Risk Assessment and Priority Setting in Infection Control in Low- to Middle-Income Countries

Dr. Nizam Damani, Queen's University, Belfast, UK

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Outline

• Setting the scene
• How to apply the concept of risk assessment in Infection Prevention & Control (IPC)
• Eliminate or minimize hazards & Health care associated infections (HCAIs) esp. in low to middle income countries
• Conclusions


A systematic review of the literature

• 5% to 15% of hospitalized patients in general wards and as many as 50% or more of patients in intensive care units (ICUs) in resource rich countries acquire HCAIs
• Magnitude of the problem in low/ middle income countries is unknown and/or grossly underestimated due to lack of surveillance data

Risk Assessment in IPC

• Risk assessment is a systemic process for assessing and integrating professional judgments about probable adverse conditions and/or events
• Risk management is the identification, assessment, and prioritization of risks followed by coordinated and economical application of resources to minimize, monitor, and control the probability and/or impact of adverse events

Key Definitions

• Hazard is defined as something with the potential to cause harm
  – Microorganisms & chemical disinfectant
• Risk is defined as the likelihood of harm resulting from a hazard
  – HCWs acquiring Blood Borne Viral infection due to exposure to contaminated sharps injuries
  – Exposure to chemical disinfectant (e.g. glutaraldehyde) in an poorly ventilated area
  – Risk of cross infections to HCWs, visitors and other patients due failure to isolate patient and/or failure to comply with good infection control practices
  – Re-use of items/equipment without adequate decontamination

Risk Assessment in IPC

This approach can be used for hazards or risks that arise from the environment or items/equipment, as well as patient-related risks

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Risk Factor

Risk Factor = Probability (Frequency) x Impact (Severity)

- Local and/or national surveillance data on the incidence of HCAIs will give you the probability or frequency and adverse incident reports and audits of IPC practices will give you the information on the frequency of failure to carry out task or a procedure as per recommended guidelines
- Risk assessment will give you the information on the impact or severity of disease to individuals (patient, HCWs, visitors & community)

Four Key stages of Risk assessment

1. Identify Risk
   - Identify risk factors
   - Know who can be harmed
   - Know what happens or can happen
   - Identify risks using the information on the frequency (probability) and impact to harm an individual

2. Analyse Risk
   - Measure potential impacts
   - Record findings
   - Develop Risk Assessment Matrix

2. Risk Analysis : Why Are They Happening?...1

Sources of performance deficit
- These occur due to an act of omission e.g., failure to comply with current professionally accepted practice which could be due to:
  - Lack of knowledge
  - Lack of communication
  - Inadequate provision of education, training and supervision
  - Lack of availability/regular supply of goods e.g. hand hygiene products, PPE
- These occur due to an act of commission i.e., an act should not have been committed which could be due to:
  - Lack of commitment
  - Lack of consideration for others

This is more complex and may also require management reinforcement

2. Risk Analysis : Why Are They Happening?...2

Type III error
- Occurs when we fail to understand the true nature of the problem
- Real solutions are adopted to deal with the wrong problems, rather than incorrect solutions to real problems
- Often due to lack of communication or misinterpretation of information
- Put an agreed evidence based risk reduction plan in place in the problem area

Reason’s ‘Swiss cheese’ model of error causation related to infection prevention and control

Pathogen Syndrome | Severity of Infection | Size of population at risk | Vulnerability | Total Risk Score
--- | --- | --- | --- | ---
Bloodstream infection | 4 | 3 | 4 | 48
Surgical site infection | 3 | 4 | 4 | 48
MRSA | 3 | 4 | 3 | 36
Cdifficile | 4 | 4 | 3 | 32
Influenza | 2 | 4 | 3 | 24
Ventilator-associated infection | 4 | 2 | 3 | 24
Resistant GNR | 5 | 2 | 3 | 10
Urinary tract infection | 1 | 3 | 3 | 9
Vancomycin-resistant enterococci | 1 | 2 | 3 | 6


Sample Risk Assessment Tool for Hospital-based Infection Control Programme

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Summary: Priority for Action

Key stages of Risk assessment

3. Risk Control: Think possible solutions!

Key stages of Risk assessment

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Risk assessment & Infection Prevention & Control

