Curricular Trends in U.S. Undergraduate Medical Education: Examples from Pre-Clinical Teaching of Physical Examination and Preparatory Curriculum for Transition to Residency

University of Tokyo
Medical Education Lecture

Yoon Soo Park, PhD
January 16, 2018
Overview

1. Curricular Changes in Medical Education

2. Examples in Medical School
   – Pre-Clinical: Teaching of Physical Examination
   – Clinical: Competency-Based Education

3. Example from Residency
   – General Surgery

4. Implications
Recap from Lecture #2 –
“Tea-Steeping” Model
Hodges BD. Academic Medicine. 2010
Snell LS, Frank JR. Medical Teacher. 2010

“Good” Tea!
Competent Physicians
Fixed Time
Four or Six Years

“Steep” in Hot Water
Medical School

Tea Bag
Medical Student
Reflecting on Medical Education

Flexner Report (1910) 100+ Years Later??

American Reactions

Canadian Reactions

2010 2014 2010 2012
Medical Education Structure

Pre-Clinical

Years 1 – 2

Clinical

Years 3 – 4

Residency

Postgraduate Training

Medical School

Prepared for Transition?
Example 1: Physical Examination (Pre-Clinical Medical Students)

Preclinical and Clinical Years

Instruction and Assessment of Physical Examination

M1  M2  M3  M4
Example 2: Competency-Based Curriculum (Graduating Medical Students)
Example 3: Competency-Based Curriculum (General Surgery)

Postgraduate Training

- Residency
- 5 Year Program

Subspecialty – Fellowship Prepared?

Modified Training Structure?
Examples: U.S. Curricular Trends

Example 1: Physical Examination

Example 2: Preparatory Curriculum

Example 3: General Surgery

National Survey Directors of Clinical Skills Courses

Literature Review Germann et al

National Survey American College of Surgeons
Example 1: Physical Examination (Pre-Clinical Medical Students)

Preclinical and Clinical Years

Instruction and Assessment of Physical Examination

M1  M2  M3  M4
Physical Examination (1)

- Critical Tool
  - ↓ Physical Exam Skills → ↓ Quality Care
  - ↓ Physical Exam Skills → ↓ Medical Errors

- Labor Intensive – Human Resource
  - Patients: Standardized (Simulated), Actual
  - Teachers: Faculty, Senior Students

- Concerns about Physical Examination training
  - 48% of Clerkship Directors
  - Less prepared than necessary
Physical Examination (2)

Inadequate Physical Exam Training

1. Lack expertise / confidence
2. Unnecessary diagnostic testing
3. Value of Physical Exam to Future Students

• Little is known
  – How do medical schools teach physical examination skills?
Physical Examination (3)

Examples – types of Physical Examination models

• Head-To-Toe [Traditional]
• Core Physical Examination
• Core + Clusters Approach
• Hypothesis-Driven Physical Examination

Questions

• How much time spent?
• Practice with who?
• How large are the groups?
• Resources? Compensation?
• ... and others
Traditional: Head-To-Toe Approach

- 1<sup>st</sup> or 2<sup>nd</sup> year, organ-based approach
- “Head-to-toe” examination of standardized patient
- 138 (or 140+) checklist items!

**Positive**
- Reliable assessment
- Direct feedback

**Negative**
- Lengthy and expensive
- Lack context: clinical reasoning and pathophysiology
- Memorized – counter to clinical reasoning skills
Approaches *Beyond* Head-To-Toe

Core Exam / Core + Cluster Physical Examination

Hypothesis-Driven Physical Examination
Discussions on Physical Examination – Academic Medicine Letters to the Editor

To the Editor

Yudkowsky, Rakhlin MD, MHPE

Academic Medicine, June 2014 - Volume 89 - Issue 6 - p 834-835
doi: 10.1097/ACM.0000000000000262
Letters to the Editor

In Reply to Yudkowsky

Gowda, Deepthman MD, MPH, Blatt, Benjamin MD, Kosowicz, Lynn Y. MD, Silvestri, Ronald C. MD

