



Letters to the Editor

Nosocomial infection in China: Management status and solutions



To the Editor:

In China, nosocomial infection is a prominent public health concern and is associated with an annual direct economic burden of \$1.5-\$2.3 billion (¥10-¥15 billion).¹ Advances in medical technology, extensive application of novel diagnostic and therapeutic techniques, and increased adoption of traumatic and invasive interventions have drastically altered the source, transmission route, and susceptible population of nosocomial infection. Emergence of multidrug-resistant bacteria has increased the proportion of refractory infections and the challenges of infection control.²⁻⁴ China has reinforced legislation to control nosocomial infection, drawing extensive support from society and medical community.⁵ This transition is reflected in the Chinese governmental response to the epidemic of Middle East respiratory syndrome.

In January 2013, 99 out of 120 patients receiving treatments for varicosity at Donggang Social Insurance Medical Clinic were infected with hepatitis C virus. Investigations indicated that this aggressive, multisource, and nosocomial hepatitis C virus infection resulted from repeated syringe use among different patients.⁶ In July 2011, 15 cataract patients undergoing surgical treatment at an Ophthalmic Hospital in the Raodu district, Linfen, suffered from endophthalmitis. Investigation showed that patients were infected with *Pseudomonas aeruginosa* endophthalmitis, which resulted from a shortage of surgical equipment and nonstandard disinfection of the surgical instruments.⁷ In March 2009, incidence of neonatal nosocomial infection was reported in a maternal and child care service center in the Ji County of Tianjin. In a neonatal ward, 5 of the total 6 newborns were dead. Investigations revealed a severe nosocomial infection resulting in deaths attributed to negligence by staff with poor infection prevention and control standards.⁸

The ongoing incidence of such serious events reflects poor standards of nosocomial infection management.

First, inadequate medical sources and imbalance in hospital development are increasingly serious challenges. Nearly 50 million of the total 1.3 billion people in China require hospitalization annually because of diseases or trauma. However, the Chinese health care system is riddled with long wait lists, shortages, and poor equipment because of funding constraints. The national medical system is not hierarchical in structure. As a result, most patients are traditionally segregated in large- and medium-sized hospitals, and hospital wards have become breeding grounds for microbial pathogens, with increased risk of infection.

Second, the under-reporting of nosocomial infection and the number of full-time staff experienced in infection control have been highlighted by health administrators during the performance

appraisal of health care institutions. In some hospitals, hospital leaders neglect poststandardization training and continuing education of the managers involved in controlling infection. Full-time professional staff members fail to undergo training in nosocomial infection and occupational health. In most hospitals, target and prospective monitoring are rare, which results in delayed discovery of high-risk areas.

Third, hospitals lack expertise and human resources skilled in infection management. Senior managers fail to consider qualified personnel. A few health care institutions simply fill available vacancies with retired nurses to ensure the number of required personnel in the department of nosocomial infection.

Forth, drug-resistant bacteria as a result of antibiotic abuse and unreasonable use are still important factors leading to nosocomial infection. Epidemiology studies suggest that the usage rate of antibiotics in hospitalized patients in some regions and hospitals is still >60%, reaching a rate of 74.67%,^{9,10} or even exceeding 90% in the neonatal ward. Inadequate catheterization and subsequent care along with poor concept of asepsis are other factors. Failure to comply with standard regulations of hand hygiene or even handwashing after examining patients with infections, lack of standardized or complete disinfection of surgical instruments, failure to implement surgical standards, failure to consider oxygen humidifiers as an important source of lower respiratory infection, and inappropriate measures of disinfection and isolation are some of the factors that artificially increase nosocomial infection.

A solution for improved nosocomial infection management in China has been proposed. The overall goal of the Chinese *Action Plan on Prevention and Control of Nosocomial Infection (2012-2015)*¹¹ includes enhanced prevention and control of nosocomial infection, insisting on "scientific prevention and control, standard management, highlighting the key points, and enforcing the implementation." The solutions are designed to improve the related technical criteria, upgrade and implement prevention and control measures, raise the professional skills and capacities, and increase the quality and safety of medicines.

