



**THE UNIVERSITY OF ILLINOIS**  
**COLLEGE OF MEDICINE**  
CHICAGO PEORIA ROCKFORD URBANA

**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



Tea Bag

Medical  
Student



“Steep” in Hot Water  
Medical School

## “Good” Tea!

Competent  
Physicians

Fixed Time  
Four or Six  
Years



# Reflecting on Medical Education

Flexner Report  
(1910)



100+ Years  
Later??

The NEW ENGLAND JOURNAL of MEDICINE

REVIEW ARTICLE

MEDICAL EDUCATION  
Malcolm Cox, M.D., and David M. Irby, Ph.D., Editors

American Medical Education 100 Years  
after the Flexner Report

Molly Cooke, M.D., David M. Irby, Ph.D., William Sullivan, Ph.D.,  
and Kenneth M. Ludmerer, M.D.

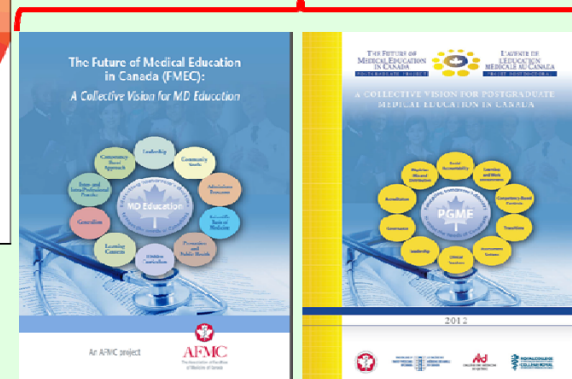
## American Reactions



2010

2014

## Canadian Reactions

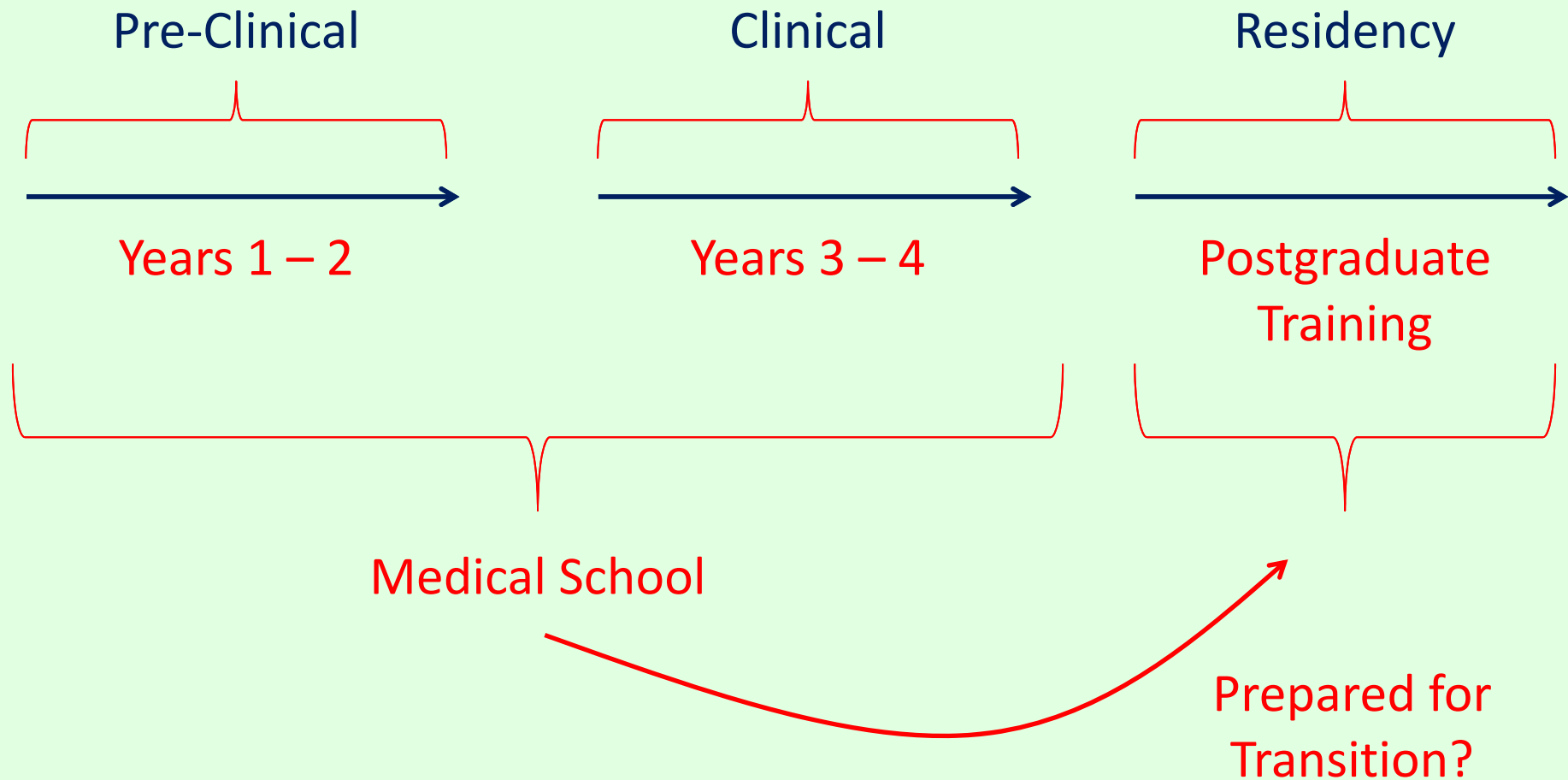


2010

2012



# Medical Education Structure

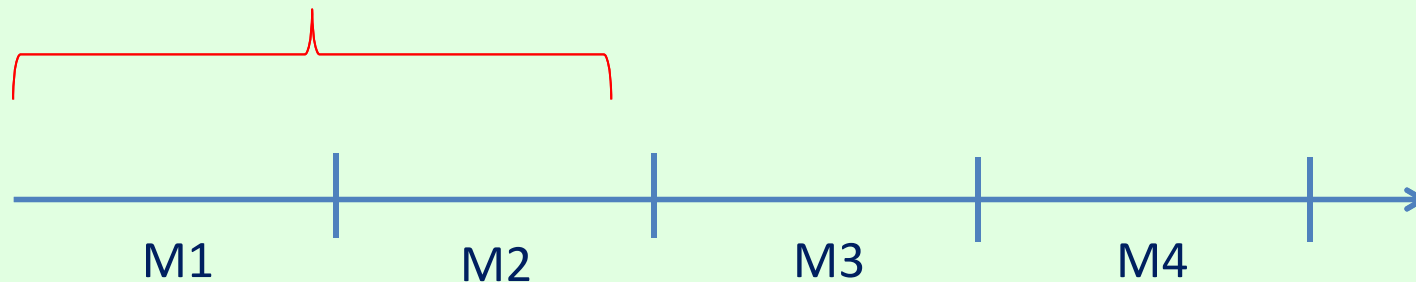




# Example 1: Physical Examination (Pre-Clinical Medical Students)

## Preclinical and Clinical Years

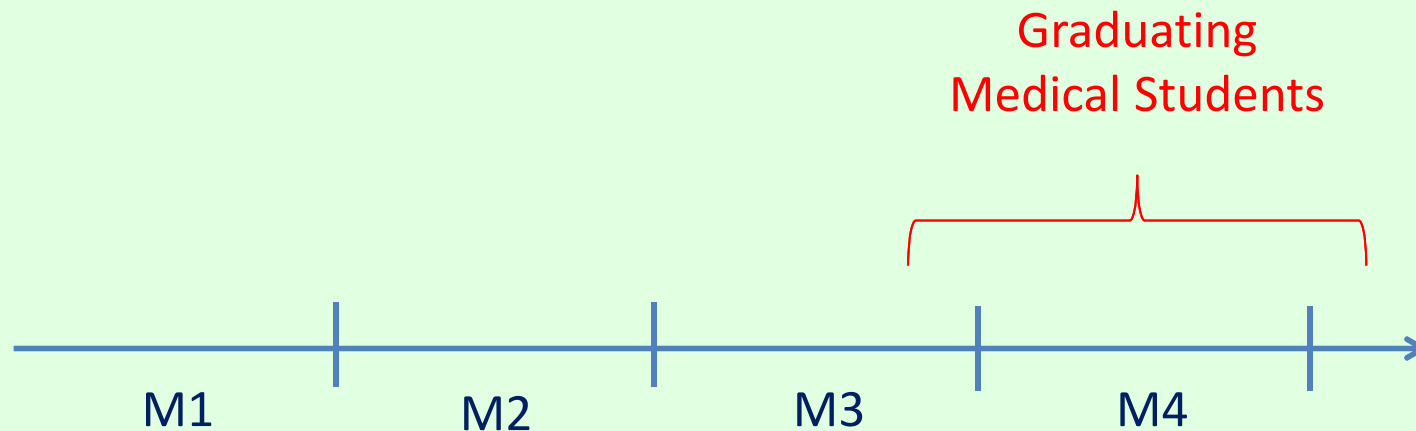
Instruction and Assessment  
of Physical Examination





