

Letter from North America

DOCTOR, DID YOU WASH YOUR HANDS?

In 1847, Hungarian doctor Ignaz Semmelweis discovered that washing one's hands with chlorine between deliveries eliminated fatal infections among labouring women. His discovery was rejected by his colleagues and he was declined a reappointment in 1849. His medical contemporaries refused to accept his findings mainly because they could not accept that they could be responsible for spreading infections. His colleagues ignored him and later committed him to a mental hospital, where he was beaten to death by guards and died of fatal wound infection. The application of his method instantly reduced the cases of fatal puerperal fever, also known as childbed fever from 12.2% to 2.4%. Dr Semmelweis' discovery and the huge success of reducing hospital-acquired infections (HAIs) were later brought to light by his students who wrote letters to news and scientific media and delivered lectures.

Semmelweis, popularly known as 'The Saviour of Mothers', never lived to enjoy the credit of his discovery. He wrote of his dreams that, 'When I look back upon the past, I can only dispel the sadness which falls upon me by gazing into that happy future when the infection will be banished ... The conviction that such a time must inevitably sooner or later arrive will cheer my dying hour.'

This vision came true in the twenty-first century. It is not uncommon that patients and family members in US hospitals now routinely ask the question, 'Doctor, did you wash your hands?' Even before the H1N1 influenza outbreak, Americans spent US\$ 117 million per year on alcohol-based hand sanitizers and the manufacturers enjoyed a 53% annual sales growth. With the advent of the H1N1 influenza pandemic, national germ phobia kicked into even higher gear promoted by advertisements by the manufacturers to 'imagine a touchable world'.

In the USA, there are an estimated annual 99 000 cases of HAI-related morbidity and deaths according to the federal Centers for Disease Control and Prevention. HAIs result in US\$ 8 billion of additional costs because of the increased inpatient days accrued. These factors have contributed to making the control of HAIs a prime target for controlling healthcare costs. Furthermore, an alarming rise in cases of HAIs resistant to current antibiotic therapies, such as methicillin-resistant *Staphylococcus aureus* (MRSA), has made the prevention of HAIs a priority. Enterococcal infections are another common HAI, of which >90% of isolates in the USA are vancomycin-resistant (VRE) and 99% ampicillin-resistant. Because many of these infections are contracted in the course of routine hospital admissions such as elective surgery, researchers and policy-makers have begun to enforce frequent hand-washing and sanitizing during patient care. A majority of hospitals in the USA now provide an automatic hand-washing gel dispenser in front of each room in the hospital or clinic, and advocate hand-washing before entering and after leaving the room.

Many hospitals have gone to great lengths to increase compliance with prevention measures in controlling the spread of HAIs. In 2008, Abington Memorial Hospital in Pennsylvania hired an infection control nurse and teams of undercover observers to address the low rates of hand-washing and sanitizing, and to establish systems of enforcing prevention measures. The observers recorded 800 to 1400 hand-washing/sanitizing events per month.

Initial compliance rates were 31%. Efforts to increase cooperation with prevention controls began with rewarding hand-washing compliance with raffles and prizes, and punishing non-compliance with a written warning of potential dismissal. Finally, Abington Memorial was able to increase hand-washing compliance rates to 88% by a hospitalwide campaign that told of a patient's death due to preventable HAI.

In 2008, HAIs of pneumonia and sepsis accounted for US\$ 718.4 billion in payments to hospitals according to the Centers for Medicare and Medicaid Services. With more evidence from the research community describing antibiotic resistance as inevitable and accelerating, hospital administrators are promoting simple hygiene systems, in particular hand-washing, which are ideally suited to prevent the further spread of infections in hospital environments. The development of new antibiotics and implementation of HAI prevention measures must go hand-in-hand. Jackson Memorial Hospital in Miami, Florida has taken monitoring of hand-washing to the highest level. Each hospital employee wears a radio-frequency identification tag (RFID), which time-stamps both their patient interaction and hand-wash. This allows the administration to observe employee compliance in real-time and to identify problem areas and individuals that need additional training. From the scientific end, vaccines against MRSA, *Pseudomonas* and streptococcal pneumonia are now in phase II/III clinical trials, and pharmaceutical companies such as Merck are expecting results and a big push to the market in 2010.