Academic Medicine, June 2014 - Volume 89 - Issue 6 - p 835
doi: 10.1097/ACM.0000000000000272
Letters to the Editor

In Reply to Gowda et al and to Yudkowsky

Uchida, Toshiko M.D. Faiman, Joanne M. MD, MHPE, Schwartz, Jennifer E. MD; Herman, Heather L. MD

Academic Medicine, June 2014 - Volume 89 - Issue 6 - p 835
doi: 10.1097/ACM.0000000000000259
Letters to the Editor

Addressing Concerns About a “Core + Clusters” Physical Exam

Gowda, Deepthman MD, MPH, Blatt, Benjamin MD, Kosowicz, Lynn Y. MD, Silvestri, Ronald C. MD

Academic Medicine, June 2014 - Volume 89 - Issue 6 - p 834
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Letters to the Editor
Entrustable Professional Activity #1

EPA 1: Gather a History and Perform a Physical Examination

Key Functions with Rotated Competencies
- Obtain a complete and accurate history in an organized fashion
- Does not collect accurate historical data
- Relies exclusively on secondary sources or documentation of

Behaviors Requiring Corrective Response
- Gathers excessive or incomplete data
- Does not deviate from a template
- Questions are prioritis not excessive

Developing Behaviors
(Learner may be at different levels within a row)

- Does not consider patient's privacy and comfort during exams
- Incorrectly performs basic physical exam maneuvers
- Performs basic exam maneuvers correctly
- Does not perform exam in an organized fashion
- Relies on head-to-toe examination
- Misses key findings
- Targets the exam to areas necessary for the encounter
- Identifies and describes normal findings
- Explains exam maneuvers to patient
- Performs an accurate exam in a logical and fluid sequence
- Uses the exam to explore and prioritize the working differential diagnosis
- Can identify and describe normal and abnormal findings

Curricular Trends: Physical Examination

- Directors of Clinical Skills Courses (DOCS)
- National Survey ($n = 106$ medical schools)
- Resources and Educational Practices
  - Teach Physical Examination $\rightarrow$ Pre-Clinical Medical Students
National Survey

• 106 medical schools (out of 141 schools, 75% response rate)
  – Data: October 2015 to February 2016

• Pre-Clerkship Curriculum Duration
  – ≤ 18 months: 43%
  – 19-21 months: 32%
  – > 22 months: 25%

• Physical Examination curriculum
  – Introduced 2 months into curriculum
  – Inter-professional education: 59%
  – Other health professions student (e.g., dental, PA, nurse): 8%
Results

• **Number of hours:** 82 hours (SD = 71)
  – 12 schools < 30 hours
  – 6 schools > 200 hours

• **Teaching**
  – Classroom (Small Group): 32%
  – Simulation Center: 30%
  – Patient Clinical Setting: 22%
  – Lectures: 13%
Resources (1) – Time Spent to Practice

~50% schools use < 15% of practice time with actual patients!
Resources (2) – Instructors and Group Size

• Instructors
  – Generalist Faculty: 65%
  – Specialist Faculty: 17%
  – Senior Student (without faculty): 5%
  – Standardized Patient (without faculty): 12%

• Group Size
  – Small Group Classroom: 8 (SD = 4, range 2 – 20)
  – Inpatient Preceptor: 3 (SD = 2, range 1 – 12)
  – Outpatient Setting: 2 (SD = 1, range 1 – 5)
Observation and Resources

Faculty Direct Observation
- Standardized Patients: 76%
- Peer: 76%
- Real Patients: 56%
- Mannequins / Simulators: 53%
  • 19% observe in all settings

• History taking integrated with PE: 87%

Sequence
• Teach Basic Skills → Advanced PE skills: 47%
• Same Time by organ system: 33%
Instruction

Comprehensive Approach 77%
  • Head-To-Toe
  • Organ System

Clinical Reasoning Approach 59%
  • Hypothesis-Driven
  • Problem-Focused
  • Evidence-Based