1. CHARACTERISTICS/TYPE OF MICROORGANISMS
   - Hazard Groups (1-4) of biological agents
   - Fully sensitive strain of Multi-resistant e.g. MRSE/MDR-78, CRE, VRE, MRSA, ESBL, VISA
   - Virulence amongst same species e.g. C. difficile hypervirulent strain 027 stain

<table>
<thead>
<tr>
<th>Group</th>
<th>Characteristics</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>Can spread within individual and affect the environment, e.g. hospital staff, visitors, patients</td>
<td>C. difficile, S. aureus</td>
</tr>
<tr>
<td>Group 2</td>
<td>Can spread from person to person and then to the environment, e.g. hospital staff, visitors, patients</td>
<td>MRSE, CRE, VRE, MDR, ESBL, VISA</td>
</tr>
<tr>
<td>Group 3</td>
<td>Can spread from person to person and then to the environment, e.g. hospital staff, visitors, patients</td>
<td>MRSE, CRE, VRE, MDR, ESBL, VISA</td>
</tr>
<tr>
<td>Group 4</td>
<td>Can cause serious and severe human disease, e.g. smallpox, Ebola, hepatitis B and C, M. tuberculosis, E. coli, S. typhi, M. pertussis, N. meningitidis, B. pertussis, C. difficile</td>
<td></td>
</tr>
</tbody>
</table>

UK HSE: Biological agents: Managing the risk in laboratories and healthcare premises, 2005. www.hse.gov.uk

2. SEVERITY OF INFECTIONS
   - Colonisation — mild infection — severe infection — death
   - MRSA patient with severe sepsis may act as disseminator
   - Patient with history of cough with positive AFB in sputum is at high risk of spreading Tuberculosis
   - Patient with diarrhoea e.g. VRE, ESBL, CRE, C difficile and other enteric pathogens are at high risk of contaminating environment and causing infection/ diseases

3. HOST SUSCEPTIBILITY
   - IMMUNITY
     - Previous exposure to diseases with life long immunity e.g. Chickenpox or previous exposure to diseases with no life long immunity e.g. Influenza, Norovirus
     - History of immunisation with vaccine-preventable disease — Hep B, MMR, BCG etc
     - Immunocompromised due to disease and/or chemotherapy

Setting Priority

80/20 rule : Pareto Principle

- Pareto was a 19th century economist who discovered the 80/20 rule while studying the distribution of wealth in Italy
- Pareto Principle can equally applies well in IPC in setting priorities as it has been estimated that 80% of adverse outcomes are often a result of only 20% of the causes
- Pareto analysis is a simple technique for prioritizing potential causes by identifying the problems

How to draw Pareto Chart

- Pareto charts can be generated by simple spreadsheet programmes
  - OpenOffice.org Calc
  - Microsoft Excel, and
  - Specialized statistical software too

Create a Pareto chart using MS Excel 2010

- http://www.wikihow.com/Create-a-Pareto-Chart-in-MS-Excel-2010
- http://paretochart.org/paretocharttemplateexcel/

Develop Pareto Chart

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Conclusions

- Carry out risk assessment and identify unsafe, unnecessary and ineffective IC practices
- Be proactive rather than reactive
- Take time out from your daily to THINK so that you can provide strategic direction to your organization
- Look at your surveillance data, information from audits and adverse events
- Analysis information, identify key issues and prioritize using 80/20 principle
- Draw up an action plan and provide solution based on the local need and resources
- Implement simple, & effective solutions which are achievable and affordable

2013

WHO Teleclass Schedule

- Improving the Patient Safety Culture as a Successful Component of Infection Control (Strategies, Dr. B. Alferan)
- Patient Participation in Hand Hygiene Promotion and Improvement, Dr. Y. Longtin
- Innovation and New Indicators in Hand Hygiene Monitoring, Prof. J. Bryce
- Special Lecture for 5 May, Prof. D. Pittet
- Risk Assessment and Priority Setting in Infection Control in Low to Middle Income Countries, Prof. N. Damani,
- Environmental Surfaces in Healthcare: A Critical Look at Current Practices and Newer Approaches, Prof. S. Settar
- Preventing Central Line-Associated Bloodstream Infections: The Matching Michigan Approach Applied in the USA and Other Countries, Prof. F. Pronovost
- Implementing Infection Control Through a Patient Safety Partnership Approach in Africa, I. Arroll
- Control of Multi-Drug Resistant Organisms in the Nursing Home Setting, Prof. A. Voss

Thank you

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