Infection control and hospital epidemiology in the Kingdom: the right discipline in the right place at the right time

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ABSTRACT

Hospital-acquired or nosocomial infection is an important medical and economic problem. Throughout the world, nosocomial infection complicates a substantial proportion of hospitalizations, causes large numbers of patient deaths, and incurs significant costs to both healthcare systems and societies. Scientific evidence suggests that infection control programs with certain essential components can prevent up to one-third of nosocomial infections; these program components include surveillance and control activities, and adequate personnel in the form of infection control practitioners and hospital epidemiologists. Infection control programs have also been shown to be a highly cost-effective public health activity. There are 3 urgent requirements for the expansion of effective infection control programs in the Kingdom of Saudi Arabia: provision of suitably trained personnel, availability of knowledge infrastructure, and growth of professional networks for information sharing and policy development. Public and private payer expectations for accountable, cost-effective, high-quality healthcare accentuate the need for infection control professionals with sophisticated problem-solving skills and an interdisciplinary approach.

Keywords: Infection control, hospital epidemiology, nosocomial infections.


More than 150 years ago, a Viennese physician named Ignaz Semmelweis documented that receiving medical care in a hospital can be hazardous to your health. Through meticulous detective work, Semmelweis concluded that medical students at a maternity hospital in Vienna were responsible for spreading puerperal fever to their patients, contributing to maternal mortality rates in excess of 10%. In the 150 years that have passed since Semmelweis's observations, the prevention and control of hospital-acquired or nosocomial infections has evolved into a mature discipline with its own standard textbooks, journals, and professional societies. Hospital-acquired infection is generally defined as infection that is not present or incubating on admission to hospital, and which occurs more than 48 hours after admission. In hospitals in economically developed nations, the 4 major types of nosocomial infection are urinary tract infections, pneumonia, surgical site infections, and bloodstream infections, whereas in developing countries gastrointestinal and postpartum infections are relatively more important.

Hospital-acquired infection is a medical and economic problem of global importance. For example, in the United States in 1992, hospital-acquired infections complicated 6% of all hospitalizations, and cost the American health-care system 4.5 billion USD. In contrast, in the developing nation of Mexico, 15% of patients become infected as a consequence of hospitalization, making nosocomial infection the 3rd leading cause of death in 1990, and generating costs equivalent to 70% of the Mexican Health Ministry budget. Using conservative assumptions, it has been estimated that a one-third reduction in the occurrence of nosocomial infections in Asia and Africa could result in monetary savings of 230 billion to 2.3 trillion...
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USD per year.9 Neither are the nations of the GCC region immune to the impact of hospital-acquired infections. In Kuwait in the 1970's, nosocomial infections occurred in 5.1% of patients and cost the national health-care system 267,000 USD per day.9 An urban hospital in the Kingdom of Saudi Arabia reported a 2.2% nosocomial infection rate,10 and other reports have documented that nosocomial infections are a problem in the Kingdom's hospitals.11-13

Nosocomial infections impose a direct economic burden to health-care systems because they prolong hospital stays, and expend resources for diagnosis, treatment, and prevention. In addition, nosocomial infections carry an indirect or future cost to society in the form of delayed return to work, lower functional status, and premature death, all of which reduce economic productivity.14 The relative magnitude of direct economic costs to health-care systems and indirect economic costs to society are unknown. However, as research defines these costs more precisely, it may become apparent that current accountable costs of nosocomial infections represent only the 'tip of the iceberg'.

What can be carried out to reduce the morbidity, attributable mortality, and costs of hospital-acquired infections? In the early 1970's, the US Centers for Disease Control initiated a landmark prospective, controlled study called SENIC (Study on the Efficacy of Nosocomial Infection Control Project) to examine the effectiveness of hospital infection-control programs in US Hospitals.15 SENIC demonstrated with a high degree of scientific validity that 32% of nosocomial infections can be prevented by effective infection-control programs. These effective programs had 4 components: surveillance and control efforts, at least one full-time infection-control practitioner per 250 hospital beds, a trained hospital epidemiologist, and feedback of wound infection rates to practicing surgeons. More recently, a consensus panel of the Society for Healthcare Epidemiology of America has published recommendations for infrastructure and essential activities of infection-control programs.16 The panel strongly recommended, on the basis of high-quality epidemiologic evidence, that hospital infection-control programs conduct surveillance of nosocomial infections and use surveillance data to improve health-care outcomes, offer hospital employees appropriate immunizations, develop policies and procedures to deal with the acquisition of communicable diseases by employees in the health-care setting, maintain the capacity to identify outbreaks of infectious diseases, and retain the services of trained hospital epidemiologists and infection-control practitioners.16