Time Spent
  • Comprehensive: 65%
  • Clinical Reasoning PE: 35%
Assessment (1)

Developing checklist

- Course Directors: 92%
- Course Faculty: 63%
- Use Accepted List: 25%

Scoring

**Live**
- Formative: 85%
- Summative: 87%
- Not Used: 1%

**Video (later)**
- Formative: 22%
- Summative: 41%
- Not Used: 22%
## Assessment (2)

### Who Serves as Patient?

<table>
<thead>
<tr>
<th></th>
<th>Formative</th>
<th>Summative</th>
<th>Not Used</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standardized Patient</strong></td>
<td>79%</td>
<td>92%</td>
<td></td>
</tr>
<tr>
<td><strong>Real Patient</strong></td>
<td>25%</td>
<td>3%</td>
<td>47%</td>
</tr>
<tr>
<td><strong>Student</strong></td>
<td>26%</td>
<td>10%</td>
<td>44%</td>
</tr>
</tbody>
</table>
### Assessment (3)

#### Who Scores the Checklist?

<table>
<thead>
<tr>
<th></th>
<th>Standardized Patient</th>
<th>Faculty</th>
<th>Student</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formative</td>
<td>8%</td>
<td>63%</td>
<td>14%</td>
</tr>
<tr>
<td>Summative</td>
<td>16%</td>
<td>62%</td>
<td>10%</td>
</tr>
<tr>
<td>Not Used</td>
<td>41%</td>
<td>5%</td>
<td>42%</td>
</tr>
</tbody>
</table>
Assessment (4)

Standard Setting – cutscore

- Norm-Referenced (e.g., Mean – 2 SD): 37%
- Angoff or Hofstee: 10%
- Borderline Group Method: 7%
- Standard by Course Director: 62%
- Standard by Committee: 38%

Number of Physical Examination assessments

- Summative (contribute to final grade): 4 (SD = 3)
- Formative: 7 (SD = 8)
Compensation (1)

Compensation of Physical Examination Faculty: Overall (%)

- Money: 20%
- Time: 26%
- Both: 11%
- None: 34%
Compensation (2)

Compensation by Role (%)

<table>
<thead>
<tr>
<th></th>
<th>Course Director</th>
<th>Large Group</th>
<th>Small Group</th>
<th>Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Money</td>
<td>31</td>
<td>12</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>20</td>
<td>27</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Both</td>
<td>23</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>None</td>
<td>51</td>
<td>32</td>
<td>6</td>
<td>46</td>
</tr>
</tbody>
</table>
Example 2: Competency-Based Curriculum (Graduating Medical Students)
Graduating Year of Medical School

- **Unstructured**, lacking clear goals and objectives

- Scrutiny with demands from **accreditation agencies**
  - ACGME Milestones
  - AAMC Core Entrustable Professional Activities (EPA)

4th Year Medical School Curriculum  Transition to Postgraduate Residency Training

Competency-Based Medical Education ??
Literature Review

• Senior-Year Internship Preparatory Courses
  – Can ease transition to residency

• Trends in US 4th year curriculum
• Preparatory courses → competency-based medical education

• Study led by Germann (Tufts University)

• Articles found
  – 6,477 articles → 4,051 articles (removing duplicates)
  – Total 817 articles
Articles Reviewed (1)

• Articles found
  – 93% research papers
  – 2% review articles

• Clinical Skills: 67%
  – Procedural Skills
  – Interpersonal Skills (professionalism, communication)

• Internship Preparatory: 6%
• Career Decision-Making: 6%
• Interprofessional Education: 5%
Articles Reviewed (2)

• **Simulation:** 100% increase
  – 2007-2011: $n = 52$
  – 2012-2016: $n = 117$

• **Competency-Based Framework:** 268% increase
  – 2007-2011: $n = 47$
  – 2012-2016: $n = 173$

