Disinfection in Hospital
Hygiene in Asia

Dr Moi Lin Ling
Director, Infection Prevention & Control
Singapore General Hospital
Disinfection

• Skin disinfection
  • Hand hygiene
  • MDRO prevention (antiseptic bath/wipes)

• Equipment disinfection
  • High level disinfection

• Environment disinfection
WHO Multimodal Hand Hygiene Improvement Strategy

- System change
- Training and education
- Evaluation and performance feedback
- Reminders in the workplace, and
- An institutional safety climate
Hand hygiene

- Product
  - Commercial
  - Local production
  - Formulae – varied

- Process
  - Strategy implementation including audits/monitoring
Asia Pacific Society of Infection Control (APSIC)

• APSIC was established in 1998
  • 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

• Aims to bring together multidisciplinary infection control professionals in the region to share their knowledge, experience, skills, and quality improvement and research findings by facilitating the exchange of information through training courses, seminars, congresses and conferences in the Asia Pacific region

• Establishes collaborative partnerships in the region to facilitate and encourage quality improvement initiatives and infection control research to promote cost effective evidence based practices throughout the Asia Pacific region
APSIC launched the Asia Pacific Hand Hygiene Excellence Award in 2009

- Objective - to identify and recognize hospitals which can demonstrate:
  - Embracing the 5 elements of the WHO Multi-modal Hand Hygiene Improvement Strategy:
    - System Change
    - Training / Education
    - Evaluation and Feedback
    - Reminders in the workplace
    - Institutional safety climate
  - High utilization of the tools in the “Guide to the Implementation of the WHO Multi-modal Hand Hygiene Improvement Strategy”.
  - Success of implementation initiatives through objective evaluation against the performance indicators as per the WHO Guidelines.
  - Creativity and innovation in the local implementation of the multi-modal strategy.
  - Taking a leadership role to help and support other institutions in their implementation of hand hygiene campaigns
Expert Review Panel

- **Professor Didier Pittet (Chair)**
  - Director, Infection Control Program, Hôpitaux Universitaires de Genève
  - WHO Collaborating Centre on Patient Safety, Geneva, Switzerland

- **Professor Dr Wing-Hong Seto**
  - Director, WHO Collaborating Centre for Infection Control, Hospital Authority, Hong Kong
  - Clinical Professor at the Department of Community Medicine, School of Public Health, University of Hong Kong

- **Dr Moi-Lin Ling**
  - Director, Infection Prevention & Control Department, Singapore General Hospital, Singapore
  - President, Asia Pacific Society of Infection Control

- **Professor Lindsay Grayson**
  - Director, Infectious Diseases & Microbiology, Austin Health, Victoria, Australia

- **Ms Patricia Ching**
  - Senior Infection Control Nurse Adviser at Hong Kong Baptist Hospital
  - Nurse Consultant for Accreditation at University of Hong Kong Shenzhen Hospital, China

- **Ms Glenys Harrington**
  - Infection Control Consultant, Infection Control Consultancy (ICC), Melbourne, Australia

- **Ms. Claire Kilpatrick**
  - International Expert on Infection Prevention and Control WHO consultant
  - Infection Prevention Society Board Member
  - Former Program Manager “Clean Care is Safer Care” of the WHO Patient Safety Programme, Geneva, Switzerland
A candidate for the HHEA needs:

- HH0: High-level HH Improvement Strategy
- Proven HAI reduction
- >3 years running
- Strong leadership

4 Regions
- Asia Pacific
- Europe
- Latin America
- Middle East & North Africa

- Finalists receive date for expert visit on Monday, 23rd
- Expert visits finalist hospitals to assess hand hygiene programme
- Expert Panel of the region assesses the submission form and defines finalists
- Expert Panel of the region discusses results of the visit and evaluates winners
- Complete self-assessment submission form
- Winners present their programme at the Infection Control Congress of the region and are rewarded

Apply for the Hand Hygiene Excellence Award
www.hhea.info
Site visits

- 2 auditors at site visit assess implementation of programs using WHO tool
- System Change
- Training / Education
- Evaluation and Feedback
- Reminders in the workplace
- Institutional safety climate
1. Add up your points.

<table>
<thead>
<tr>
<th>Score</th>
<th>Component</th>
<th>Subtotal</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>System Change</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Education and Training</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Evaluation and Feedback</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Reminders in the Workplace</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Institutional Safety Climate</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
</tr>
</tbody>
</table>

2. Determine the assigned ‘Hand Hygiene Level’ for your facility.

<table>
<thead>
<tr>
<th>Total Score (range)</th>
<th>Hand Hygiene Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 125</td>
<td>Inadequate</td>
</tr>
<tr>
<td>126 - 250</td>
<td>Basic</td>
</tr>
<tr>
<td>251 - 375</td>
<td>Intermediate (or Consolidation)</td>
</tr>
<tr>
<td>376 - 500</td>
<td>Advanced (or Embedding)</td>
</tr>
</tbody>
</table>

3. If your facility has reached the Advanced level, then complete the Leadership section overleaf.

(otherwise go to Step 4).

