Infection Control in Hospital Accreditation

Paul Ananth Tambyah
Are Hospitals Dangerous???

- Hospitals were originally set up for the sick and dying among the poor
- The wealthy had physicians go to their homes to provide care
- Hospitals were widely and correctly perceived as dangerous places

Pittet et al http://www.hopisafe.ch
Many new technologies are introduced before protocols for safety and infection control are in place.
The chain is as strong as its weakest link.

In 1993 an epidemic of human immunodeficiency virus (HIV) infection occurred among 30 patients at 2 renal dialysis centers in Egypt. The centers, private center A (PCA) and university center A (UCA), were visited, HIV-infected patients were interviewed, seroconversion rates at UCA were calculated, and relatedness of HIV strains was determined by sequence analysis: 34 (62%) of 55 patients from UCA and 5 (42%) of 12 patients from PCA were HIV-infected. The HIV-infected PCA cases at UCA varied significantly with day and shift of dialysis session. Practices that resulted in sharing of syringes among patients were observed at both centers. The analyzed V3 loop sequences of the HIV strain of 12 outbreak patients were -96% related to each other. V3 loop sequences from each of 8 HIV-infected Egyptians unrelated to the 1993 epidemic were only 70%-80% related to those from outbreak strains. Dialysis patients may be at risk for HIV infection if infection control guidelines are not followed.

Table 1. Characteristics of dialysis centers visited in Egypt, June and November 1993.

<table>
<thead>
<tr>
<th>Center, city</th>
<th>Reused Dialyzers</th>
<th>Lines</th>
<th>Syringes</th>
<th>Reused Syringes</th>
<th>Shared Syringes</th>
<th>Trays</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private center A, Tanta</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>University center A, Tanta</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>Center B, Tanta</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>Transplant hospital center</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Received 16 February 1999; revised 21 July 1999; electronically published 15 December 1999.
Hospital accreditation has been defined as “A self-assessment and external peer assessment process used by health care organizations to accurately assess their level of performance in relation to established standards and to implement ways to continuously improve”. [1] Critically, accreditation is not just about standard-setting: there are analytical, counseling and self-improvement dimensions to the process. There are parallel issues around evidence-based medicine, quality assurance and medical ethics (see below), and the reduction of medical error is a key role of the accreditation process. Hospital accreditation is therefore one component in the maintenance of patient safety. However, there is limited and contested evidence supporting the effectiveness of accreditation programs. [2]

Accreditation schemes recognized as providers of national healthcare accreditation services include:
- Malaysian Society for Quality in Health, or MSQH - based in Malaysia [7]
- Joint Commission International, or JCI - based in the USA [8]
- Accreditation Canada, formerly known as Canadian Council on Health Services Accreditation, or CCHSA - based in Canada [5]
- Joint Committee for Healthcare Facilities Accreditation Program (JCAH) - based in the USA [6]
- Accreditation Commission for Health Care Inc. (ACHC) - based in the USA [9]
- The Joint Commission: "Exemplary Provider Programs" - based in the USA [10]
- Accreditation Canada
- Accreditation Canada, formerly known as Canadian Council on Health Services Accreditation, or CCHSA - based in Canada [5]
- The Compliance Team: "Exemplary Provider Programs" - based in the USA [10]
- Accreditation Canada
- Accreditation Canada, formerly known as Canadian Council on Health Services Accreditation, or CCHSA - based in Canada [5]
- Joint Commission International, or JCI - based in the USA [8]
- Accreditation Canada
- Accreditation Canada, formerly known as Canadian Council on Health Services Accreditation, or CCHSA - based in Canada [5]
- Joint Commission International, or JCI - based in the USA [8]
- Accreditation Canada
- Accreditation Canada, formerly known as Canadian Council on Health Services Accreditation, or CCHSA - based in Canada [5]
- Joint Commission International, or JCI - based in the USA [8]
- Accreditation Canada
- Accreditation Canada, formerly known as Canadian Council on Health Services Accreditation, or CCHSA - based in Canada [5]
- Joint Commission International, or JCI - based in the USA [8]

The different accreditation schemes vary in quality, size, intent and the skill of their marketing. They also vary considerably in terms of the cost incurred by hospitals and healthcare institutions. They have varying degrees of commitment to assessing medical ethical standards and clinical standards. They all have web sites.

International schemes

Some accreditation schemes also undertake international accreditation work outside of their base country. One of the large number of accreditation schemes in the USA, the Joint Commission (JCI) currently being the best known, has created Joint Commission International, or JCI. In recent years, DNV have been challenging JCI in the USA.

The former Trent Accreditation Scheme (TAS) from the UK was the first to accredit a hospital in Asia, in Hong Kong in 2000 [17], and QHA Trent Accreditation from the UK have continue to work in the same field. Since TAS started the process, others, such as JCI, have entered the market.
Accreditation for Hospitals

These JCI standards provide meaningful metrics to improve the quality and patient safety in all clinical and managerial functions of acute care hospitals, as well as embrace continuous performance improvement.

