

Infection Control Practices at the Singapore General Hospital: From a Swedish Point of View

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Methicillin-resistant *Staphylococcus aureus* (MRSA) is the most common antibiotic resistant pathogen in many parts of the world, and is associated with significant in-hospital morbidity and mortality.¹ The majority of MRSA infections are hospital acquired, and the prevalence of such cases can be affected by infection control practices such as hand hygiene of the staff members, barrier nursing, isolation of infected patients, and active surveillance for asymptomatic MRSA carriers.² In Singapore, MRSA is a major problem, causing approximately 35% of all *S. aureus* infections in patients treated at public hospitals.³ Sweden is one of the few countries that still have low numbers of MRSA isolates (0.8% of *S. aureus* infections).⁴

We are 3 students beginning our last semester of medical school at Sahlgrenska University Hospital (SU) in Gothenburg, Sweden. In November and December 2007, we spent 5 weeks at Singapore General Hospital (SGH) making a research project about MRSA. During our stay, we observed the daily work at SGH in order to determine whether limitations of infection control practices contribute to the high MRSA prevalence in Singapore. In this article, we present our subjective analysis of the differences in infection control practices between SGH and SU.

Background

SU is the largest tertiary care hospital in northern Europe, with approximately 2300 beds. Our observations at SU are based on 5 years of medical studies. During the last 2½ years, we have been rotated in wards and emergency rooms of almost all specialties.

SGH is the largest tertiary care hospital in Singapore, with approximately 1500 beds. During our visit, we participated in several clinical rounds at the internal medicine wards. Our observations at SGH are based on these rounds and discussions with infectious diseases specialists and other doctors. We have also reviewed the infection control policies published on the intranet at SGH.

Observations

The key differences in infection control practices between SGH and SU are highlighted in Table 1 and elaborated.

Hand Hygiene

As with SU, it is explicit at SGH that it is the responsibility of every staff member to practice good hygiene at the hospital. This is clear from the numerous posters that have been placed strategically throughout the hospital. However, the doctors at SGH generally washed their hands less frequently than those at SU. In addition, the hand washing technique was insufficient; most doctors at SGH used a small amount of alcohol and rubbed it into the centre of their palms only.

Clothes and Accessories

At SGH we observed doctors generally wore private clothes in the hospital. Many kept their stethoscopes hanging on their shoulders. In some cases, doctors also carried a purse which was not removed before examining the patients. Rings and watches were commonly used while attending to patients. At SU doctors generally wear short-sleeved scrubs. Long-sleeved coats are sometimes used as well, but must be removed before examining a patient. The scrubs are left at the hospital for washing at the end of each day.

Hospital Environment

In the class C internal medicine wards at SGH, each room hosted up to 16 patients. They shared the same toilets. The spaces between the beds were small, and many of the patients had infected wounds, pneumonia, or other contagious diseases. This environment differed from that in the class A wards, where fewer patients shared the same room and the floor in some cases was covered with wall-to-wall carpets. At SU, all of the wards have the same standard. There are no carpets in the hospital, and no more than 4 patients share the same room.

MRSA Policy

At SGH, screening for MRSA was done only in selected wards, such as renal medicine and intensive care units. Although there is a policy for isolation and cohorting of MRSA-positive patients, especially those with respiratory or open wound positive cultures, there was no universal conformation and MRSA-infected patients were often

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Table 1. Differences in Observed Infection Control Practices at SGH and SU.

Practices	SGH	SU
Individual level (front end healthcare workers):		
• Frequency of alcohol handrub usage	Lower	Higher
• Hand washing technique, including amount of alcohol gel used	Inadequate	More often appropriate
• Clothing	Majority use personal clothing	Majority use hospital scrubs
• Personal effects	Majority wear rings/watches	Rings/watches infrequently worn
Hospital environment:		
• Bed-to-room ratios	Up to 17 beds per room/cubicle	Maximum of 4 beds per room
• Distance between beds	Minimum 0.9 m*	Minimum 1.5 m**
• Furnishings	Carpets in class A wards	No carpets throughout inpatient wards
Policy level:		
• MRSA control	Less strict MRSA control policy overall	Stricter MRSA control policy (“search and destroy”)

MRSA: methicillin-resistant *Staphylococcus aureus*; SGH: Singapore General Hospital; SU: Sahlgrenska University Hospital

*HICPAC (CDC) guidelines. **The Swedish Healthcare Hygiene Association, 2003.

treated in the common wards. SU practices a search and destroy strategy, which means all patients infected or colonised with MRSA are placed in isolation rooms until eradication is completed. Furthermore, patients recently hospitalised abroad are screened for MRSA and isolated until negative culture results are received, and staff members who have visited hospitals abroad are screened for MRSA before returning to work.

Discussion

Considering the high standard of healthcare provided at SGH, we were surprised to see that the standard of infection control practices was markedly lower at SGH compared to SU. In our opinion, the most basic, but also the most important rule, is to always use alcohol-based hand rub before and after coming into contact with a patient. To perform an effective hand wash, a large volume of alcohol is required and the fingertips have to be cleaned thoroughly.

