

Practice Forum

# A Global Approach to Control Nosocomial Infections in a Large General Teaching Hospital

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## Abstract:

An increase in nosocomial infections with multi-resistant bacteria prompted the infection control team at Sint Jan General Hospital to adopt a new hospital-wide strategy involving implementation of the VigiGerme® infection prevention and control model.

Improvement in attitudes and perceptions of nosocomial infections has resulted in demonstrable reductions in the incidence of methicillin-resistant *Staphylococcus aureus* (MRSA) and quinolone-resistant *Enterobacter aerogenes* (QREA) infections.

## Introduction

Sint Jan General Hospital (SJGH) is a 900-bed teaching institution serving local, regional and national populations in acute and chronic care. It employs more than 2,500 healthcare workers (HCW) including 190 staff physicians and around 80 residents. Services provided include general surgery, internal medicine, paediatrics and gynaecology, in addition to an important emergency department, 6 intensive care units and a large oncology department, including a bone marrow transplant unit.

An increase of nosocomial infections, in particular with methicillin-resistant *Staphylococcus aureus* (MRSA), quinolone-resistant *Enterobacter aerogenes* (QREA) and meropenem-resistant *Pseudomonas aeruginosa* (MRPA), was observed in SJGH throughout 2002 and 2003 (Figure 1).

Since intense efforts of the IC team from 1995 to 2003 did not prevent a dramatic increase in the incidence of MRSA, QREA and MRPA colonisations and infections,

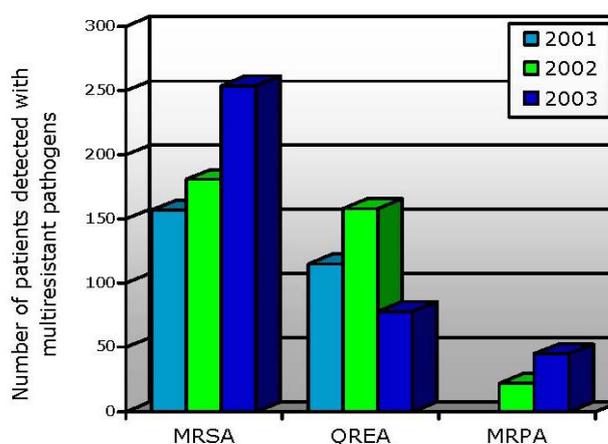


Figure 1: Evolution of incidence of nosocomial infections caused by multiresistant pathogens

the IC team developed a strategic plan, early in 2004, to decrease these nosocomial infections.



The new strategy had a 3-pronged approach (Table 1), of which this report addresses the first: improvement in IC practices.

Table 1. SJGH Strategy to reduce nosocomial infections with multi-resistant bacteria.

- Improvement in IC practices in order to prevent transmission of nosocomial organisms.
- Effective antibiotic policy in order to decrease selective pressure of emerging multi-resistant strains.
- Improved epidemiological monitoring to correctly identify all patients carrying multi-resistant bacterial strains.

### Challenges

The following objectives were identified:

- To design a clear methodology of preventive measures that should be effective in preventing the spread of multi-resistant nosocomial infections
- To obtain agreement and commitment from hospital management and for them to designate the project as top priority
- To implement these IC measures throughout the entire hospital
- To obtain a change in HCW behaviour in order to improve compliance with IC precautions
- To measure the effect through monitoring of objective quality indicators.

Early in 2004, the hospital management team agreed to the principles of the strategic plan developed by the IC team.

### Methods and results

*A new approach in IC preventive measures: the VigiGerme® concept*

A scientific collaboration was developed, with the IC department of the University Hospital of Geneva, Switzerland, to implement the patented VigiGerme® concept (developed by our Swiss colleagues) in our own institution.

The strength of the VigiGerme® concept is its simplicity; taking appropriate hospital-wide measures to protect patients and HCW against infection risks and the spread of multi-resistant bacteria. It aims to increase HCW's compliance with standard and additional IC precautions, through the provision of relevant information and training, in order to obtain a permanent change in attitude.

Following thorough preparation by a Task Force (composed of members of the hospital directorate and the IC team) and with help from different working groups throughout the hospital, the project was implemented in October 2004.