The standards are applicable for:

- Public and private hospitals
- Medical and psychiatric hospitals
- Related outpatient clinics

Learn more about accreditation for Hospitals

- View the Hospital Standards Only Version
- View a sample version of the Hospital Standards with MEs and Intent
- Hospital FAQs
- General Eligibility Requirements for a Hospital Survey
Infection Control
A Major Part of Accreditation
Reminders when JCI audits come round

Patient and Family Rights (PFR)

1. Support patients’ and families’ rights:
   - Values and beliefs;
   - Privacy, confidentiality;
   - Appropriate protection of patients and patients’ possessions;
   - Participation in care process (e.g. resuscitative services, pain management, end of life care & resolution of complaints)

2. Staff awareness to ensure informing patients about their rights

3. Obtain informed consent where appropriate e.g. surgery, anesthesia, use of blood and blood products, high-risk procedures

Patients have a right to a second opinion and we must facilitate this.
The Private Hospitals And Medical Clinics (PHMC) Act (Chapter 248)(1980) and its Regulations (1991) came into operation on 1 January 1994. No premises may be used as a private hospital, maternity, nursing home, medical (including dental clinic) or clinical laboratory (including x-ray laboratory) unless it is licensed under the PHMC Act by the Ministry of Health. This website provides you with e-service to apply for this licence.

**Quick Reference**

- Participation in Chronic Disease Management Programme
- List of Registered Rapid HIV Test Kits
- List of Approved Agencies to Endorse and/or Provide External Quality Assessment Services (EQAS)

**Important Notes:**

Any application for licence renewal shall be made to the Director of Medical Services **not later than 2 months** before the expiry date of the current licence, failing which the applicant shall pay a late payment fee which shall be 20% of the fee payable for the licence renewal or $100, whichever is higher.
On 12/04/2013, you requested for the version in force on 12/04/2013 incorporating all amendments published on or before 12/04/2013. The closest version currently available is that of 02/01/2011.

PRIVATE HOSPITALS AND MEDICAL CLINICS ACT
(CHARTER 248)
(Original Enactment: 27 of 1980)
REVISED EDITION 1999
(30th December 1999)

An Act to provide for the control, licensing and inspection of private hospitals, medical clinics, clinical laboratories and healthcare establishments, and for purposes connected therewith.

[1st January 1993]

Short title
Quality assurance committees

11.—(1) The licensee of a prescribed healthcare institution shall, in accordance with such prescribed requirements as may apply to that healthcare institution, establish one or more quality assurance committees to —

(a) monitor and evaluate the quality and appropriateness of the services provided and the practices and procedures carried out at the prescribed healthcare institution;

(b) identify and resolve problems that may have arisen in connection with any service provided or any practice or procedure carried out at the prescribed healthcare institution;

(c) make recommendations to improve the quality of the services provided and the practices and procedures carried out at the prescribed healthcare institution; and

(d) monitor the implementation of the recommendations made under paragraph (c).

(2) The licensee of a prescribed healthcare institution shall report to the Director the activities, findings and recommendations of each quality assurance committee of the prescribed healthcare institution as and when required by the Director.

(3) A person who is or was a member of a quality assurance committee is neither competent nor compellable —

(a) to produce before any court, tribunal, board or person any document in
Core components for infection prevention and control programmes

Report of the Second Meeting
Informal Network on Infection Prevention and Control in Health Care

Geneva, Switzerland
26–27 June 2008
1. Infection Control Infrastructure:

- Ministry of Health section dedicated to Infection Control
- Each healthcare facility should have a designated Infection Control Officer
- A multidisciplinary infection control team should be constituted in each healthcare facility and should be recognized for their work
- There should be integration between the local infection control team, infection control officer and national and international agencies.
SHEA – the Society for Healthcare Epidemiology in America
2. Local Infection Control Guidelines
APSIC has guidelines on Sterilization and Disinfection

THE ASEAN GUIDELINES
FOR DISINFECTION AND STERILIZATION OF INSTRUMENTS IN
HEALTH CARE FACILITIES
Steam sterilisation
3. Trained healthcare workers:

- There should be access to training either locally or through international or regional agencies for infection prevention and control staff.
- Healthcare worker protection needs to be a priority specifically addressing bloodborne pathogens and nosocomial respiratory infections including tuberculosis and respiratory viruses.
- A concerted effort should be undertaken to reduce injections and ensure that sharps are safely disposed.
ABOUT APSIC

The Asia Pacific Society of Infection Control (APSIC) was established in 1998 and is a multi-national, voluntary, organization dedicated to the advancement of infection control practice to reduce hospital associated infections, monitor and control emerging and re-emerging infectious diseases and improved patient outcomes.

APSIC aims to bring together multidisciplinary infection control professionals in the region to share their knowledge, experience, skills, and expertise.

Introduction

The Asia Pacific Society of Infection Control (APSIC) is a multi-national, voluntary, organization dedicated to the advancement of infection prevention and control.

APSIC objectives include:

- To build a network of infection control professionals working towards quality healthcare in the Asia Pacific region
- To facilitate exchange of information and data on infection prevention and control through workshops, seminars, congresses, and conferences
- To assist in formulating recommendations, guidelines or standards by consensus working groups
The International Federation of Infection Control

- http://www.theific.org/basic_concepts/index.htm
The Effect of an Education Program on the Incidence of Central Venous Catheter-Associated Bloodstream Infection in a Medical ICU*

Daud K. Warren, MD; Jeanne E. Zach, BSN; Jennie L. Magfield, MPH; Alexander Chen, MD; Donna Prentice, MSN; Victoria J. Fraser, MD; and Martin H. Kellef, MD, FCCP

Objective: To determine whether an education initiative could decrease the incidence of central venous catheter-attenuated bloodstream infection.

