We are very excited about participating in each of these conferences & education days. Our best wishes to all of the various organizers, and we thank them for their dedication and effort in organizing these very important educational opportunities. We look forward to attending and talking to all of the participants.



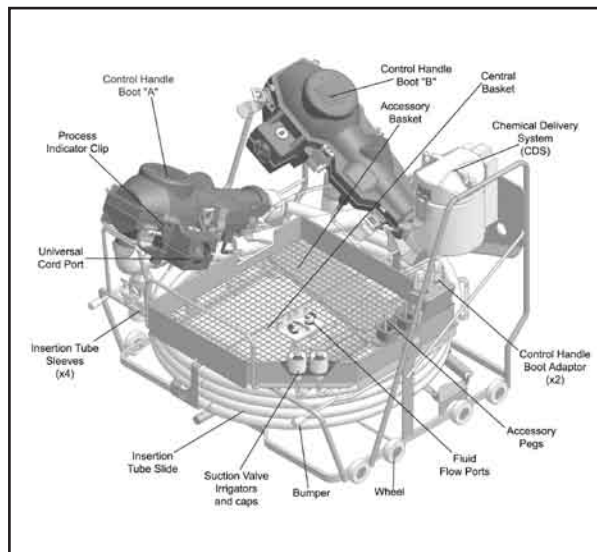
## Experimental Evaluation of an Automated Endoscope Reprocessor with In Situ Generation of Peracetic Acid for Disinfection of Semicritical Devices

Syed A. Sattar, PhD; Richard J. Kibbee, MLT; Jason A. Tetro, BSc; Tony A Rook, BSc

Nosocomial infections are an unfortunate reality and pose an increasing threat with every new adaptation of microbes into "superbugs". Multidrug-resistant *Mycobacterium tuberculosis*, Vancomycin-resistant *Enterococcus*, Methicillin-resistant *Staphylococcus aureus*, Vancomycin-resistant *S. aureus*, and penicillin-resistant *Streptococcus pneumoniae* are all examples of such pathogens. *Clostridium difficile*, a cause of potentially fatal diarrhea, has also emerged as a significant nosocomial pathogen.

Heat-sensitive, semicritical medical devices (eg, flexible endoscopes) require at least a high-level disinfection between uses. Inadequate reprocessing of such devices or their contamination during disinfection could cause infections. For example, *Mycobacterium chelonae* has been isolated from biofilms in endoscope reprocessors that use 2% glutaraldehyde at use-dilutions. These rapidly growing mycobacteria are especially dangerous for immunocompromised or otherwise debilitated persons. We undertook a study to evaluate the effectiveness of a peracetic acid (PAA) disinfection solution generated by combining 2 dry chemical components with water (which react to generate peracetic acid) in an endoscope reprocessing system for decontamination of external and internal surfaces of several common types of experimentally contaminated heat-sensitive medical devices. The endoscope reprocessor we evaluated was the Reliance EPS Endoscope Processing System (Reliance EPS; Steris), which is designed to disinfect many types of heat-sensitive endoscopes.

The American Society for Testing and Materials Simulated-Use Test protocol (E1837-02), which incorporates a soil load in each inoculum, was used to evaluate the efficacy of the system



when processing 4 common types of endoscopes contaminated separately with 5 types of nosocomial pathogens: *Pseudomonas aeruginosa* (ATCC 15442), spores of *Clostridium difficile* (ATCC 9689), a glutaraldehyde-resistant strain of *Mycobacterium chelonae*, a Vancomycin-resistant strain of *Enterococcus faecalis*, and a Methicillin-resistant strain of *Staphylococcus aureus*. Rinse solution samples from channels and from surfaces of the processed endoscopes were tested for any microbicidal residues.