Scrubs are hygienic working clothes with short sleeves and pockets provided for papers, stethoscope and other equipment. When the scrubs are worn only at the hospital, the risk to pass on infections from hospital to community or from community to hospital can be decreased. The change of clothes upon arriving at the hospital is also a good opportunity for the doctor to remove rings and watches. Finally, we believe that wearing scrubs can make it easier to use a large quantity of alcohol-based hand rubs; when private clothes are worn, the risk of spilling might be more considered.

The difference in environment between class A and class C wards at SGH is a result of Singapore’s healthcare policy and cannot be changed by the hospital staff. Nevertheless, when as many as 16 patients share the same room, extra care needs to be taken with regard to hygiene practices. It would be very unfortunate if low socio-economic status

became a risk factor for MRSA and other hospital-acquired infections. In class A wards, the most evident limitation in infection control practices are the wall-to-wall carpets, which are hard to disinfect properly and therefore not hygienic.

It is likely that the search and destroy strategy is one of the reasons why the MRSA prevalence has remained low in SU. However, we do not believe that such a strategy could be practiced at SGH as the prevalence of MRSA infections is too high and many of the staff members are likely to be carriers.

At SU, the clinical part of the undergraduate education begins with the infectious diseases course. Specific lectures about infection control practices are given before students participate in clinical work. When students come to the wards for the first time, the infectious diseases specialists will teach them hospital hygiene in practice. In addition, students perform experiments in the microbiology laboratory in order to understand the importance of hospital hygiene. In one of the experiments, 10 students form a line. After dipping the right hand into a can of cultured bacteria, the student who is first in line shakes hands with the second one. This student then shakes hands with the third, and the handshaking continues down the line. Finally, each student press the right palm on an Agar plate, which is incubated overnight. The following day the 10 plates are shown to the students, providing striking evidence that hands of staff members are a potent source for transmission of infections. In another experiment, students use cotton swabs to collect samples from objects such as door handles, pencils and wrist watches. The students are generally surprised to see that many objects in the environment are contaminated, in some cases with several species of bacteria. Although we have not witnessed in-depth the teaching curriculum at Singapore’s medical school, our conversations with and

observations of local medical students and doctors suggest that infection control practice and teaching does not form an important part of the local medical education compared to SU.

What Swedish medical students learn in school with regard to infection control is also reinforced by the culture of Swedish hospitals, where infection control policies are more rigidly enforced. We believe this continuum from education to working culture to be integral to the overall low prevalence of MRSA and other antibiotic-resistant nosocomial infections in Sweden.

Conclusions

We found many limitations of infection control practices at SGH compared to SU. Since our observations were made at 2 large public hospitals, they may reflect the general situation in Sweden and Singapore. If that is the case, we find it likely that these differences in infection control practices contribute to the higher number of MRSA infections in Singapore compared to Sweden.

Several intervention studies have been made, showing that changing the hygiene practices of the employees can decrease the number of hospital-acquired infections.^{5,6} Our suggestion to SGH would be to run a campaign intended mainly for doctors, with the goals of improving hand hygiene and making the doctors wear scrubs at the hospital. Apart from the advantages previously mentioned, the change to scrubs could lead to several positive effects. The new

appearance of the doctors would be obvious to everyone, and thereby promoting hospital hygiene as a serious matter. If the doctors improve their behaviour, they might act as role models for other staff members. To teach infection control practices in theory is not enough; it needs to become a natural part of the everyday job.

REFERENCES

1. Grundmann H, Aires-de-Sousa M, Boyse J, Tiemersma E. Emergence and resurgence of methicillin-resistant *Staphylococcus aureus* as a public-health threat. *Lancet* 2006;368:874-85.
2. Muto CA, Jernigan JA, Ostrowsky BE, Richet HM, Jarvis WR, Boyce JM, et al. SHEA guideline for preventing nosocomial transmission of multidrug-resistant strains of *Staphylococcus aureus* and enterococcus. *Infect Control Hosp Epidemiol* 2003;24:362-86.
3. Hsu LY, Tan TY, Jureen R, Koh TH, Krishnan P, Lin RTP, et al. Antimicrobial drug resistance in Singapore hospitals. *Emerg Infect Dis* 2007;13:1944-7.
4. Tiemersma EW, Bronzwaer SLAM, Lyytikäinen O, Degener JE, Schrijnemakers P, Bruinsma N, et al. Methicillin-resistant *Staphylococcus aureus* in Europe, 1999-2002. *Emerg Infect Dis* 2004;10:1627-34.
5. Boyce JM, Havill NL, Kohan C, Dumigan DG, Ligi CE. Do infection control measures work for methicillin-resistant *Staphylococcus aureus*? *Infect Control Hosp Epidemiol* 2004;25:395-401.
6. Pittet D, Hugonnet S, Harbarth S, Mourouga P, Sauvan V, Touveneau S, et al. Effectiveness of a hospital-wide programme to improve compliance with hand hygiene. *Lancet* 2000;356:1307-12.