Design: Preintervention and postintervention observational study.

Setting: The 19-bed medical ICU in a 1,400-bed university-affiliated tertiary care hospital.

Patients: Between January 2000 and December 2003, all patients admitted to the ICU were included in the study.

Intervention: A mandatory education program was developed to improve the practice of infection control in the ICU. The program consisted of a series of educational sessions conducted at all patient care stations, which included lectures, role-playing, and self-assessment activities.

Measurements and main results: Seventy-four episodes of CVC-related bloodstream infections occurred in the 24-month period (1.3% per 1,000 catheter-days). The incidence of CVC-related bloodstream infections decreased significantly after the intervention (3.2% per 1,000 catheter-days) [p < 0.019]. The estimated cost savings realized by the institution was $133,600 and $4,573,000 (nominal and inflation-adjusted costs) for the 24 months following the intervention.

Conclusions: The study showed that the implementation of an education program can result in a significant reduction in CVC-related bloodstream infections, leading to substantial cost savings.

Key words: bloodstream infection, catheter-associated infection, education, hospital-acquired infection

Abbreviation: CDC = Centers for Disease Control and Prevention

Table 2—Hospital Policy for the Prevention of Catheter-Associated Bloodstream Infection Described in the Study Module and Preintervention and Postintervention

<table>
<thead>
<tr>
<th>Prevention Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wash hands thoroughly or use an alcohol-based hand sanitizer before and after patient contact.</td>
</tr>
<tr>
<td>Disinfect hands and wear sterile gloves before changing the dressing on the catheter.</td>
</tr>
<tr>
<td>Avoid leaving the catheter site exposed to the environment.</td>
</tr>
<tr>
<td>Change the dressing every 7 days or when it becomes damp, soiled, or saturated.</td>
</tr>
<tr>
<td>Use sterile technique to apply the dressing.</td>
</tr>
<tr>
<td>Avoid changing catheters over a guidewire.</td>
</tr>
<tr>
<td>Change the catheter if the tip of the catheter is found to be infected.</td>
</tr>
<tr>
<td>Change the dressing every 7 days or when it becomes damp, soiled, or saturated.</td>
</tr>
<tr>
<td>Follow hospital protocol for changing IV fluid administration sets and cleaning of injection ports with appropriate antiseptic.</td>
</tr>
</tbody>
</table>

Figure 1. Monthly rate per 1,000 catheter-days of catheter-associated bloodstream infection from January 2000 through December 2003. The mean catheter-associated bloodstream infection rate for the baseline period (2000 and 2001) and the intervention period following introduction of the intervention program (2002 and 2003) are shown (broken line).
Staff Qualifications and Education (SQE)

**Doctors:**

*Credentialed*
- Ensure you are privileged to perform department identified specific/core procedures.
- Maintain a case log for all specific/core procedures performed

*Ward Based Procedures*

You must be privileged to perform:
- Sedation
- Chest Tube Insertion
- Central Venous Catheter insertion and removal
- Thoracocentesis, LPs, abdominal taps, joint aspirations and BM aspirations

**Other Healthcare workers:**

- Ensure competency requirements are met with.
- Maintain documentation of competency.
- Complete reassessment of competency where necessary.

ALL HCWs with patient contact—You must have a valid BCLS cert

*If your name is not on the JCI website list of credentialled doctors for an invasive procedure, you are NOT allowed to perform this procedure without supervision from someone who is credentialled.*
An Improvised sharps box in East Asia
Hepatitis B Prevalence in Singapore

- Families of Hep B carriers (1980s): 38% (n=358)
- Multiple transfused patients (1984): 13% (70)
- Male prostitutes (1982): 14.9% (121)
- Dental surgeons (1985): 11.4% (114)
- NSmen (1984): 7.9% (1172)
- Female prostitutes (1982): 6.3% (239)
- HIV infected persons (1992): 8.5% (47)
- First time blood donors (1986): 3.9% (3342)
- Intellectually disabled children (1992): 2.7% (336)

Goh KT. Ann Acad Med Sing 1997;26:671
4. Surveillance:

- There should be some kind of surveillance system in place for hospital acquired infections. At its most rudimentary, this can be surveillance for in-hospital mortality or readmissions or returns to the operating room for infection.
- Surveillance should make use of what technology is available including mobile phone technology.
- Checklists should be implemented to reduce the incidence of surgical site infections.
There are international guidelines on surveillance of resistant bacteria.
Special Article

A Surgical Safety Checklist to Reduce Morbidity and Mortality in a Global Population


N Engl J Med
Volume 360(5):491-499
January 29, 2009
Study Overview

• In eight hospitals throughout the world, implementation of a 19-item surgical safety checklist was associated with improved outcomes.

