Objective:
- Dapat menjelaskan konsep dasar ebm, dan gambaran kejadian medication error di ICU serta pentingnya pencegahan medication error di ICU.
- Dapat menjelaskan tahapan dalam ebm.
- Dapat menentukan level of evidence drug literature.
- Dapat menyebutkan web site ebm.
- Dapat melakukan critical appraisal dan menjelaskan penerapan konsep EBM di ICU.

Introduction
- Apakah latar belakang yang mendasari lahirnya EBM di kedokteran?
- Bagaimana di ICU?
- Apakah EBM?
- Apakah urgensinya?
- Bagaimana gambaran aplikasinya?
Introduction

- Opinion based v.s. evidence based medication
- Harm v.s. safety
- Law and legal formal
- Economic beneficity

Introduction: Error medicine

- Leape L. Error in Medicine. JAMA. 1994
  - 4% of all hospital stays
  - mortality rate of 14%

- Committee on Quality of Health Care in America, Institute of Medicine. 2000.
  - Death related to adverse events:
    - 44000 à 98000 patients each year
    - 8th cause of mortality

Table 4: Median (range) of the percentages of pAIDE by error type

<table>
<thead>
<tr>
<th>Error type</th>
<th>Median (range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overdose or underdose</td>
<td>22.4 (7.9-29.6)</td>
</tr>
<tr>
<td>Inappropriate drug</td>
<td>17 (0.0-20.9)</td>
</tr>
<tr>
<td>Inappropriate drug administration</td>
<td>16.5</td>
</tr>
<tr>
<td>Inadequate patient monitoring</td>
<td>12 (1.8-46.7)</td>
</tr>
<tr>
<td>Wrong frequency</td>
<td>8.8 (4.6-12.9)</td>
</tr>
<tr>
<td>Known allergy</td>
<td>6.9 (5.7-8.1)</td>
</tr>
<tr>
<td>Lack of preventive therapy</td>
<td>6.7</td>
</tr>
<tr>
<td>Missed dose</td>
<td>6.1 (3.0-7.2)</td>
</tr>
<tr>
<td>Drug-drug interaction</td>
<td>2.8 (2.7-2.8)</td>
</tr>
<tr>
<td>Other</td>
<td>12.2</td>
</tr>
</tbody>
</table>

(Camphalbal et al., 2008)
MEDICATION ERROR, PREVENTABILITY, AND MORBIDITY LEVEL

Hepler & Segal, 2003

(Camphbel et al., 2008)

MEDICATION ERROR IN PROCESS

Hepler & Segal, 2003
ORIGINATION MEDICATION ERROR

(Camphbel et al., 2008)

<table>
<thead>
<tr>
<th>Study</th>
<th>Setting</th>
<th>Definition</th>
<th>No. Prescription</th>
<th>Dispensing</th>
<th>Administration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bums</td>
<td>General</td>
<td>ADEs</td>
<td>27</td>
<td>0.60</td>
<td>0.24</td>
</tr>
<tr>
<td>Knobal</td>
<td>Pediatrics</td>
<td>Errors</td>
<td>616</td>
<td>0.84</td>
<td>0.04</td>
</tr>
<tr>
<td>Knobal</td>
<td>Pediatrics</td>
<td>Potential  ADEs</td>
<td>120</td>
<td>0.91</td>
<td>0.14</td>
</tr>
<tr>
<td>Kytes</td>
<td>Non-ICU</td>
<td>Preventable &amp; potential ADEs</td>
<td>106</td>
<td>0.46</td>
<td>0.14</td>
</tr>
<tr>
<td>Kytes</td>
<td>ICU</td>
<td>ADEs*</td>
<td>158</td>
<td>0.41</td>
<td>0.11</td>
</tr>
</tbody>
</table>

* intercepted & non-intercepted ADEs

INTRODUCTION: ERROR IN ICU?

Patient safety in intensive care: results from the multinational Sentinel Events Evaluation (SEE) study

Unintended Event:
- An occurrence that harmed or could have harmed a patient
- Reporting by all ICU staff members:
  - Voluntarily – Anonymously - Confidential

SEE STUDY

Selected Events
- Medication: wrong drug, dose, or route
- Airway: unplanned extubation, artificial airway obstruction, cuff leakage
- Lines, Drains, Catheters: dislodgement, inappropriate opening/disconnection
- Equipment failure: power supply, oxygen supply, ventilator, infusion pump
- Alarms: inappropriate turn off
SEE Study - participating Countries

220 ICUs in 29 countries
2090 patients

SEE STUDY

Adults

Patients: 1913
Sex: 61 % m / 39 % w
Age (mean): 62.3 ± 16.3 (18 – 99 a)
NEMS (median): 27 (18;38)
SOFA (median): 4 (2;7)
Events: 584
Pts with ≥ 1 Event: 393
At least 1 sentinel event: 73% of ICUs