For all organisms tested, the baseline level of contamination of the endoscopes ranged from 5 log<sub>10</sub> to greater than 7 log<sub>10</sub> at each external surface site and internal channel. All tests showed reductions in viability of the test organism to undetectable levels. All rinse solution samples from external and internal sites of the endoscopes proved to be free of any residual microbicidal activity

The Reliance EPS system, as tested, showed the successful elimination of the 5 major nosocomial pathogens from the internal and external surfaces of 4

common types of endoscopes. The processor, with its single-use dry chemical components and control handle boot connection system, provides an effective, standardized means of disinfection endoscopes.

PAA is an effective and safe alternative to glutaraldehyde, proving rapid, broad-spectrum microbicidal activity. Chemicals from its breakdown are environmentally benign. PAA use-dilution has not been associated with respiratory or skin sensitization.

Automated reprocessing of semicritical medical devices avoids many of the pitfalls of manual reprocessing. However, several deficiencies have been associated with some processors, such as the unsafe nature of many chemicals used as high-level disinfectants and the growth of potentially harmful microorganisms in the reprocessors themselves. The system we tested addresses these concerns by generating a safer high-level disinfection solution inside the unit during the processing cycle. These developments should enhance the reliability, convenience, and safety of flexible endoscope processing, with the rapidly increasing demand for such devices.

The full text of this article, published originally in *Infection Control and Hospital Epidemiology* (Nov. 2006, Vol. 27, No. 11), is available by request to:

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## Essential Training for Environmental Services Staff

Nicole Kenny, Virox Technologies Inc.

The Centers for Disease Control (CDC) "Emerging Infectious Diseases" journal published that in 1995, hospital acquired infections cost an estimated \$4.4 billion and contributed to more than 88,000 deaths. That's one death every six minutes. The Chicago Tribune conducted an extensive investigation of hospital facilities and found that seventy-five percent of an estimated 103,000 patient deaths were linked to HAIs. Unsurprisingly, they determined that most of these premature deaths could be attributed to dirty facilities, dirty hands and dirty instruments. The report also found that Environmental Services (EVS) staff were inadequately trained and have a higher rate of occupational-acquired diseases than nurses.

As an infection control community, we know that housekeeping practices vary widely between institutions. Commonly, cleaning practices do not allow for the appropriate disinfectant contact time required by the disinfectants. We know as well that there is no standardized, formal training program for EVS staff. This department plays an important role in closing the gap in infection control but in order to close this gap there needs to be some basic training.

The goal of any Environmental Services Department within a healthcare facility should be to prevent the spread of infectious agents among patients and healthcare workers by meticulous cleaning and appropriate disinfection of environmental surfaces. To reach this goal the EVS department will need to have a comprehensive training program, the objective of which should be to provide department staff with the informa-

tion they need to accomplish their jobs safely. The training program should be a part of the big picture of "How to Protect Yourself". At a minimum the training program should include:

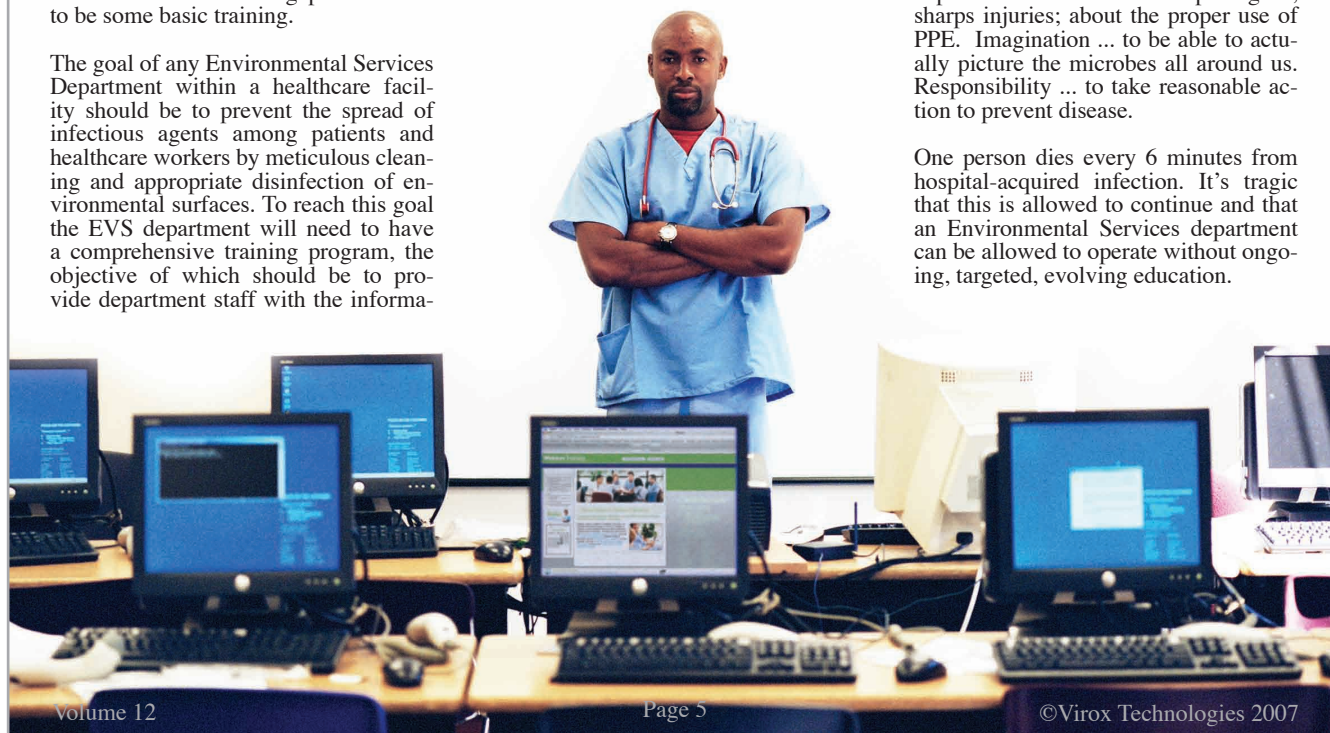
1. Identification of occupational risks and hazards associated with handling infectious waste
2. Sharps safety
3. Blood borne pathogens
4. Infection control training
  - a. Microbiology
  - b. Transmission
5. Hand hygiene
6. Personal protective equipment (PPE) including donning & doffing
7. MSDS and hazards associated with using chemicals (cleaning agents, disinfectants etc)
8. Product usage training including proper cleaning and disinfection techniques

The benefit behind the division of sections is twofold. First, it allows the person responsible for training to involve other departments such as Infection Control or Occupational Health & Safety where specific knowledge and

expertise can be called upon. Second, by segmenting the areas into shorter pieces the trainee is not overwhelmed. The individual sections also allow for developing unique methods of delivery. Education should be tailored to the size, topic and needs of the group. Not all programs must be instructor-led in a classroom setting. They can also consist of CD programs and/or video-based programs or a series of self-study modules. For example, the product usage training may be better suited to a traditional classroom setting where employees can observe someone performing the task while other sections such as Blood Borne Pathogens can use video based training. Switching up the method of delivery helps keep the trainee engaged.

A basic understanding of these eight topics doesn't require a stethoscope or coke-bottle glasses, or even the ability to squint. It takes knowledge, imagination and responsibility. Knowledge ... to know basic microbiology, where pathogenic microbes are found, and how they cause disease; to know how cleaning and disinfectant products should be used; to know how to be protected from exposure to blood borne pathogens, sharps injuries; about the proper use of PPE. Imagination ... to be able to actually picture the microbes all around us. Responsibility ... to take reasonable action to prevent disease.

One person dies every 6 minutes from hospital-acquired infection. It's tragic that this is allowed to continue and that an Environmental Services department can be allowed to operate without ongoing, targeted, evolving education.