The following additional steps are recommended to address the challenges of nosocomial infection:

- Governments at all levels must invest increasingly to improve hospital conditions. Public hospitals should be transformed into not-for-profit organizations in the national health care system.
- To disseminate the knowledge of nosocomial infection, the government and health workers should popularize and publicize new techniques and know-hows for infection prevention and control.
- To improve environmental hygiene, a national system of sanitation should be created to provide population access to adequate sanitation measures given the current unsanitary conditions in hospitals
- To emphasize appropriate hospital layout, a well-developed, scientifically planned hospital infrastructure is essential to ensure

sustainable care and development and nosocomial infection management. The government and the director of the hospital should emphasize the role of rational design of the wards and hospital layout and balance the costs and benefits in prevention of infection.

- The hospital information system (HIS) enables the control of infection by regulating all of the operational aspects, such as medical, administrative, financial, and legal issues and the corresponding services. The HIS is the essential technologic backup of the environment and infrastructure in a modernized hospital system. Information sources related to nosocomial infection may be enriched using the HIS and enhance the ability of health care professionals. The HIS facilitates organizations in nosocomial infection management, official documentation, and ensures data security.
- Evidence-based medicine (EBM) is intended to optimize decision-making by emphasizing the use of evidence from well-designed research studies. According to the theory of EBM, the strongest evidence based on meta-analyses, systematic reviews, and randomized controlled trials yields strong recommendations. Combined with the data of epidemiologic survey and analysis, EBM may provide useful strategies to improve nosocomial infection management. However, the inadequacy of clinical application of EBM in nosocomial infection management in China needs to be addressed.
- A no-pay policy by the government and medical insurance organizations must be implemented rigorously for items of nosocomial infection that are not covered by medical insurance. This policy will encourage awareness of prevention and control measures that reduce the incidence of hospital infection.

The quality of infection control is an important indicator balancing quality of management and medical administration. During the early period of the severe acute respiratory syndrome epidemic in 2002, the nosocomial infection rate of medical staff reportedly exceeded 10% because of inadequate disease knowledge. However, this rate does not represent all the data because there were several hospitals or wards with a zero infection rate among the medical staff during the outbreak. The discrepancy is associated with different attitudes toward infection. Overall, nosocomial infection management in China and worldwide has a long way to go.

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Serratia marcescens bacteremia cases: A pseudo-outbreak experience



To the Editor:

Serratia marcescens has become an important cause of nosocomial infections over the last 2 decades.¹ These bacteria can survive on inanimate surfaces and 2% chlorhexidine solutions for months^{2,3} or in medications, and they can subsequently cause outbreaks.^{4,5} Although *S marcescens* strains are usually reported to be a cause of outbreaks, especially in neonatal intensive care units (ICUs),^{6,7} there are also several reports about these strains causing pseudo-outbreaks.^{8,9} A pseudo-outbreak is defined as the recovery of the same organism from the cultures of patients who are not infected or colonized with the organism.⁹ Such pseudo-outbreaks increase laboratory costs and may lead to unnecessary treatment. Leaving the source of contamination undetermined may also eventually cause nosocomial infections.

During a 35-day period, 22 *S marcescens* strains were isolated from 20 patients (19 blood cultures, 2 tracheal aspirates, and 1 urine sample). After isolating the first 4 isolates from blood cultures, the laboratory informed Hospital Infection Control Committee. Throughout the environmental investigation, the number of isolates reached 22 before the source was determined. These patients were hospitalized in 2 different ICUs. Nearly all of the examined patients (19/20) had a history of admittance to the emergency department (ED) on the same day or 1 day before hospitalization in the ICUs, and some of the patients were transferred to the ED via a common ambulance delivery system. All of the invasive procedures performed on the patients were also examined. Most of the *S marcescens* instances were isolated from the active surveillance cultures that were taken when the patients entered the ICUs. In addition to these factors, the patients did not have any signs and symptoms compatible with clinical infection. This situation was therefore considered a