### Education

All HCWs with patient contact are educated about the principles of standard and additional precautions. Participants fill out an electronic questionnaire about their knowledge of infection control and risk perception at the beginning and end of each session. All attendees receive a VigiGerme® watch as a reminder to be compliant with the VigiGerme® principles. They are also provided with a Vigi-Pocket card and a Vigi-document to supplement their daily practices.

### Result

Over a two year period, 91% of HCWs and 80% of the medical staff attended the education sessions. Only 51% of the medical residents were trained because of the high turnover in this group (being a teaching hospital).

### Evaluating compliance with standard and additional precautions

An electronic registration system was developed to continuously measure the compliance of healthcare workers (doctors, nurses, and all staff involved in patient care) with standard precautions, in particular hand hygiene, and additional IC precautions. During the compliance measurement sessions, every manipulation performed by the HCW is electronically recorded in a PDA using software developed for this purpose. The data are then analysed to calculate compliance.

### Result

Since the project began, IC nurses have performed 140 hours of compliance measurement sessions, involving more than 130 HCWs and doctors during their visits to almost 1,000 patients. Compliance, especially with correct hand disinfection, improved continuously from the day of implementation (2006 versus 2004:  $P=0.0001$ ) (Figure 2).

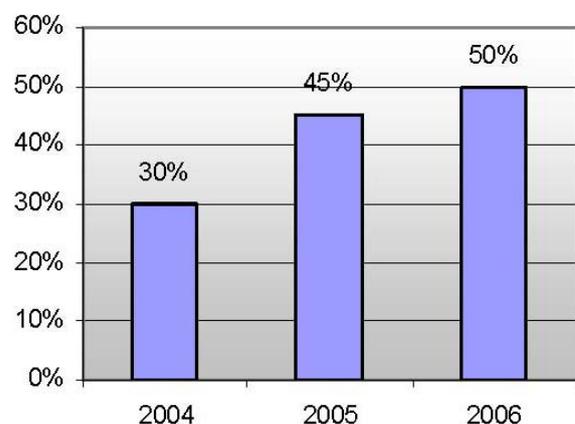


Figure 2: Evolution of compliance with correct hand hygiene



### Evaluating attitudes towards preventive IC measures

A confidential questionnaire, investigating basic knowledge, attitude and risk perception towards IC, was completed by a sample of 500 HCWs (response rate 100%) involved in patient care. Two years later, the same questionnaire was used in order to measure improvement (response rate 70%).

In addition, knowledge of infection control and risk perception was systematically assessed before and after training sessions.

#### Result

The questionnaires assessing basic knowledge of the HCW sample (2006 vs. 2004) indicated low baseline scores but significant improvements in knowledge of hospital hygiene and risk perception of nosocomial infections.

The introduction of the VigiGerme® education sessions also resulted in significant improvements in knowledge of hygienic measures and risk perception ( $P < 0.001$ ), demonstrated by 'before and after' measurements.

#### Feedback and motivation

Improvement in attitudes towards IC precautions requires a change in thinking. Suitable feedback is essential for this and is provided using posters, graphics and information on the hospital's 'intranet', explaining data and proposing alertness/change in behaviour. Every ward is presented with its own poster, indicating compliance results (from periodical analysis of the use of hand alcohol and personal safety equipments, such as gloves, gowns and masks).

#### Monitoring consumption of IC consumables

The use of hand alcohol and personal safety equipment (gloves, gowns and masks) is periodically analyzed as an indirect indicator of compliance with the new IC precautions.

#### Result

Periodical analysis of the use of hand alcohol, related to patient days, increased significantly (Figure 3). At the baseline, the use of gloves was already high but nevertheless increased by 16%. The use of masks increased by

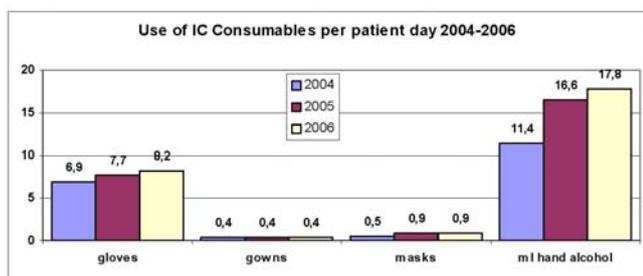


Figure 3: Evolution of hand hygiene consumables

66% and gowns were worn 26% more often than at baseline.