• Use of the checklist may improve the safety of surgical procedures in hospitals in various economic circumstances.
## Elements of the Surgical Safety Checklist

### Table 1. Elements of the Surgical Safety Checklist.*

**Sign in**

Before induction of anesthesia, members of the team (at least the nurse and an anesthesia professional) orally confirm that:

- The patient has verified his or her identity, the surgical site and procedure, and consent
- The surgical site is marked or site marking is not applicable
- The pulse oximeter is on the patient and functioning
- All members of the team are aware of whether the patient has a known allergy
- The patient’s airway and risk of aspiration have been evaluated and appropriate equipment and assistance are available
- If there is a risk of blood loss of at least 500 ml (or 7 ml/kg of body weight, in children), appropriate access and fluids are available

**Time out**

Before skin incision, the entire team (nurses, surgeons, anesthesia professionals, and any others participating in the care of the patient) orally:

- Confirms that all team members have been introduced by name and role
- Confirms the patient's identity, surgical site, and procedure
- Reviews the anticipated critical events
  - Surgeon reviews critical and unexpected steps, operative duration, and anticipated blood loss
  - Anesthesia staff review concerns specific to the patient
  - Nursing staff review confirmation of sterility, equipment availability, and other concerns
- Confirms that prophylactic antibiotics have been administered ≤60 min before incision is made or that antibiotics are not indicated
- Confirms that all essential imaging results for the correct patient are displayed in the operating room

**Sign out**

Before the patient leaves the operating room:

- Nurse reviews items aloud with the team
  - Name of the procedure as recorded
  - That the needle, sponge, and instrument counts are complete (or not applicable)
  - That the specimen (if any) is correctly labeled, including with the patient's name
  - Whether there are any issues with equipment to be addressed
- The surgeon, nurse, and anesthesia professional review aloud the key concerns for the recovery and care of the patient

*The checklist is based on the first edition of the WHO Guidelines for Safe Surgery. For the complete checklist, see the Supplementary Appendix.*
### Table 2. Characteristics of Participating Hospitals.

<table>
<thead>
<tr>
<th>Site</th>
<th>Location</th>
<th>No. of Beds</th>
<th>No. of Operating Rooms</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prince Hamzah Hospital</td>
<td>Amman, Jordan</td>
<td>500</td>
<td>13</td>
<td>Public, urban</td>
</tr>
<tr>
<td>St. Stephen's Hospital</td>
<td>New Delhi, India</td>
<td>733</td>
<td>15</td>
<td>Charity, urban</td>
</tr>
<tr>
<td>University of Washington Medical Center</td>
<td>Seattle, Washington</td>
<td>410</td>
<td>24</td>
<td>Public, urban</td>
</tr>
<tr>
<td>St. Francis Designated District Hospital</td>
<td>Ifakara, Tanzania</td>
<td>371</td>
<td>3</td>
<td>District, rural</td>
</tr>
<tr>
<td>Philippine General Hospital</td>
<td>Manila, Philippines</td>
<td>1800</td>
<td>39</td>
<td>Public, urban</td>
</tr>
<tr>
<td>Toronto General Hospital</td>
<td>Toronto, Canada</td>
<td>744</td>
<td>19</td>
<td>Public, urban</td>
</tr>
<tr>
<td>St. Mary’s Hospital*</td>
<td>London, England</td>
<td>541</td>
<td>16</td>
<td>Public, urban</td>
</tr>
<tr>
<td>Auckland City Hospital</td>
<td>Auckland, New Zealand</td>
<td>710</td>
<td>31</td>
<td>Public, urban</td>
</tr>
</tbody>
</table>

* St. Mary’s Hospital has since been renamed St. Mary’s Hospital–Imperial College National Health Service Trust.
Table 5. Outcomes before and after Checklist Implementation, According to Site.*

<table>
<thead>
<tr>
<th>Site No.</th>
<th>No. of Patients Enrolled</th>
<th>Surgical-Site Infection</th>
<th>Unplanned Return to the Operating Room</th>
<th>Pneumonia</th>
<th>Death</th>
<th>Any Complication</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before</td>
<td>After</td>
<td>Before</td>
<td>After</td>
<td>Before</td>
<td>After</td>
</tr>
<tr>
<td>1</td>
<td>524</td>
<td>598</td>
<td>4.0</td>
<td>2.0</td>
<td>4.6</td>
<td>1.8</td>
</tr>
<tr>
<td>2</td>
<td>357</td>
<td>351</td>
<td>2.0</td>
<td>1.7</td>
<td>0.6</td>
<td>1.1</td>
</tr>
<tr>
<td>3</td>
<td>497</td>
<td>486</td>
<td>5.8</td>
<td>4.3</td>
<td>4.6</td>
<td>2.7</td>
</tr>
<tr>
<td>4</td>
<td>520</td>
<td>545</td>
<td>3.1</td>
<td>2.6</td>
<td>2.5</td>
<td>2.2</td>
</tr>
<tr>
<td>5</td>
<td>370</td>
<td>330</td>
<td>20.5</td>
<td>3.6</td>
<td>1.4</td>
<td>1.8</td>
</tr>
<tr>
<td>6</td>
<td>496</td>
<td>476</td>
<td>4.0</td>
<td>4.0</td>
<td>3.0</td>
<td>3.2</td>
</tr>
<tr>
<td>7</td>
<td>525</td>
<td>585</td>
<td>9.5</td>
<td>5.8</td>
<td>1.3</td>
<td>0.2</td>
</tr>
<tr>
<td>8</td>
<td>444</td>
<td>584</td>
<td>4.1</td>
<td>2.4</td>
<td>0.5</td>
<td>1.2</td>
</tr>
<tr>
<td>Total</td>
<td>3733</td>
<td>3955</td>
<td>6.2</td>
<td>3.4</td>
<td>2.4</td>
<td>1.8</td>
</tr>
</tbody>
</table>

* The most common complications occurring during the first 30 days of hospitalization after the operation are listed. Bold type indicates values that were significantly different (at P<0.05) before and after checklist implementation, on the basis of P values calculated by means of the chi-square test or Fisher’s exact test. P values are shown for the comparison of the total value after checklist implementation as compared with the total value before implementation.