4. Review the areas identified by this evaluation as requiring improvement in your facility and develop an action plan to address them (starting with the relevant WHO improvement tools listed). Keep a copy of this assessment to compare with repeated uses in the future.
<table>
<thead>
<tr>
<th>YEAR</th>
<th>No of Applicants</th>
<th>No of Countries</th>
<th>Winners</th>
<th>Country</th>
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<tbody>
<tr>
<td>2010</td>
<td>78</td>
<td>6</td>
<td>Artemis Health Institute</td>
<td>India</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Monash Medical Centre</td>
<td>Australia</td>
</tr>
<tr>
<td>2011</td>
<td>18</td>
<td>4</td>
<td>Dr. Sardjito General Hospital</td>
<td>Indonesia</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>National Taiwan University Hospital</td>
<td>Taiwan</td>
</tr>
<tr>
<td>2012</td>
<td>28</td>
<td>7</td>
<td>Bethseda Hospital</td>
<td>Australia</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>West China Hospital of Sichuan University</td>
<td>China</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cho Ray Hospital</td>
<td>Vietnam</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Hong Kong Baptist Hospital</td>
<td>China</td>
</tr>
<tr>
<td>2013</td>
<td>23</td>
<td>6</td>
<td>Siloam Hospitals Surabaya</td>
<td>Indonesia</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Assunta Hospital</td>
<td>Malaysia</td>
</tr>
<tr>
<td>2014</td>
<td>10</td>
<td>6</td>
<td>Prince of Wales Hospital, Hong Kong</td>
<td>China</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Hung Vuong Hospital</td>
<td>Vietnam</td>
</tr>
<tr>
<td>2015</td>
<td>11</td>
<td>6</td>
<td>RS Premier Jatinegara Hospital</td>
<td>Indonesia</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Jai Prakash Narayan Apex Trauma Center, AIIMS</td>
<td>India</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>University Medica Center</td>
<td>Vietnam</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fortis Hospital, Mohali</td>
<td>India</td>
</tr>
<tr>
<td>2016</td>
<td>19</td>
<td>9</td>
<td>St. Luke's Medical Center</td>
<td>Philippines</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ramathibodi Hospital</td>
<td>Thailand</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Seoul National University Bundang Hospital</td>
<td>Korea</td>
</tr>
</tbody>
</table>
CONGRATULATION TO ALL AWARD WINNERS
Multidrug resistant organism (MDRO) Prevention

- MDRO bundle
  - Active surveillance
  - Antimicrobial management, including antimicrobial stewardship programmes
  - Practice of isolation precautions such as contact precautions for patients or residents identified with MDROs
  - Hand hygiene in accordance with institutional guidelines
  - Environmental hygiene in accordance with institutional guidelines
  - Antiseptic body baths (or wipes for bedridden patients or residents) to reduce bio-burden in patients or residents identified with MDROs
• Full-body bathing with chlorhexidine every other day reduced the risk of acquiring the composite outcome of four HAIs (CAUTI, VAP, incisional SSI, and primary BSI) in SICU patients by 44.5%
Implementation of antiseptic baths

• Alternative product to CHG – octenidine dihydrochloride

• Phased implementation at Singapore General Hospital
  • ICU, HD and ICAs – June 2012
  • Jan 2013 - extended to bed-bound patients in general wards
  • October 2013 - hospitalwide
Results from use of antiseptic baths hospitalwide after >3 years at tertiary hospital

<table>
<thead>
<tr>
<th></th>
<th>Pre-implementation</th>
<th>Post-implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>HA ACBA per 1,000 patient days</td>
<td>0.26</td>
<td>0.11</td>
</tr>
<tr>
<td>HA MRSA per 1,000 patient days</td>
<td>0.82</td>
<td>0.69</td>
</tr>
<tr>
<td>HA VRE incidence per 1,000 patient days</td>
<td>0.50</td>
<td>0.77</td>
</tr>
<tr>
<td>HA CRE per 1,000 patient days</td>
<td>0.09</td>
<td>0.36</td>
</tr>
<tr>
<td>Hand Hygiene (% compliance)</td>
<td>63.0%</td>
<td>78.7%</td>
</tr>
<tr>
<td>Environmental hygiene (% compliance)</td>
<td>86.8%</td>
<td>88.8%</td>
</tr>
</tbody>
</table>
APSIC Guidelines

