COMPUTER-ASSISTED INSTRUCTION IN EVIDENCE-BASED MEDICINE: A PILOT STUDY
OUTLINE

- BACKGROUND & AIM
- COMPUTER-BASED EBM CURRICULUM
- METHODOLOGY OF SYSTEM EVALUATION
- RESULTS
- CONCLUSIONS
**BACKGROUND & AIM**

- **Evidence-based medicine**: Guyatt & all in 1991
  - imposes the translation of knowledge resulted from research in daily individual decisions

- **Aim**:
  - Self-directed learning
  - Evidence-based medicine training
  - Undergraduate students: Faculty of Medicine
  - Computer-based curriculum: assessment of effectiveness
COMPUTER-BASED EBM CURRICULUM

Goals:

- Promoting the access to EBM knowledge and resources for the Romanian medical students
- Increasing students’ awareness and use of relevant medical evidence
- Teaching the calculation and interpretation of fundamental EBM metrics
COMPUTER-BASED EBM CURRICULUM

- Incorporates thirteen modules and six resources:
  - Assisting creation and browsing of critical appraised topics - CATRom
  - Assisting creation and browsing of guidelines models and clinical practice guidelines - Guidelines
  - Calculation of 95% confidence interval for proportions
  - Twenty diagnostic and treatment guidelines published by the Romanian College of Physicians
  - Seventeen materials on proved based medicine published by Stetoskop Journal
  - EBM dictionary
**COMPUTER-BASED EBM CURRICULUM**

- **Knowledge evaluation:**
  - Interactive system
    - End of each module: five multiple-choice questions with one to up to four correct answers: *self-evaluation*
    - End of course evaluation: forty-five multiple-choice questions with one to up to four correct answers: *teacher-assisted evaluation*
Methodology of System Evaluation

- 4th year undergraduate medical students
- Faculty of Medicine
- “Iuliu Hatieganu” University of Medicine and Pharmacy Cluj-Napoca, Romania
- Academic year 2005-2006
- One series out of five
METHODOLOGY OF SYSTEM EVALUATION

- The aim of the study & enrolment
- Students eligibility:
  - Attended to the traditional course for EBM education
  - Complete the baseline characteristics form (access to an individual computer with CD-ROM)
  - Complete the consent participation form
**Methodology of System Evaluation**

- Two groups: intervention and control
- Both:
  - Traditional EBM two-hour course (covered the steps of practicing evidence-based medicine):
    - 18 true/false paper-based questionnaire with 5 problem-based questions
  - Previously received training in research methodology, epidemiology, and statistics
- Intervention group: additional computer-based training (3 months)
  - 45 multiple-choice questions with 15 clinical problem-based questions
RESULTS: SUMMARY OF GROUPS CHARACTERISTICS

- Differences between the groups:
  - Gender
    - 67.50% F in intervention group – n = 40
    - 64.29% F in control group – n = 56
    - p = 0.743
  - Age:
    - $m_i = 21.78$ in intervention group
    - $m_c = 21.91$ in control group
    - p = 0.235
RESULTS: SUMMARY OF GROUPS CHARACTERISTICS

- Differences between the groups:
  - Computer access:
    - \( p = 0.713 \)
  - Internet access:
    - \( p = 0.676 \)
  - 1\textsuperscript{st} time contact with EBM:
    - \( p = 0.003 \) (A higher percent of students from intervention group were familiar with the EBM previous to the study compared with the control group)
# Results: Evaluation of Web-Based Curriculum

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Intervention (n = 40)</th>
<th>Control (n = 56) &amp; Intervention (n = 40)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. questions (type)</td>
<td>45</td>
<td>18</td>
</tr>
<tr>
<td>Average [95%CI]</td>
<td>37.90</td>
<td>11.11</td>
</tr>
<tr>
<td>StDev</td>
<td>2.15</td>
<td>2.32</td>
</tr>
<tr>
<td>Me</td>
<td>38</td>
<td>11</td>
</tr>
<tr>
<td>Min</td>
<td>32</td>
<td>7</td>
</tr>
<tr>
<td>Max</td>
<td>42</td>
<td>16</td>
</tr>
</tbody>
</table>

MCQs = multiple-choice questions; StDev = standard deviation; Me = median; Min = minimum; Max = maximum; 95% CI = 95% confidence intervals.
RESULTS: EVALUATION OF WEB-BASED CURRICULUM

Students’ performances (both groups): eighteen questions test

- 7/18 (39%)
- 8/18 (44%)
- 9/18 (50%)
- 10/18 (56%)
- 11/18 (61%)
- 12/18 (67%)
- 13/18 (72%)
- 14/18 (78%)
- 15/18 (83%)
- 16/18 (89%)

干预组 (n=40) 和对照组 (n=56) 获得指定正确答案的学生百分比
RESULTS: EVALUATION OF WEB-BASED CURRICULUM

At the end of EBM course:
- There were not significant differences on EBM knowledge between intervention and control groups:
  - $p = 0.7948$
  - $n_{intervention} = 40$
  - $n_{control} = 56$
RESULTS: EVALUATION OF WEB-BASED CURRICULUM

Students’ performances on intervention group: test of forty-five questions

percent of students that gave the specified correct answers
RESULTS: EVALUATION OF WEB-BASED CURRICULUM

Comparison intervention and control groups:

Averages of the proportion of correct answers:

- intervention group: 0.844, n = 40
- control group: 0.617, n = 56
- p = 0.0174
RESULTS: EVALUATION OF WEB-BASED CURRICULUM

Comparison intervention and control groups:

<table>
<thead>
<tr>
<th>Class</th>
<th>1: ≥50</th>
<th>2: ≥60</th>
<th>3: ≥70</th>
<th>4: ≥80</th>
</tr>
</thead>
<tbody>
<tr>
<td>$f_{a\text{-int}}$</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>36</td>
</tr>
<tr>
<td>$f_{r\text{-int}}$</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0.9</td>
</tr>
<tr>
<td>95% CI$_{fr\text{-int}}$</td>
<td>[0.90–1.00]</td>
<td>[0.90–1.00]</td>
<td>[0.90–1.00]</td>
<td>[0.78–0.97]</td>
</tr>
<tr>
<td>$f_{a\text{-con}}$</td>
<td>51</td>
<td>32</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td>$f_{r\text{-con}}$</td>
<td>0.9</td>
<td>0.6</td>
<td>0.2</td>
<td>0.1</td>
</tr>
<tr>
<td>95% CI$_{fr\text{-con}}$</td>
<td>[0.80–0.96]</td>
<td>[0.43–0.70]</td>
<td>[0.11–0.32]</td>
<td>[0.04–0.21]</td>
</tr>
<tr>
<td>$p$</td>
<td>0.0421</td>
<td>&lt; 0.001</td>
<td>&lt; 0.001</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

$f_a$ = absolute frequency; $f_r$ = relative frequency; 95% CI$_r$ = 95% confidence interval for relative frequency; int = intervention group (n = 40); con = control group (n = 56)
CONCLUDING REMARKS

- Traditional method for EBM training (a two-hour course) it is not adequate
- The interactive web-based approach was efficient and effective in undergraduate students’ EBM education
- However, more researches comparing the proposed web-based curriculum with other educational models, applied on residents and practitioners are imperative
References

- Proc 11 ISHIMR 328-38;2006.
ACKNOWLEDGEMENTS

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Thank you for your attention!