Conclusion

• Implementation of the checklist was associated with concomitant reductions in the rates of death and complications among patients at least 16 years of age who were undergoing noncardiac surgery in a diverse group of hospitals
Device Associated Infection Prevention

• Closed urinary catheter drainage should be used with improvisation if necessary to ensure closed drainage.
• A system of reminders possibly nurse based should be used to reduce the utilization of devices including urinary catheters.
• Sedation protocols and education on aseptic technique are important for all facilities which mechanically ventilate patients.
• Oral rehydration should be encouraged as much as possible to reduce the use of vascular access devices including peripheral intravenous catheters.
• Bundles should be considered in attempts to reduce the incidence of central line associate bloodstream infection
Device-associated infection rates, device use, length of stay, and ventilator-associated infections among various subgroups of critically ill patients: International Nosocomial Control Consortium findings

Bijie Hu MD, Lili Tao MD, Victor D. Rosenthal MD, MSc, CIC,C,∗ Yao Suo MD, Xiandong Gao MD, Ruisheng Li MD, Danxia Su, Chunxia Hao MD, Wei Pan MD, Catherine L. Saunders PhD, M

*Department of Respiratory Medicine, Zhongshan Hospital, Fudan University, Shanghai, China
**Department of Respiratory Medicine, Huashan Hospital, Fudan University, Shanghai, China
†International Nosocomial Infection Control Consortium (INICC), Buenos Aires, Argentina
‡Department of Infection Control, Changhai Hospital, Shanghai, China
§Department of Infection Control, First Hospital, Shantou Medical University, Taiyuan, China

Table 2
Stratified mortality, LOS, and device-associated HCAI rate

<table>
<thead>
<tr>
<th>Subgroup</th>
<th>Mortality, n (%)</th>
<th>ICU-days, median (range)</th>
<th>CLABSI (laboratory-confirmed), n (%)</th>
<th>CLABSI rate/1,000 CL-days (95% CI)</th>
<th>VAP rate/1,000 MV-days (95% CI)</th>
<th>CALTI rate/1,000 UC-days (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>2,931</td>
<td>142 (54)</td>
<td>3 (1-231)</td>
<td>95 (64)</td>
<td>7,76 (4,41-15,5)</td>
<td>15 (5,9-35)</td>
</tr>
<tr>
<td>IAC Score</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;5</td>
<td>1,199</td>
<td>112 (42)</td>
<td>2 (1)</td>
<td>51 (33)</td>
<td>6,94 (3,35-15,2)</td>
<td>19 (6,5-54)</td>
</tr>
<tr>
<td>5-10</td>
<td>1,063</td>
<td>143 (52)</td>
<td>2 (1)</td>
<td>103 (64)</td>
<td>9,07 (4,61-19,4)</td>
<td>19 (5,9-27)</td>
</tr>
<tr>
<td>&gt;10</td>
<td>602</td>
<td>133 (46)</td>
<td>2 (1)</td>
<td>95 (64)</td>
<td>7,78 (4,41-15,5)</td>
<td>17 (5,9-31)</td>
</tr>
<tr>
<td>ICU</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospital 1, Medical Cardiac</td>
<td>37</td>
<td>13 (4)</td>
<td>3 (1-10)</td>
<td>53 (33)</td>
<td>7,57 (4,32-16,8)</td>
<td>16 (5,9-32)</td>
</tr>
<tr>
<td>Hospital 2, Medical-Surgical</td>
<td>294</td>
<td>11 (3)</td>
<td>4 (1-14)</td>
<td>75 (47)</td>
<td>9,65 (5,06-17,3)</td>
<td>21 (5,9-32)</td>
</tr>
<tr>
<td>Hospital 2, Medical-Surgical</td>
<td>277</td>
<td>13 (3)</td>
<td>4 (1-10)</td>
<td>75 (47)</td>
<td>9,65 (5,06-17,3)</td>
<td>21 (5,9-32)</td>
</tr>
<tr>
<td>Hospital 3, Neurology</td>
<td>113</td>
<td>13 (4)</td>
<td>4 (1-10)</td>
<td>75 (47)</td>
<td>9,65 (5,06-17,3)</td>
<td>21 (5,9-32)</td>
</tr>
</tbody>
</table>
## Open vs Closed Systems