#### Monitoring the incidence of multi-resistant pathogens

The most important indicator for success is the incidence of nosocomial infections caused by MRSA, QREA and MRPA throughout the hospital. These indicators are monitored daily.

#### Result

As a result of the actions described above, a reduction in most nosocomial infections was observed.

In 2005, MRSA colonisations and infections were reduced significantly ( $P < 0.001$  for 2004 vs. 2003 and 2005 vs. 2003;  $P = 0.037$  for 2005 vs. 2004). The decreased incidence of MRSA-bacteraemia is particularly encouraging (Figure 4). In 2006, the proportion of MRSA-bacteraemias, compared to MSSA bacteraemias, decreased by 59% from 2003.

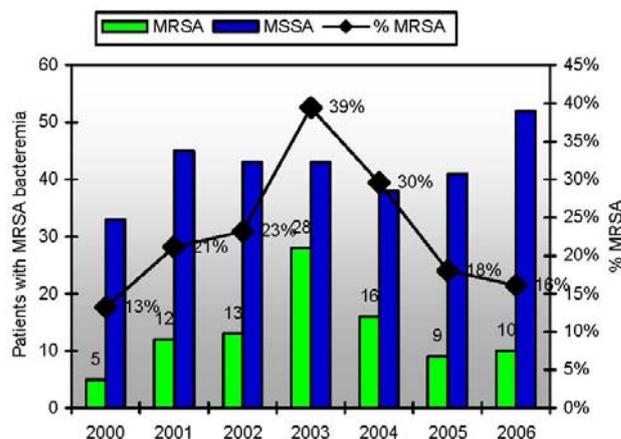


Figure 4: Numbers of yearly MRSA and MSSA bacteraemia and proportion of MRSA amongst S. aureus bacteraemia

Nosocomial QREA colonisations and infections decreased significantly in 2006 ( $P = 0,009$ ) compared to 2005 but not significantly compared to 2004 (Figure 5).

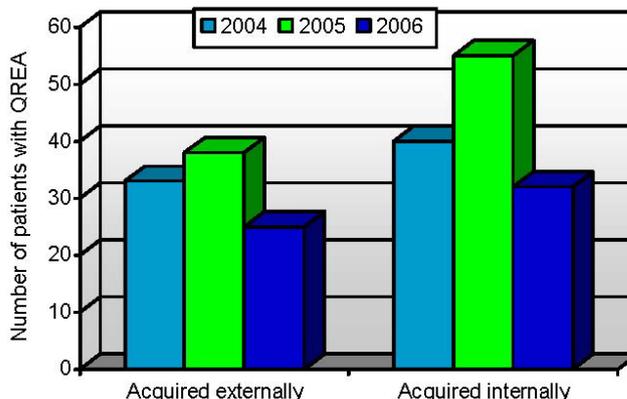


Figure 5: Evolution of QREA infection



Nosocomial MRPA colonisations and infections were not reduced. These results can probably be explained by the fact that MRSA is acquired exogenously by cross-infection, in contrast to MRPA where endogenous selection of mutants caused by antibiotic pressure has an important rule.

#### *Structural changes in the IC team*

Fundamental changes in the structure of the IC team, in addition to reorganisation and redefining of each member's tasks, proved essential. Hospital management approved the appointment of 2 additional IC nurses so that, at the start of the VigiGerme® project, the IC team consisted of 3 IC nurses and 0.75 IC physician (FTE).

The modus operandi of the IC team also changed: the basic philosophy was redirected from a short term procedure-driven attitude towards a professional project management and result-driven strategy. Its actions became part of a total quality system based on “plan – do – check – act” (PDCA-circle).

A new culture of teambuilding and task/responsibility allocation was implemented.

#### **Conclusion**

The implementation of a systematic, standardised program to improve perceptions and attitudes toward risks of nosocomial infections proved to be effective. Specific training, compliance measurement and information feedback appeared to be the major determinants for success.

These changes were quantified objectively and resulted in demonstrable improvements in the incidence of nosocomial infections. The present approach also demonstrates the need for an integrated yet fundamental approach to IC throughout the entire hospital organisation.



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