SEE STUDY

# of events in patients (adults)

<table>
<thead>
<tr>
<th># of events</th>
<th># of pts</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>3522</td>
</tr>
<tr>
<td>1</td>
<td>65 pts</td>
</tr>
<tr>
<td>2</td>
<td>54 pts</td>
</tr>
<tr>
<td>3</td>
<td>22 pts</td>
</tr>
<tr>
<td>&gt;3</td>
<td>20 pts</td>
</tr>
</tbody>
</table>

Percent
391 affected patients

SEE STUDY

<table>
<thead>
<tr>
<th>Events / 100 pt days</th>
<th>lower 95% CI</th>
<th>upper 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>38.8</td>
<td>34.7</td>
</tr>
<tr>
<td>Lines, drains</td>
<td>14.5</td>
<td>12.0</td>
</tr>
<tr>
<td>Medication</td>
<td>10.5</td>
<td>8.6</td>
</tr>
<tr>
<td>● Prescription</td>
<td>5.7</td>
<td>4.4</td>
</tr>
<tr>
<td>● Administration</td>
<td>4.8</td>
<td>3.6</td>
</tr>
<tr>
<td>Equipment</td>
<td>9.2</td>
<td>7.4</td>
</tr>
<tr>
<td>Airway</td>
<td>3.3</td>
<td>2.4</td>
</tr>
<tr>
<td>Alarms</td>
<td>1.3</td>
<td>0.6</td>
</tr>
</tbody>
</table>

SEE STUDY

Explanatory power within the final model

Explanatory power of measured variables

risc-time
organfailures
ICU as random component
nems
intervention
icu
patients per nurse
organfailure
nursing intervention
is cu
A look into the nature and causes of human errors in the ICU
Donchin et al, Crit Care 1995

SEE study

S E N T I N E L  E V E N T S  E V A L U A T I O N  ( S E E )

Information
www.hsro-esicm.org

Contact:
andreas.valentin@meduniwien.ac.at
Adverse events in ICU
- Frequent and in relation with
  - Severity of the patients
  - Procedures
- Impact on:
  - Zhan C, Miller MR. Excess length of stay, charges, and mortality attributable to medical injuries during hospitalization. JAMA, 2003, 290:1868-1874
  - Morbidity and mortality
  - Finance
    - Iatrogenic pneumothorax: 17,312 US$
    - DVP and post operative pulmonary emboli: 21,709 US$
- Legal issues
- Psychology of the team
- Preventability?

If you hear this

“I am proud to say that I have no adverse event in my ICU”

You should conclude that this is a very dangerous ICU

- No documentation of events
- No evaluation
- No corrective action
- May be even no patient in that ICU….
Evidence-based medicine (EBM) is the process of systematically reviewing, appraising and using clinical research findings to aid the delivery of optimum clinical care to patients (www.bandolier.com).

Not only a skill but also an attitude change.

Conscientious, explicit, and judicious use of current best evidence in making decisions about individual patients. – Archie Cochrane 1972

An updated model for evidence-based clinical decisions.

Clinical state and circumstances (what's wrong, what are the options)

Clinical expertise - Art of medicine

Patients' preferences and actions

Research evidence
Piramida evidence dan Desain Penelitian

Randomized Controlled Studies
- Cohort Studies
- Case Control Studies
- Case series/Reports
- Ideas, Editorials, Opinions
- Animal research
- In vitro (test tube) research

Meta-analysis

Level of evidence Study design

Resources drug literature/medicinal literature
- PUBMED
- McMaster University HIRU (Health Information Research Unit) Cochrane Collaboration
  - http://hiru.mcmaster.ca/
- Oxford University Centre for Evidence-Based Medicine
  - http://cemb.ox.ac.uk
- American College of Physician (ACP), ACP Journal Club Online
  - http://www.acpjc.org
1. Clinical Question: Patient-focused, problem-oriented
2. Find Best Evidence: Literary Search
3. Critical Appraisal: Evaluates evidence for quality and usefulness
4. Apply the Evidence: Implement useful findings in clinical practice
5. Evaluate: The information, intervention, and EBM process

THE FIVE BASIC STEPS OF EBM

Five Steps to Practice EBM
- Step 1: Converting the need for information (about prevention, diagnosis, prognosis, therapy, causation, etc.) into an answerable question or PICO.
- Step 2: Searching the best evidence with which to answer that question.
- Step 3: Critically appraising the evidence for its validity (closeness to the truth), impact (size of the effect), and applicability (usefulness in our clinical practice).
- Step 4: Integrating the evidence with our clinical expertise and patients’ unique biology, values and circumstances.
- Step 5: Evaluating our effectiveness and efficiency in executing steps 1-4 and seeking ways to improve them both for next time.