<table>
<thead>
<tr>
<th>Microorganism</th>
<th>Open system</th>
<th>Closed system</th>
<th>(P) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gram-positive bacteria, n (%)</td>
<td>16 (59%)</td>
<td>4 (80%)</td>
<td>.08</td>
</tr>
<tr>
<td><em>Staphylococcus aureus</em></td>
<td>10</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Coagulase-negative staphylococci</td>
<td>5</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Enterococci</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Gram-negative bacteria, n (%)</td>
<td>10 (37%)</td>
<td>1 (20%)</td>
<td>.04</td>
</tr>
<tr>
<td><em>Escherichia coli</em></td>
<td>3</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><em>Enterobacter</em></td>
<td>2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><em>Klebsiella</em></td>
<td>3</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><em>Proteus</em></td>
<td>2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><em>Acinetobacter</em></td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Yeasts (Candida), n (%)</td>
<td>1 (11%)</td>
<td>0 (0%)</td>
<td>.40</td>
</tr>
<tr>
<td>Culture-documented BSIs, n (%)</td>
<td>27 (100%)</td>
<td>5 (100%)</td>
<td></td>
</tr>
</tbody>
</table>
5. Microbiology Laboratory

• All healthcare facilities should have access to a microbiology laboratory

• The laboratory should make use of software such as WHONET to generate local antibiograms

• This surveillance data should preferably be aggregated at a national level to monitor the emergence of novel and resistant pathogens

• External quality assurance whether national or international should be considered for all microbiology laboratories

Yoichi Hirakataa,b,*, Junichi Matsudaa, Yoshitsugu Miyazakib, Shimeru Kamihiraa, Sayoko Kawakamic, Yukihisa Miyazawac, Yasuo Onod, Nobuhiko Nakazakiel, Yasuyoshi Hiratael, Matsuhisa Inouef, John D. Turnidgel, Jan M. Bellg, Ronald N. Jonesh, Shigeru Kohnobo

**Big geographical differences in Asia Pacific**
ESBL epidemiology

Table 2
Percentage of organisms expressing an ESBL phenotype in the SENTRY Antimicrobial Surveillance Program in the Asia-Pacific region, 1998–2002

<table>
<thead>
<tr>
<th>Organism, country, or region (number of isolates tested)</th>
<th>No. (%) of isolates with presumptive ESBL phenotype</th>
<th>No. (%) of isolates with confirmed ESBL phenotype</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All substrates\textsuperscript{a}</td>
<td>Ceftazidime\textsuperscript{b}</td>
</tr>
<tr>
<td>\textit{K. pneumoniae}</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australia (328)</td>
<td>15 (4.6)</td>
<td>15 (100)</td>
</tr>
<tr>
<td>China (75)</td>
<td>28 (37.3)</td>
<td>26 (92.9)</td>
</tr>
<tr>
<td>Hong Kong (224)</td>
<td>37 (16.5)</td>
<td>34 (91.9)</td>
</tr>
<tr>
<td>Japan (210)</td>
<td>23 (11.0)</td>
<td>19 (82.6)</td>
</tr>
<tr>
<td>Philippines (319)</td>
<td>89 (27.9)</td>
<td>89 (100)</td>
</tr>
<tr>
<td>Singapore (225)</td>
<td>82 (36.4)</td>
<td>80 (97.6)</td>
</tr>
<tr>
<td>South Africa (135)</td>
<td>40 (29.6)</td>
<td>38 (95.0)</td>
</tr>
<tr>
<td>Taiwan (222)</td>
<td>36 (16.2)</td>
<td>31 (86.1)</td>
</tr>
<tr>
<td>Overall (1738)</td>
<td>350 (20.1)</td>
<td>332 (94.9)</td>
</tr>
<tr>
<td>\textit{E. coli}</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australia (1311)</td>
<td>21 (1.6)</td>
<td>17 (81.0)</td>
</tr>
<tr>
<td>China (163)</td>
<td>51 (31.3)</td>
<td>42 (82.4)</td>
</tr>
<tr>
<td>Hong Kong (608)</td>
<td>106 (17.4)</td>
<td>75 (70.8)</td>
</tr>
<tr>
<td>Japan (337)</td>
<td>22 (6.5)</td>
<td>17 (77.3)</td>
</tr>
<tr>
<td>Philippines (338)</td>
<td>44 (13.0)</td>
<td>42 (95.5)</td>
</tr>
<tr>
<td>Singapore (318)</td>
<td>39 (12.3)</td>
<td>32 (82.1)</td>
</tr>
<tr>
<td>South Africa (261)</td>
<td>5 (1.9)</td>
<td>4 (80.0)</td>
</tr>
<tr>
<td>Taiwan (319)</td>
<td>3 (1.1)</td>
<td>3 (100)</td>
</tr>
<tr>
<td>Overall (3655)</td>
<td>321 (9.3)</td>
<td>290 (90.5)</td>
</tr>
</tbody>
</table>

High rates in SG, CN, SA
6. Environment:

- Healthcare facilities should ensure clean and safe water for clinical use.
- Adequate ventilation should be provided for healthcare facilities using natural cross ventilation if appropriate.
- Locally produced alcohol based hand rubs can be used effectively even in settings without running water.
A WHO Multimodal Implementation Strategy to improve hand hygiene

- An evidence based approach
- Five core components
- Additional components can be incorporated