But are the activities of infection-control programs cost-effective? In a re-analysis of SENIC data in which the costs of effective infection-control programs were compared with the costs of nosocomial infections, it was found that infection-control programs in the USA pay for themselves if they prevent only 6% of infections, and that any reduction in excess of 6% represents a net fiscal saving to the hospital.7 Furthermore, in an economic model assuming liberal costs and conservative benefits, it was shown that effective infection-control programs are one of the most cost-effective activities in public health.17

If effective infection-control programs are important from the viewpoint of quality of health care and cost-effectiveness, where do hospitals in the Kingdom need to go from here? First, trained personnel are needed in the form of infection-control practitioners and hospital epidemiologists. The Ministry of Health has recently instituted a national training program for infection-control practitioners and the future fruits of this program are eagerly awaited. In addition, the Ministry of Health's Field Epidemiology Training Program is a source of epidemiologists who might function in hospital settings. However, since hospital epidemiologists must enlist the cooperation of physicians and other health-care workers for many of their programs and activities, and since many infection-control issues also involve clinical infectious disease issues, we believe that clinical infectious diseases specialists with expertise in infection control would be most persuasive and effective in this role. In fact, in North American hospitals, most infection-control officers or hospital epidemiologists have a background in clinical infectious diseases.

The educational requirements of hospital epidemiologists and infection-control practitioners are also continuing to evolve. Classical infection-control training with its emphasis on outbreak investigation, microbiology, and disinfection, while of fundamental importance, is by itself no longer adequate to the task. In the cost-conscious and efficiency-oriented environment of modern hospitals, infection-control professionals will be called upon to exercise skills and provide leadership in such diverse areas as economic analysis, information technology, continuous quality improvement, opinion leadership, health-care worker behavior modification, risk management, teamwork, occupational and environmental health, and product and technology assessment.18-21 As an added bonus, while expertise in hospital epidemiology is entirely relevant to the prevention and control of hospital-acquired infections, it is also applicable to the prevention and reduction of non-infectious adverse events in health-care facilities. Since training in such skills is not readily available throughout the Kingdom, we believe that one or 2 centers of excellence in hospital epidemiology should be established to provide such training in a "real-world" context.

A second need for infection-control programs in
the Kingdom is infrastructure. Infection-control professionals are knowledge workers\(^2\) par excellence, and such workers must be equipped with the tools of the information age to be effective. These tools include office space and equipment, computers and software, clinical microbiology services including molecular typing capability, and sources of knowledge such as the Internet, professional journals and monographs, and training courses.

A third need of infection-control programs in the Kingdom is the formation of networks and professional societies which can provide certification in infection control, and to develop national quality standards and recommendations for the prevention and control of nosocomial infections. One example was the establishment of the Riyadh Infection Control Forum in 1997 with representation from many public hospitals throughout the city; this informal network provides opportunities for information exchange, education, practice guideline development, and collaborative research. It is hoped that in the future this network will evolve into a formal society that serves infection-control professionals throughout the Kingdom, whether employed in public or private health-care settings.

Some would disagree with our premise that classical infection control should be redefined with the broad scope implied by the term “hospital epidemiology” and some might argue that the market-based health-care reform which drives the evolution of infection-control programs in countries such as the USA is not relevant to GCC countries. We submit, to the contrary, that economic realities in GCC countries will force payers of health care to increasingly demand high quality, accountable, cost-effective medical care. The delivery of such care requires adaptable, sophisticated knowledge workers who can bring innovative, interdisciplinary approaches to bear upon deeply ingrained, systemic quality problems whether infectious or non-infectious in nature. Infection control professionals, with their tradition of measurement expertise, health-care worker education, interdisciplinary cooperation, and evidence-based consultation are poised to lead and demonstrate such interdisciplinary approaches in the cause of promoting high quality health care in the Kingdom. In 1999, hospital epidemiology is the right discipline in the right place at the right time.

**References**

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