STEP I: ASKING ANSWERABLE CLINICAL QUESTION
**Types of Clinical Questions**

- **By Content**
  - Diagnosis
  - Therapy
  - Etiology
  - Prognosis

- **By Format**
  - Background
  - Foreground

---

**PERTANYAAN “Foreground”**

- Ask for specific knowledge about managing patients with a disorder
- Have four (or three) essential components:
  - 1. Patient and/or problem
  - 2. Intervention (treatment)
  - 3. Comparison intervention
  - 4. Clinical outcomes

---

**Foreground question: There are four elements of a well-formulated question**

- **Patient** ~ Who is the patient or what is the problem being addressed?
- **Intervention** ~ What is the intervention?
- **Comparison** ~ What are the alternatives?
- **Outcome** ~ What are the outcomes?

**PICO METHODE**
MERUMUSKAN PERMASALAHAN METODE PICO?

Step 1 of the EBM process: formulate a sensible, focused clinical question – use PICO methods

<table>
<thead>
<tr>
<th>PICO</th>
<th>EBM process asks the doctor to consider</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient</td>
<td>What patient population he or she is interested in?</td>
<td>Patient is female caucasian child with ear infection</td>
</tr>
<tr>
<td>Intervention</td>
<td>What tests, what treatments could be considered?</td>
<td>Antibiotics</td>
</tr>
<tr>
<td>Comparison</td>
<td>alternatives to consider?</td>
<td>No treatment</td>
</tr>
<tr>
<td>Outcome</td>
<td>what the outcome of interest is (and how is it to be measured)</td>
<td>Ear infection reduced</td>
</tr>
</tbody>
</table>

Ex. Asking Answerable Clinical Question

<table>
<thead>
<tr>
<th>Patient/Problem</th>
<th>Insulin-dependent diabetics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention</td>
<td>Intensive insulin regimen</td>
</tr>
<tr>
<td>Comparison</td>
<td>Regular insulin regimen</td>
</tr>
<tr>
<td>Outcomes</td>
<td>Retinopathy</td>
</tr>
<tr>
<td></td>
<td>Symptomatic hypoglycemia</td>
</tr>
</tbody>
</table>

In the insulin-dependent diabetics, does intensive insulin regimen or Regular insulin regimen lead to symptomatic hypoglycemia?
KASUS 1

● Meurut Saudara perlu atau tidakkah pengontrolan GDS pada semua pasien di ICU? Ataukah pasien kritis yang memiliki riwayat DM yang perlu dikontrol GDSnya? Apakah dasar bukti ilmiah pendapat Saudara?
● Bagaimana langkah Saudara dalam mencari bukti ilmiah?
● Bagaimana mana Saudara menyusun permasalahan klinis dan apakah PICOnya?

Kasus 2

● Penggunaan kortikosteroid pada pasien ARDS masih diperdebatkan efiksinya. Bagaimana menurut Saudara? Apa dasar bukti ilmiah pendapat Saudara?
● Susunlah rumusan permasalahan penggunaan kortikosteroid pada ARDS dan apakah PICOnya?

STEP II: SEARCHING THE BEST EVIDENCE

- WEB SITE – SOURCE OF DRUG LITERATURE
- CRITICAL THINKING – APPRAISAL
- DRUG LITERATUR
Searching The Best Evidence

- (primary journals or databases) ~ Medline, NEJM, Lancet...
- (secondary journals or databases) ~ ACP journal club, Cochrane.
- (level of evidence) ~
WEBSITE OF EBM

1. ACP Journal Club: http://www.acponline.org (1-4, 7)
2. Cochrane – DARE (Database of Abstracts of Reviews of Effects)
3. CDSR (Cochrane Database of Systematic Reviews) – Collaborative Review Groups http://www.cochrane.org/reviews/index.htm
4. CRTR (Cochrane Central Register of Controlled Trials)
5. Cochrane collaboration
7. Micromedex (CCIS)
8. Centre for Evidence-Based Medicine: http://www.ebm.ox.ac.uk
9. McMaster University HRU (Health Information Research Unit) Cochrane Collaboration: http://www.ebmc.jr2.ox.ac.uk
10. American College of Physician (ACP): http://www.acponline.org
12. AHRQ website: http://www.ahrq.gov
13. INFOPOEMs: http://www.mcp.com/POEMs
15. (HINT): http://www.hint.org.tw

LATIHAN 2

SEARCHING JOURNAL SEBAGAI BUKTI ILMIAH

KASUS 1

Apakah kata kunci dan alamat sumber pustaka dimana Saudara akan mencari bukti ilmiah yang Saudara butuhkan sebagaimana permasalahan pada kasus 1?
**Kasus 2**

Penggunaan kortikosteroid pada pasien ARDS masih diperdebatkan efikasinya. Bagaimana menurut Saudara? Apa dasar bukti ilmiah pendapat Saudara?