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>System change</td>
<td>Training and education</td>
</tr>
<tr>
<td></td>
<td>Measurement (observation and feedback)</td>
</tr>
<tr>
<td></td>
<td>Reminders in the workplace</td>
</tr>
<tr>
<td></td>
<td>Establishment of a safety climate</td>
</tr>
</tbody>
</table>
124 countries and territories which have committed to WHO hand hygiene campaign

Source: http://www.who.int/gpsc/statements/en/index.html
7. Monitoring and Evaluation of Programs:

- Infection Prevention and Control Programs should be monitored on a regular basis both internally and externally.
International Accreditation has a focus on infection control.
8. **Links with public health and other services:**

- Procedures have to be in place to ensure adequate linkages with ministries of health, agriculture and other appropriate agencies in preparation for pandemic or epidemic infections.
- Adequate waste management procedures need to be in place including incineration of medical waste.
- Sterilisation and disinfection needs to be adequately monitored.
International links are critical for Emerging Infectious Diseases

SARS showed the importance of global networks.

http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5212a1.htm
SARS controlled in China and globally

22 Universities and 2610 Schools Closed (Apr 24)
Fever Checks at Airports Begin (Apr 22)
Quarantine of Close Contacts (Apr 21)
Outbreak Announced Publicly by Government (Apr 20)
HCW Training in PPE and Management of Patients With SARS (Apr 18)
Joint SARS Group Formed, Fever Clinics Open (Apr 17)
SARS Made Reportable (Apr 10)
Contact Tracing Begins (Apr 9)

Libraries, Bars, Theaters Closed (Apr 26)
Start to Group Patients With SARS in Designated Wards (Apr 27)
New 1000-Bed SARS Hospital Opens (May 1)
MOH Infection Control Guidelines (May 4)
66 Designated Fever Clinics (May 6)
All Patients With SARS in Designated Hospitals (May 8)

SARS indicates severe acute respiratory syndrome; HCW, health care worker; PPE, personal protective equipment; MOH, China Ministry of Health.

©2003 American Medical Association. All rights reserved.
So...is Influenza Airborne?

Results of observational studies

<table>
<thead>
<tr>
<th>Number</th>
<th>Setting</th>
<th>Population</th>
<th>Case identification</th>
<th>Number (% laboratory tested)</th>
</tr>
</thead>
<tbody>
<tr>
<td>62</td>
<td>Hospital</td>
<td>Medical patients and staff</td>
<td>Viral isolation; serology</td>
<td>55 (89%)</td>
</tr>
<tr>
<td>1116</td>
<td>Hospital housing</td>
<td>Medical patients and staff</td>
<td>Clinical; serology</td>
<td>1116 (100%)</td>
</tr>
<tr>
<td>53</td>
<td>Aircraft</td>
<td>Healthy adults</td>
<td>Clinical viral isolation; serology</td>
<td>Unclear</td>
</tr>
<tr>
<td>110</td>
<td>Naval base aircraft</td>
<td>Healthy adults</td>
<td>Clinical viral isolation; serology</td>
<td>105 (95%)</td>
</tr>
<tr>
<td>39</td>
<td>LTCF</td>
<td>Elderly residents</td>
<td>Clinical viral isolation; serology</td>
<td>37 (95%)</td>
</tr>
<tr>
<td>690</td>
<td>LTCF</td>
<td>Elderly residents</td>
<td>Viral isolation</td>
<td>241 (35%)</td>
</tr>
<tr>
<td>15</td>
<td>NICU</td>
<td>Critical care neonates</td>
<td>Clinical viral isolation; antigen detection</td>
<td>4 (27%)</td>
</tr>
<tr>
<td>54</td>
<td>NICU</td>
<td>Critical care neonates</td>
<td>Clinical; antigen detection</td>
<td>54 (100%)</td>
</tr>
<tr>
<td>59</td>
<td>Correctional facility</td>
<td>Healthy adults</td>
<td>Clinical viral isolation; antigen detection</td>
<td>21 (35%)</td>
</tr>
</tbody>
</table>

LTCF=Long-term care facility; NICU=neonatal intensive care unit.

Table 5: Summary of influenza epidemiological studies
There was no difference!
November 5, 2009

President Barack Obama
The White House
1600 Pennsylvania Avenue, NW
Washington D.C. 20500

Dear President Obama:

During this state of national emergency due to the 2009 H1N1 influenza pandemic, it is imperative that healthcare professionals and facilities receive clear, practical, and evidence-based federal guidance to ensure patient and healthcare worker safety. With this in mind, the SHEA, IDSA, and APIC express significant concern with the federal guidance, developed by your Administration in cooperation with several agencies and recently issued by the Centers for Disease Control and Prevention (CDC), and Occupational Safety and Health Administration (OSHA) requiring the use of personal protective equipment (PPE) by healthcare workers in suspected or confirmed cases of H1N1 influenza.