• **Preparatory Course:** 218% increase
  – 2007-2011: $n = 11$
  – 2012-2016: $n = 35$
Number of Articles:
Senior Year Preparatory Courses

Frequency (count)

4 2 1 2 3 3 7 4 8 6 10
Preparatory Curriculum

• Competency-Based Medical Education (CBME)
  – 75% used CBME framework

• Specialties
  – Surgery: 39%
  – Pediatrics: 8%
  – Internal Medicine: 6%
  – Emergency Medicine: 4%
  – Obstetrics and Gynecology: 4%
  – Geriatrics: 2%
  – Pharmacology: 2%
Example 3: Competency-Based Curriculum (General Surgery)

Postgraduate Training

Residency

5 Year Program

Subspecialty – Fellowship
Prepared?

Modified Training Structure?
Residency Training: General Surgery
National Survey

Journal of Surgical Education

“Taking Training to the Next Level”: The American College of Surgeons Committee on Residency Training Survey
Richard B. Damewood, MD, FACS, Patrice Cahill Blair, MPH, Yoon Soo Park, PhD, Linda K. Lupi MBA, Rachel Williams Newman, MS, Ajit K. Sachdeva, MD, FRCSC, FACS

• American College of Surgeons
• Association of Program Directors in Surgery
• Accreditation Council for Graduate Medical Education
• American Board of Surgery
National Survey (1)

- Perspectives → Program Directors
- 135 General Surgery Programs (March – August 2016)

Areas Surveyed
- Goals of residency education
- Areas of greatest need
- Proficiency-based training
- Autonomy
- Structured curricula
- Best practices
- Faculty development
- Resources
- Models for surgery residency
Comparison of Today’s Residents (to 10 Years ago)

% Less Prepared

Entering Residents

<table>
<thead>
<tr>
<th>Skill</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical Knowledge</td>
<td>38%</td>
</tr>
<tr>
<td>Clinical Skills</td>
<td>62%</td>
</tr>
<tr>
<td>Technical Skills</td>
<td>62%</td>
</tr>
<tr>
<td>Critical thinking skills</td>
<td>46%</td>
</tr>
<tr>
<td>Decision-making and judgment</td>
<td>52%</td>
</tr>
</tbody>
</table>

Graduating Residents

<table>
<thead>
<tr>
<th>Skill</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical Knowledge</td>
<td>20%</td>
</tr>
<tr>
<td>Clinical Skills</td>
<td>48%</td>
</tr>
<tr>
<td>Technical Skills</td>
<td>61%</td>
</tr>
<tr>
<td>Critical thinking skills</td>
<td>40%</td>
</tr>
<tr>
<td>Decision-making and judgment</td>
<td>51%</td>
</tr>
</tbody>
</table>

- Professionalism, Interpersonal and Communication Skills
Challenges

Limiting Resident Autonomy

- Liability: 68%
- Patients who do not want to be cared by residents: 68%
- Regulations: 65%

Final Year of Medical School

- 62% suggest significant overhaul of 4th year of medical school
Factors Posing Challenges / Needing Increased Activity – Current 5-Year Structure

**Factors Posing Challenges**

- Unfunded Mandates: 62%
- Duty Hour Restrictions: 54%
- Supervision Requirements: 46%
- Decreasing # Operations: 30%

**Areas Needing Increased Activity**

- Resident Autonomy: 63%
- Use of National Curricula: 24%
- Endoscopy Training: 17%
- Use of Simulation: 15%
Curricular Models (1)

Alternative models proposed:

- Five year surgery core plus one year transition: “5+1”
- Four year surgery core plus one year transition: “4+1” Model
- Four year surgery core plus two years transition: “4+2” Model
- Three year surgery foundational experience plus two or three years specialty experience: “3+2” Model
Curricular Models (2)

One Best Recommendation?