Although efforts to increase prevention measures are of vital importance, given the ability of bacteria to rapidly acquire antibiotic resistance, some critics warn of the costs of germ phobia and its potential contribution to increasing healthcare costs. They point out some of the recent studies noting that the bacterial species from environments which require metabolic versatility have an intrinsic resistance to antibiotics, independent of human factors. These bacteria possess collections of proteins, termed resistome, which participate in the resistance to an antibiotic drug selection pressure; however, this is not their primary function. A key concept in the idea of a resistome is that functional shifting or recombination can occur with any potential combination of proteins within the bacterial genome to address new selection pressures imposed by an antibiotic on the naïve bacterium. This hypothesis was confirmed through the investigation of a *P. aeruginosa* model system. Further research has revealed that sub-inhibitory antibiotic doses induce a higher level of mutagenesis and consequently higher incidence of multidrug resistance. Furthermore, these genetic modifications occurred in antibiotic-naïve populations. Thus, the biodiversity of bacteria within an environment contains a natural reservoir for antibiotic resistance genes, for which low-level selection pressures provide a route for conferring resistance across many bacterial populations.

Critics believe that these extraordinary efforts in hand hygiene are a waste of resources because some bacterial infections are opportunistic and occur by means other than contact transfer. However, this argument has less support, given current trends in healthcare. Hand-hygiene measures are a mandatory requirement for receiving accreditation by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO). JCAHO hand-hygiene and infection control requirements include

monitoring of hand-hygiene compliance, mandatory use of alcohol-based hand products, ubiquitous placement of hand-washing gel dispensers in patient care areas, and targeted surveillance of drug resistance organisms. Nosocomial infections are reported at a rate of over 25% in India and it is responsible for more mortality than any other form of accidental death. A study from a national tertiary referral institute from Chandigarh in 2006 reported a 36% infection rate in the burns unit, 31% ventilator-associated pneumonia and 9% wound infection rates, prompting the institute to train a dedicated 'infection control nurse' for every 250 beds. Joint Commission International (JCI), the international arm of JCAHO, is now evaluating and issuing accreditation to Indian hospitals. Currently, 15 hospitals in India including two hospitals in New Delhi

received JCI accreditation, meeting JCI standards for infection prevention and control. JCAHO guidelines are the foundation for JCI accreditation standards. The campaign for JCI accreditation is driven by its association with improved patient care, safety and outcomes in the USA. In addition to its credibility in the USA, emerging regional healthcare market competition may promote JCI certification as a requirement for hospitals in other countries to successfully operate in the future.

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Shubhchintak:

The AIIMS Helpline on HIV/AIDS, Sex and Family Life

The AIDS Education and Training Cell of the Centre for Community Medicine, All India Institute of Medical Sciences, New Delhi runs an interactive phone helpline (*Shubhchintak*) and an email-based helpline (*e-Shubhchintak*). These helplines aim to create awareness about HIV/AIDS and answer queries from the general public about AIDS and HIV infection. Queries on sex, sexuality, contraception and marital disharmony are also addressed. The telephonic service works between 10 a.m. and 5 p.m. on all working days from Monday to Friday at 011-26588333. The internet facility is available at eshubhchintak@gmail.com or you may visit our website at www.aiims.edu or www.aiims.ac.in. The Cell also sends out books on HIV/AIDS; Family Life and Sex free of cost to the general public. For details, please contact Dr Bir Singh, Professor of Community Medicine, All India Institute of Medical Sciences at birsingh43@gmail.com