In October, two separate studies were presented that reinforce our viewpoint on the use of surgical masks versus respirators. In the first study (Loeb, et al., JAMA, 2009), no significant difference in influenza acquisition was observed in nurses in Toronto assigned to wear N95 respirators or surgical masks. Last week, at the IDSA Annual Meeting, investigators from Australia presented a re-evaluation of a study performed in China (Macintyre, et al.). Again, no significant difference was observed between healthcare workers wearing surgical masks or N95 respirators. Of note, the MacIntyre study was initially reported to show a significant benefit associated with use of the N95 respirators and this preliminary report was both presented to the Institute of Medicine’s Committee on Respiratory Protection for Healthcare Workers in the

Thank you in advance for your careful consideration and expeditious implementation of these recommendations. Our leaders stand ready to continue to work with you in responding to the 2009 H1N1 pandemic. Should you have any questions, please contact Jennifer Bright, SHEA’s executive director at 703-684-1007, Robert Gudis, IDSA’s vice president for public policy and government relations at 703-399-0202 or Lisa Tomlinson, Director of Government Affairs for APIC at 202-454-2606

Respectfully,

Mark E. Rupp, MD  
SHEA President

Richard Whitley, MD, FIDSA  
IDSA President

Christine Nutty, RN, MSN, CIC  
APIC President

CC: Kathleen Sebelius, MPA, Secretary, DHHS  
Tom Frieden, MD, Director, CDC  
Francis Collins, MD, Director, NIH  
Anthony Fauci, MD, Director, NIAID  
Hilda Solis, Secretary, DOL  
Jordan Barab, Acting Assistant Secretary, OSHA  
Rosamary Sokas, MD, MPH Director, Office of Occupational Medicine, OSHA  
Melody Barnes, JD, Director, Domestic Policy Council, The White House
Staff used N95s vs SARS
PAPRs were available
In Singapore
Even bank robbers used N95 masks
It was expensive.
WHO guidelines may help resolve the issue

Infection prevention and control of epidemic- and pandemic-prone acute respiratory diseases in healthcare
**Table 1. Infection control precautions for HCWs and caregivers providing care for patients with ARDs according to a sample of pathogens**

<table>
<thead>
<tr>
<th>Precaution</th>
<th>No pathogen identified</th>
<th>Bacterial ARD(^a)</th>
<th>Parainfluenza RSV &amp; adenovirus</th>
<th>Influenza virus with sustained human-to-human transmission (e.g. seasonal influenza, pandemic influenza)</th>
<th>New influenza virus with no sustained human-to-human transmission (e.g. avian influenza)</th>
<th>SARS</th>
<th>Novel organisms causing ARD(^a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand hygiene(^c)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Gloves</td>
<td>Risk assessment(^b)</td>
<td>Risk assessment(^b)</td>
<td>Yes</td>
<td>Risk assessment(^d)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Gown(^a)</td>
<td>Risk assessment(^f)</td>
<td>Risk assessment(^f)</td>
<td>Yes</td>
<td>Risk assessment(^d)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Eye protection</td>
<td>Risk assessment(^f)</td>
<td>Risk assessment(^f)</td>
<td>Risk assessment(^f)</td>
<td>Risk assessment(^f)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Medical mask on HCWs and caregivers</td>
<td>Yes</td>
<td>Risk assessment(^f)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Not routinely(^a)</td>
</tr>
<tr>
<td>Particulate respirator on HCWs and caregivers for room entry</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Not routinely(^b)</td>
<td>Not routinely(^b)</td>
<td>Yes</td>
</tr>
<tr>
<td>within 1m of patient</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Not routinely(^b)</td>
<td>Not routinely(^b)</td>
<td>Yes</td>
</tr>
<tr>
<td>for aerosol-generating procedures(^c)</td>
<td>Yes</td>
<td>Not routinely(^b)</td>
<td>Not routinely(^b)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Medical mask on patient when outside isolation areas(^b)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes(^\dagger)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Single room</td>
<td>Yes, if available(^h)</td>
<td>No</td>
<td>Yes, if available(^h)</td>
<td>Yes, if available(^h)</td>
<td>Yes</td>
<td>Yes</td>
<td>Not routinely(^b)</td>
</tr>
<tr>
<td>Airborne Precaution room(^b)</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Not routinely(^b)</td>
<td>Yes</td>
<td>Yes</td>
<td>Not routinely(^b)</td>
</tr>
<tr>
<td>Summary of infection control precautions for routine patient care, excluding aerosol-generating procedures(^b)</td>
<td>Standard plus Droplet Precautions</td>
<td>Standard Precautions</td>
<td>Standard plus Droplet plus Contact Precautions</td>
<td>Standard plus Droplet plus Contact Precautions</td>
<td>Standard plus Droplet plus Contact Precautions</td>
<td>Standard plus Airborne Precautions</td>
<td>Standard plus Airborne Precautions</td>
</tr>
</tbody>
</table>

\(^a\) ARD without risk factor for ARD of potential concern (e.g. influenza-like illness without risk factor for ARD of potential concern)

\(^b\) Risk assessment

\(^c\) Single room

\(^d\) Not routinely

\(^e\) Single room

\(^f\) Risk assessment

\(^g\) Not routinely

\(^h\) Single room

\(^i\) Single room

\(^j\) Single room

\(^k\) Single room
Infection Control in a nutshell

Everything I needed to know about infection control, I learned in kindergarten

– Julie Gerberding, former Director US CDC
Always clean your hands
Cover your mouth when you cough
Don’t go to work when you are sick
Why do infection control??

- It saves money
- It saves lives
- It is the right thing to do......(not just when the auditors are around)

Paul Ananth Tambyah