# Example 2: Competency-Based Curriculum (Graduating Medical Students)

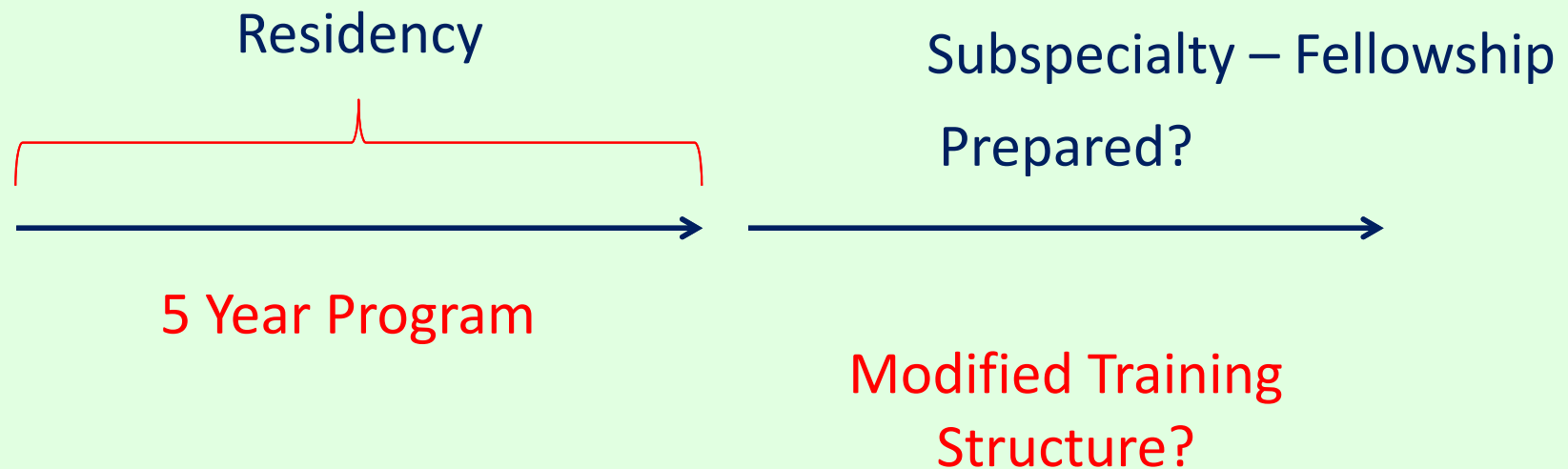
## Clinical Years





# Example 3: Competency-Based Curriculum (General Surgery)

## Postgraduate Training





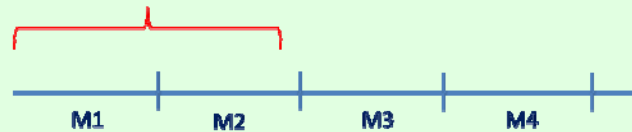


# Examples: U.S. Curricular Trends

Example 1:  
Physical Examination

## Predclinical and Clinical Years

Instruction and Assessment  
of Physical Examination

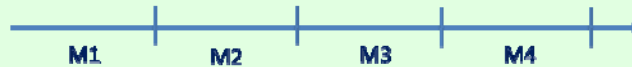


National Survey  
Directors of Clinical  
Skills Courses

Example 2:  
Preparatory Curriculum

## Clinical Years

Graduating  
Medical Students



Literature Review  
*Germann et al*

Example 3:  
General Surgery

## Postgraduate Training

Residency

Subspecialty – Fellowship  
Prepared?



Modified Training  
Structure?