<table>
<thead>
<tr>
<th>Structure</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keep existing 5-year structure</td>
<td>22%</td>
</tr>
<tr>
<td>Keep existing 5-year structure + 6\textsuperscript{th} year of formal transition (5+1)</td>
<td>12%</td>
</tr>
<tr>
<td>Keep existing 5-year structure + 6\textsuperscript{th} year of fellowship</td>
<td>3%</td>
</tr>
<tr>
<td>Move to 4-year core training + 5\textsuperscript{th} year of transition (4+1)</td>
<td>11%</td>
</tr>
<tr>
<td>Move to 4-year core training + 5\textsuperscript{th} &amp; 6\textsuperscript{th} year of specialization (4+2)</td>
<td>28%</td>
</tr>
<tr>
<td>Move to 3-year core training + 4\textsuperscript{th} &amp; 5\textsuperscript{th} year of specialization (3+2)</td>
<td>13%</td>
</tr>
</tbody>
</table>
Curricular Model (3): Preparedness, Feasibility, and Acceptability

- "5+1" Model: Preparedness 67%, Feasibility 48%, Acceptability 26%
- "4+1" Model: Preparedness 44%, Feasibility 60%, Acceptability 21%
- "4+2" Model: Preparedness 77%, Feasibility 30%, Acceptability 21%
- "3+2" Model: Preparedness 67%, Feasibility 29%, Acceptability 26%
Implications
The Goal of the Continuum of Clinical Professional Development in a 3 Year Specialty Program

- Master
  - Patient Care
- Expert
  - Systems Based Practice
  - Professionalism
- Proficient
- Competent
- Advanced
- Beginner
- Novice

PGY 1  |  PGY 2  |  PGY 3  |  MOL/MOC CPD

Note: Slide taken from Nasca (2012); accessible on ACGME website
Recent Changes in North America

National Institutes of Health
Translational Science

Institute of Medicine
Gap in Training and Practice

Graduate Medical Education
Accreditation and Funding

Undergraduate Medical Education
Licensure Examination
Motivation for Change

• Graduate medical education
  – Accreditation body (Accreditation Council for Graduate Medical Education)
  – Need valid assessment systems
  – Institute of Medicine

• Undergraduate medical education
  – Changes to licensing examination (USMLE)
  – History and Physical Examination
  – Communication and Interpersonal Skills
  – Patient Note
End USMLE Step 2 Clinical Skills – Why?

Eliminate Step 2 CS for US Medical Graduates

In 2004, the US Medical Licensing Exam (USMLE) was expanded to include a clinical skills assessment - Step 2 CS. A similar exam had previously been administered only to foreign medical graduates, but since the change all graduates of US medical schools are required to pass the exam prior to obtaining a medical license. We strongly believe eliminating the national clinical skills exam for US medical graduates reduces unnecessary costs in the education process without negatively affecting patient care.
Response from the Community

Step Up—Not On—The Step 2 Clinical Skills Exam: Directors of Clinical Skills Courses (DOCS) Oppose Ending Step 2 CS
Ecker David J, MD, Milan, Felipe S, MD, Cassese, Todd MD; Farhan Jeanine M, MD, MHPE; Madigosky, Wendy S, MD, MSPH; Masse, P., Stanford Jr MD, Mendiz, Paul MD; Obadia, Sharon DO; Ovitesh, Robin K, MD; Silvestri, Ronald MD, Uchida, Toshiko MD, Daniel, Michele MD, MHPE
Academic Medicine: Post Author Corrections: August 22, 2017
doi: 10.1097/ACM.0000000000001874
Perspective: PDF Only

Can We Increase the Value and Decrease the Cost of Clinical Skills Assessment?
Burdick William P., MD, MSEd, Boulet, John R, PhD; LeBlanc, Kim Edward MD, PhD
Academic Medicine: Post Author Corrections: August 22, 2017
doi: 10.1097/ACM.0000000000001867
Invited Commentary: PDF Only
Medical Education Structure

Pre-Clinical
Years 1 – 2

Clinical
Years 3 – 4

Residency
Postgraduate Training

Medical School

Prepared for Transition?
Questions

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