## Socio-Economic Burden Continued from page 1

patient phase, and 30% of patients who did have an HAI identified during the in-patient phase reported symptoms and treatment that met the criteria for a post-discharge urinary tract, chest and/or surgical site infection during this study.

### Impact of HAI on length of hospital stay and costs

Patients who presented with one or more HAIs during their in-patient stay were found have been hospitalized for a period 2.9 times longer than those for uninfected patients, an additional 14 days. Hospital overheads, capital charges and the cost of management time accounted for 33% of the additional costs incurred, while nursing care accounted for 42%, medical care 6%, operations and consumables 6%, paramedics and specialist nurses 4%, antimicrobials 2%, other drugs 3%, microbiology tests 1%, and other tests and investigations 3% (see figure on page 1).

### Impact of HAI on the healthcare sector post-discharge

Patients who had an HAI identified during the in-patient phase and/or an infection identified post-discharge had, on average, greater contact with their family physician, visited the hospital more frequently for outpatient appointments, and received more visits from homecare nurses as compared with uninfected patients. These infected patients therefore imposed an additional economic burden on such services. Patients who had an HAI identified during the in-patient phase and/or identified post-discharge, on average, had a greater impact on community nursing costs compared with uninfected patients. Patients who presented with an HAI as an in-patient and a subsequent infection post-discharge had the greatest impact on community nursing costs.

### Impact of HAI on costs incurred by patients

The mean personal expenditure on items such as drugs and dressings was found

to be between 1.7 and 3.2 times greater than the uninfected group. Increases were found to be greatest for patients who presented with an HAI as an in-patient and also had an HAI identified post-discharge.

### Impact of HAI on the number of days from admission to return to normal daily activities

The mean number of days from admission to resuming normal daily activities was greater for patients in the infected groups by a multiple of 1.2 to 1.5, or between 6 and 13 days.

### Impact of HAI on the number of days employed patients were away from paid employment

The mean number and value of days from admission to return to paid employment was greater for patients who had acquired an HAI. Those patients who had presented with an HAI as an in-patient required 1.3 times longer than uninfected patients, an extra 6 days. Those who were found to have an HAI post-discharge required 1.2 times longer, an extra 5 days.

### Impact of HAI on the number of days informal caregivers spent caring for patients and their dependants

The mean number of days of care provided by family, friends and other "informal caregivers" for patients infected with an HAI was 1.4 to 2 times greater than that of uninfected patients.

### Impact of HAI on health status

The responses given to the general health status questionnaire, administered four weeks post-discharge, provided information on eight dimensions of health. Two summary measures relating to physical and mental well-being were derived from these data. Patients with an HAI, on average, obtained lower scores for these two measures than patients who did not acquire an infection, indicating a poorer outcome as determined by these health measures. Patients who presented with an HAI as in in-patient and met the study criteria for a post-discharge infection, on average, reported the lowest

health status.

### Impact of HAI on in-patient mortality

The in-patient death rate was found to be considerably higher in patients with an HAI which presented during the hospital stay – 13% of patients with an HAI died compared with 2% of patients who did not present with an HAI in hospital. After adjustment for the effects of age, sex, diagnosis, number of co-morbidities, admission specialty and admission type, patients with an HAI were found to be 7.1 times more likely to die in hospital than uninfected patients.

### The benefits of prevention

This study was not directly concerned with estimating the benefits of prevention. However, the estimates presented provide important information on the value of resources that might be released for alternative use if a proportion of infections are prevented. These may be viewed as the gross benefits of prevention. Net benefits will depend on the cost and effectiveness of prevention activities.

The results of this study provide a detailed account of the socio-economic burden imposed by HAIs occurring in adult patients admitted to selected specialties. It represents the first comprehensive attempt to estimate these costs. The results provide valuable information that might be used at national and local level to inform the management of HAI and, when used alongside effectiveness studies of infection prevention and control measures, will facilitate the development of effective policies to control hospital acquired infection..

For a copy of the full report including reference, contact Nicole Kenny  
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