• The APSIC Guidelines for Disinfection and Sterilization of Instruments in Health Care Facilities [2011]

• APSIC Guidelines For Environmental Cleaning And Decontamination [2013]

• APSIC Guide For Prevention Of Central Line Associated Bloodstream Infections (CLABSI) [2015]
APSIC Guidelines for Disinfection and Sterilization of Instruments in Health Care Facilities

• Endorsed by the following national societies
  • Borneo Infection Control Society
  • New Zealand Sterile Sciences Association (NSSA)
  • Infection Control Association of Singapore (ICAS)
  • Ho Chi Minh City Infection Control Society, Vietnam
  • The Central Sterilization Services Association of Thailand (CSSA)
  • The Thai Perioperative Nurses Association (TPNA)
  • The Nursing Association for Prevention and Control of Infections (NAPCI)
  • Central Services and Sterilization Association of the Philippines (PACSSM)
  • Korea Association of Central Supply Department Nurses (KACSDN)
  • Hong Kong Infection Control Nurses Association (HKICNA)

• Available on APSIC website: http://apsic-apac.org
Selection of Product/Process for Reprocessing

- Compatibility of the equipment/device to be reprocessed to detergents, cleaning agents and disinfection/sterilization processes
  - Determined by the manufacturer of the equipment/device; and

- Manufacturer **must** provide written information regarding the safe and appropriate reprocessing of the medical equipment/device
Sterilants and disinfectants

- Reviewed by an individual with Infection Prevention and Control at least annually
- List of sterilants and disinfectants used
- Safety issues
Selecting disinfectants - checklist

- Efficacy for the intended use;
- Compatibility with the equipment/device and surfaces to be disinfected;
- Compatibility with detergents, cleaning agents and disinfection and/or sterilization processes;
- The intended end use of the equipment/devices to be disinfected;
- The method for monitoring the product concentration;
- Recommendations for rinsing (e.g., water quality, volume, time);
- Safety for use, with minimal toxic and irritating effects to/for staff; and
- Environmental safety and biodegradability.
Top 10 Health Technology Hazards Report 2017 (ECRI)

- Infusion Errors Can Be Deadly If Simple Safety Steps Are Overlooked
- Inadequate Cleaning of Complex Reusable Instruments Can Lead to Infections
- Missed Ventilator Alarms Can Lead to Patient Harm
- Undetected Opioid-Induced Respiratory Depression
- Infection Risks with Heater-Cooler Devices Used in Cardiothoracic Surgery
- Software Management Gaps Put Patients, and Patient Data, at Risk
- Occupational Radiation Hazards in Hybrid ORs
- Automated Dispensing Cabinet Setup and Use Errors May Cause Medication Mishaps
- Surgical Stapler Misuse and Malfunctions
- Device Failures Caused by Cleaning Products and Practices
Disinfection of Reusable Medical Equipment/Devices

• Semi-critical medical equipment/devices require at a minimum, high-level disinfection but sterilisation is preferred. (IA)

• The chemical disinfectant used for disinfecting medical equipment/devices must be compatible with both the equipment/device manufacturer’s instructions for disinfection and the cleaning products involved in the reprocessing of the equipment/device. (IA)

• The process of high-level disinfection requires monitoring and auditing. If a chemical product is used, the concentration of the active ingredient(s) must be verified and a logbook of daily concentration test results is to be maintained. (IA)

• Manufacturer’s instructions for installation, operation and on-going maintenance of pasteurizing equipment must be followed to ensure that the machine does not become contaminated. (IA)
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• The chemical disinfectant used for disinfecting medical equipment/devices must be compatible with both the equipment/device manufacturer’s instructions for disinfection and the cleaning products involved in the reprocessing of the equipment/device. (IA)

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• Manufacturer’s instructions for installation, operation and on-going maintenance of pasteurizing equipment must be followed to ensure that the machine does not become contaminated. (IA)
Reprocessing Endoscopy Equipment/Devices

• Individuals responsible for reprocessing endoscopes shall be specially trained and shall meet the facility’s written endoscope processing competency requirements, including ongoing education and training and annual competency testing (IA)
• Critical endoscopes shall be sterilized prior to use. (IA)
• Semi-critical endoscopes require a minimum of high-level disinfection prior to use. (IA)
• Adequate ventilation is required to remove toxic vapours generated by, or emitted from, cleaning or disinfecting agents. (IA)
• Endoscope cleaning shall commence immediately following completion of the clinical procedure. (IA)
• Patency and integrity of the endoscope sheath shall be verified through leak testing, performed after each use. (IA)
• Endoscopic accessories (e.g., biopsy forceps and brushes) that enter sterile tissue or the vascular system shall be disposable or sterilized after each use. (IA)
• Final drying of semi critical endoscopes shall be facilitated by flushing all channels with filtered air, followed by 70% isopropyl alcohol, followed by forced air purging of the channels. (IA)
Methods for reprocessing duodenoscopes

