Evidence-Based Infection Control
A Webber Training Teleclass with Dr. Mark Loeb

Slide 1
Evidence-Based Infection Control

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Slide 2
Definition
Evidence-based infection control is...
...the explicit, judicious and conscientious use of current best evidence from infection control research in making decisions about the prevention and control of infection of individuals and populations.

Slide 3
Evidence-based infection control...
...is an attempt to build a bridge between evidence from research and infection control practice.

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Major components of infection control decisions
- Epidemiologic circumstances
- Available resources, Staff/Patient Preferences
- Research evidence

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Transfer of Evidence
- Evidence from research
- IC decisions

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Get the evidence straight
Develop infection control policies
Apply the policies

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5 Steps of Evidence-Based Infection Control

- Framing the question appropriate to the circumstances
- Finding the evidence
- Evaluating the evidence
- Making and doing the decision
- Evaluating the process

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Slide 11

Framing the question

PICO

• Patient or Population
• Intervention
• Comparison
• Outcome

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Framing the Question

In nurses providing care to SARS patients in the ICU, does use of an N95 mask reduce SARS transmission?
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5 Steps of EBIC
☐ framing the question
✓ finding the evidence
☐ evaluation of the evidence
☐ making and doing the decision
☐ evaluation of the whole process

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Approach to Research Evidence:
What question am I asking?
• Therapy
• Prognosis
• Diagnosis
• Etiology

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Common features of Infection Control Research
1. Comparative
   Soap 1 vs Soap 2
   MRSA culture vs PCR
   N95 vs No N95

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Common features (con’t)

2. Preplanned
   • Objective, rationale, background
   • Inclusion and exclusion criteria
   • Methodology for all interventions
   • Outcomes and how & when measured

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Severe Acute Respiratory Syndrome (SARS)


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Question

In patients with SARS, does interferon reduce mortality?

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Levels of Evidence

• Animal study
• Case Report
• Case-control
• Cohort
• RCT
• Systematic review

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Animal Studies

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Case Report
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Case-Control Study
• Begin with Case
• Compare to controls
• Pros: quick, inexpensive
• Cons: bias in selection of cases, selection of controls, recall bias, measurement
• Use: determine risk

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Cohort Study
• Begin with patients who do NOT have the outcome
• Follow forward in time
• Pros: less bias since outcome unknown, better to design data collection
• Cons: expensive, lengthy
• Use: best to assess risk, outcome

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Randomized Controlled Trials
• Randomly allocate patients to an intervention, follow up and measure outcomes
• Pro: reduce selection, assessment bias, confounding
• Con: expensive, not always possible
• Bottom line: gold standard for prevention, treatment

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Systematic review
• Highest form of evidence
• Evidence-based review article
• Has purpose, search strategy, inclusion and exclusion criteria
• May or may not include meta-analysis
• Bottom line: summary of the best evidence

Slide 26
Antibiotics for asymptomatic bacteriuria: effect on mortality

<table>
<thead>
<tr>
<th>Study</th>
<th>Treatment</th>
<th>Control</th>
<th>RR</th>
<th>RR(95%CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abrutyn 1994</td>
<td>30/166</td>
<td>30/192</td>
<td>0.89</td>
<td>(0.58,1.37)</td>
</tr>
<tr>
<td>Bisce 1987</td>
<td>3/14</td>
<td>3/15</td>
<td>0.65</td>
<td>(0.11, 3.73)</td>
</tr>
<tr>
<td>Nicolle 1983</td>
<td>5/11</td>
<td>5/15</td>
<td>1.4</td>
<td>(0.52, 3.58)</td>
</tr>
<tr>
<td>Nicolle 1987</td>
<td>9/26</td>
<td>4/24</td>
<td>2.1</td>
<td>(0.7, 5.9)</td>
</tr>
<tr>
<td>Total(95%CI)</td>
<td>46/266</td>
<td>51/292</td>
<td>1.02</td>
<td>(0.71, 1.46)</td>
</tr>
</tbody>
</table>

Favours treatment: Favor treatment
Favours control: Favor control

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JASPA
(Journal Associated Score of Personal Angst)

J: Are you ambivalent about renewing your JOURNAL subscriptions?
A: Do you feel ANGER towards prolific authors?
S: Do you ever use journals to help you SLEEP?
P: Are you surrounded by PILES of PERIODICALS?
A: Do you feel ANXIOUS when journals arrive?

0 = liar?
1-3 = normal range
>3 = sick

* Modified from BMJ 1995;311:1666-1668

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- Original articles published in journals
- Cochrane reviews
- ACP Journal Club/Evidence-Based abstract
- Computerized decision support systems (CDSS)
- Synopses
- Studies

Slide 29

An evidence-based information system integrates and summarizes important research evidence about a clinical problem and links, through an electronic medical record, a specific patient’s circumstances to the relevant information.

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[Image of evidence-based information system]

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Synopses

ACP Journal Club / Evidence-Based J abstract

Synopses are distillations of high-quality individual studies and reviews that provide enough information to support decisions or actions.

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ACP Journal Club

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Systematic reviews. Systematic because they contain methods describing how the individual articles were obtained, and inclusion/exclusion criteria describing selection of the articles.

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High-quality original studies such as randomized controlled trials and cohort studies. Critical appraisal must be applied to determine their quality.

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5 Steps of EBIC
- framing the question
- finding the evidence
- evaluation of the evidence
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Preventive or Therapeutic Trial: Are the results valid?

• Was assignment of treatment randomized?
• Was the randomization list concealed?
• Were all patients who entered the trial accounted for at the end?
• Were they analyzed in the groups to which they were randomized?

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Preventive or Therapeutic Trial: Are the results valid?

• Was there “blinding”? If so who was blinded?
• Were the groups treated equally (aside from experimental intervention)?
• Were the groups similar at the start of the trial?

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Preventive or Therapeutic Trial: What are the results?

• How large is the treatment effect?
• How precise is the treatment effect?
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Risk Reduction
Absolute risk reduction = control rate - experimental rate
Relative risk reduction = control rate - experimental rate / control rate

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Drug A: 2% die of pneumonia
Placebo: 4% die of pneumonia
Absolute difference: 4% - 2% = 2%
Relative difference: 4% - 2% = 50%

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Number Needed to Treat (NNT)
Number of patients who need to be treated to prevent 1 or more adverse events
NNT = 1/ARR e.g. 1/0.02 = 50

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Confidence Intervals
• A way of quantifying the uncertainty in measurement
• 95% CI = range of values within which we can be 95% sure that the true value for the whole population lies
RR = 1.3 (95% CI, 1.02 - 1.74)

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Preventive or Therapeutic Trial: Will the results help me provide healthcare?
• Can the results be applied to my patient population?
• Were all important outcomes considered?

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Prognosis Study: Are the results valid?
• Was a representative and well-designed sample of patients collected at a similar point in the course of their disease (condition)?
• Was follow up sufficiently long and complete?
• Were objective and unbiased outcome criteria used?
• Was adjustment for important prognostic factors done?

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Systematic review: Are the results valid?
• Does the stated objective of the review address your question?
• Does the methods section describe finding and including all relevant studies?
• Is study validity assessed?
• Are the results consistent from study to study?

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Systematic Reviews: What are the results?
• How large is the treatment effect?
• How precise is the treatment effect?
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Systematic Reviews: Will the results help me provide healthcare?

• Can the results be applied to my patient population?
• Were all important outcomes considered?
• Are the likely benefits worth the potential harms and benefits?

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