Apakah kata kunci dan alamat sumber pustaka dimana Saudara akan mencari bukti ilmiah yang Saudara butuhkan sebagaimana permasalahan pada kasus 2?

---

**Critical appraisal drug literature:**

1. Apakah informasinya valid?…Drug literature and Level of evidence
2. Apakah informasinya penting?... Menghitung parameter outcome clinic
3. Apakah informasinya bermanfaat? …..menilai aplikabilitas

---

**Strength of Evidence**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Strong evidence from at least one systematic review of well designed randomized controlled trials</td>
</tr>
<tr>
<td>II</td>
<td>Strong evidence from at least one properly designed randomized controlled trial of appropriate size</td>
</tr>
<tr>
<td>III</td>
<td>Evidence from well designed trials without randomization: single group pre-post, cohort, time series or matched case-controlled studies</td>
</tr>
<tr>
<td>IV</td>
<td>Evidence from well designed non-experimental studies from more than one centre or research group</td>
</tr>
<tr>
<td>V</td>
<td>Opinions of respected authorities, based on clinical evidence, descriptive studies or reports of expert committees</td>
</tr>
<tr>
<td>VI</td>
<td>Someone once told me</td>
</tr>
</tbody>
</table>
The Evidence Pyramid

Randomized Controlled Studies
- Cohort study
- Case Control Studies
- Case series/Reports
- Ideas, Editorials, Opinions
- Animal research
- In vitro (test tube) research

Grade of Recommendation | Level of Evidence | Therapy
---|---|---
[A] | 1a | Systemic review of RCTs
    | 1b | Single RCT
    | 1c | 'All-or-none'
[B] | 2a | Systemic review of cohort studies
    | 2b | Cohort study or poor RCT
    | 2c | 'Outcomes' research
[C] | 3a | Systemic review of case-control studies
    | 3b | Case-control study
[D] | 4 | Case series
| 5 | Expert opinion, physiology, bench

What type of evidence best addresses the question, problem or issue?

CLINICAL PRACTICE
- Diagnosis, dx
- Prognosis
- Therapy, treatment

APPROPRIATE TYPES FOR CLINICAL RESEARCH
- Cross-sectional study - not randomized trial
- Follow-up studies of patients evaluated at same early point of illness
- RCT or Systematic review of multiple RCTs must be used when non-experimental approaches to study introduce bias or confounders about efficacy
- Exceptions: When treatment may be beneficial in an otherwise fatal condition
- When no studies are available (e.g. certain conditions, new treatments, etc.)

HARM
- RCT, Cohort, Case-control

OTHER INFORMATIONAL
- Expert opinion
- History-taking
- Assessing clinical course

APPROPRIATE TYPES FOR OTHER INFORMATIONAL
- Qualitative research
- Case-control study
- Cohort study
- Computer-assisted, computer-supported research

MISCELLANEOUS
- Basic Science, Genetics, Neuronal
Menilai tingkat kepentingan informasi

Informasi dari jurnal ilmiah yang valid ada 2 jenis yaitu

- Penting
- Tidak penting

Bagaimana menilainya?

MENILAI TINGKAT KEPEMENINGAN DATA/INFORMASI JURNAL ILMIAH

Lakukan perhitungan parameter outcome:

1. Jurnal dengan design RCT/uji kemanjuran: hitung NNT/ARR/RR apabila skala pengukurannya nominal tetapi untuk skala pengukurannya ratio lihat nilai p (signifikansi)
2. Jurnal dengan design kohort/uji prognosis: hitung nilai RR/NNT
3. Jurnal dengan design cross sectional/case control/uji diagnosis: hitung nilai OR/

Menilai tingkat kepentingan informasi yang disajikan jurnal ilmiah

<table>
<thead>
<tr>
<th>Table 2: How to calculate odds ratios, risk</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention</td>
<td>1,000</td>
<td>150</td>
</tr>
<tr>
<td>Control</td>
<td>1,000</td>
<td>100</td>
</tr>
</tbody>
</table>

EER = A/B = 150/1000 = 15%
ARR = EER - CER = 15% - 10% = 5%
NNT = 1/ARR = 1/5% = 20
Latihan 3:
- Tentukan level of evidence dari jurnal ilmiah yang Saudara peroleh untuk kasus 1 dan kasus 2

LATIHAN 4:
- Bagaimana menghitung outcome atau menilai tingkat kepentingan informasi dari jurnal ilmiah yang Saudara peroleh?

Selamat mencoba