- Ethylene oxide sterilization after HLD with periodic microbiologic surveillance
- HLD done twice with periodic microbiologic surveillance
- HLD with scope quarantine until negative culture
- Liquid chemical sterilant processing system using peracetic acid (rinsed with extensively treated potable water) with periodic microbiologic surveillance
- Other FDA-cleared low-temperature sterilization technology (provided material compatibility and sterilization validation testing performed using the sterilizer and endoscope) after HLD, with periodic microbiologic surveillance
- HLD with periodic microbiologic surveillance
Storage of endoscopes

• Store semi-critical endoscopes by hanging vertically in dedicated closed, ventilated cabinet outside of the decontamination area and procedure room
• HEPA-filtered channel purge drying cabinet should be used for storage
Key recommendations

• Critical medical and surgical devices and instruments that enter normally sterile tissue, body space or vascular system must be sterilised before use. (IA)
• Steam sterilisation is the preferred method for sterilising critical medical and surgical devices and instruments that are not damaged by heat, steam, pressure, or moisture. (IA)
• High-level disinfection is required for semi-critical patient care equipment. (IA)
• Standard sterilisation and disinfection procedures are adequate for patient care equipment used on patients with blood-borne pathogens, MDRO including multiply resistant *Mycobacterium tuberculosis* except prions. (IA)
• Needles must be single-use and must not be reprocessed. (IA)
APSIC Guidelines For Disinfection And Sterilisation Of Instruments In Health Care Facilities

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APSIC CSSD Centre of Excellence Award

- Application form available at website: http://apsic-apac.org

- Closing date for submission is 30 May

- Participants will be offered a complimentary COE education event organized by APSIC. The education event will be organized at participant's country.

- Expert Panel will review all submissions and select finalists

- 2 experts from the panel will arrange to pay an audit visit to the selected finalists
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The Epi Triangle

- Host
- Agent
- Environment
High touch points
Enhancing environment hygiene

- **People**
  - Dedicated, trained staff

- **Process**
  - Frequency of cleaning
  - Cleaning agents
  - Monitoring

<table>
<thead>
<tr>
<th>Total Risk Score</th>
<th>Risk Type</th>
<th>Minimum Cleaning Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>High Risk</td>
<td>Clean after each case/event/procedure and at least twice per day</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clean additionally as required</td>
</tr>
<tr>
<td>4-6</td>
<td>Moderate Risk</td>
<td>Clean at least once daily</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clean additionally as required (e.g., gross soiling)</td>
</tr>
<tr>
<td>2-3</td>
<td>Low Risk</td>
<td>Clean according to a fixed schedule</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clean additionally as required (e.g., gross soiling)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location</th>
<th>Probability of contamination</th>
<th>Potential for Exposure</th>
<th>Population</th>
<th>Total Score</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autopsy/mortuary</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>6</td>
<td>Clean at least once daily. Clean additionally as required (e.g., gross soiling)</td>
</tr>
<tr>
<td>Cardiac catheterization and angiodynography area</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>6</td>
<td>Clean after each case/event/procedure and at least twice daily</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Clean additionally as required (e.g., gross soiling)</td>
</tr>
</tbody>
</table>

*Source: APSIC Guidelines For Environmental Cleaning And Decontamination*
Use of disinfectants

- Liquid disinfectants chosen for use in environmental health care should:
  - Be low level disinfectants (used for non-critical items)
  - Be active against the usual microorganisms encountered in the health care setting;
  - Ideally require little or no mixing or diluting;
  - Be active at room temperature with a short contact time;
  - Have low irritancy and allergenic characteristics; and
  - Be safe for the staff, patients and environment.
Use of disinfectants

• Effective use of a disinfectant for environment includes:
  • Application of disinfectant only after visible soil and other impediments to disinfection have been removed
  • Following the manufacturer’s written instructions for dilution and contact time;
  • Frequently changing disinfectant solution with no ‘double-dipping’ of cloths into disinfectant; and
  • Appropriate use of personal protective equipment, if required, to prevent exposure to the disinfectant.
Conclusion: breaking the chain of infection

- **Infectious agents**
  - Bacteria, viruses, fungi and/or parasites

- **Reservoir**
  - Animate, inanimate or environmental

- **Susceptible host**
  - A person whose resistance to the infectious agent is lacking

- **Portal of entry**
  - A path by which the infectious agent is able to enter the susceptible host

- **Portal of exit**
  - Infectious agent leaves the reservoir

- **Modes of transmission**
  - Mechanisms for transfer of the infectious agent from the reservoir to a susceptible host