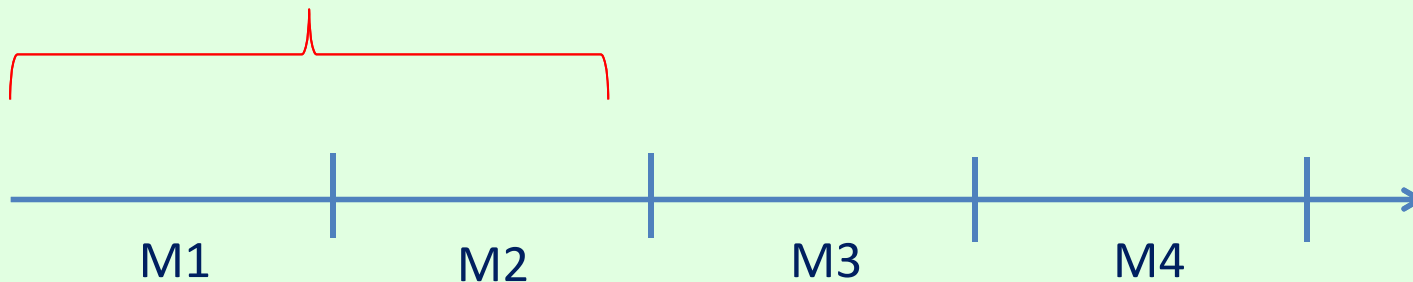
National Survey  
American College of  
Surgeons



# Example 1: Physical Examination (Pre-Clinical Medical Students)

## Preclinical and Clinical Years

Instruction and Assessment  
of Physical Examination





# 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

ACADEMIC MEDICINE | AAMC  
Journal of the Association of American Medical Colleges

**A Core Physical Exam for Medical Students: Results of a National Survey**

Gowda, Deepthiman MD, MPH; Blatt, Benjamin MD; Fink, Mary Johanna MD; Kosowicz, Lynn Y. MD; Baecker, Aileen MPH; Silvestri, Ronald C. MD

Academic Medicine: March 2014 - Volume 89 - Issue 3 - p 436-442  
doi: 10.1097/ACM.000000000000137  
Research Reports

ACADEMIC MEDICINE | AAMC  
Journal of the Association of American Medical Colleges

**Teaching the Physical Examination: A Longitudinal Strategy for Tomorrow's Physicians**

Uchida, Toshiko MD; Farnan, Jeanne M. MD, MHPE; Schwartz, Jennifer E. MD; Heiman, Heather L. MD

Academic Medicine: March 2014 - Volume 89 - Issue 3 - p 373-375  
doi: 10.1097/ACM.000000000000136  
Commentaries

## Hypothesis-Driven Physical Examination

ASME | medical education  
www.mededuc.com  
Explore this journal >

**A hypothesis-driven physical examination learning and assessment procedure for medical students: initial validity evidence**

Rachel Yudkowsky, Junji Otaki, Tali Lowenstein, Janet Riddle, Hiroshi Nishigori, Georges Bordage

First published: 20 July 2009 Full publication history  
DOI: 10.1111/j.1365-2923.2009.03379.x View/save citation

MEDICAL TEACHER | Journal  
Medical Teacher >  
Volume 33, 2011 - Issue 5

Research Article  
**A model teaching session for the hypothesis-driven physical examination**

Hiroshi Nishigori, Kozo Masuda, Makoto Kikukawa, Atsushi Kawashima, Rachel Yudkowsky, Georges Bordage & ...show all  
Pages 410-417 | Published online: 28 Feb 2011  
Download citation | https://doi.org/10.3109/0142159X.2010.540269



# Discussions on Physical Examination – *Academic Medicine* Letters to the Editor

ACADEMIC  
MEDICINE |  AAMC  
Journal of the Association of American Medical Colleges

## To the Editor

Yudkowsky, Rachel MD, MHPE

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

ACADEMIC  
MEDICINE |  AAMC  
Journal of the Association of American Medical Colleges

## In Reply to Yudkowsky

Gowda, Deepthiman 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

ACADEMIC  
MEDICINE |  AAMC  
Journal of the Association of American Medical Colleges

## In Reply to Gowda et al and to Yudkowsky

Uchida, Toshiko MD; Farnan, Jeanne M. MD, MHPE; Schwartz, Jennifer E. MD; Heiman, Heather L. MD

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

ACADEMIC  
MEDICINE |  AAMC  
Journal of the Association of American Medical Colleges

## Addressing Concerns About a “Core + Clusters” Physical Exam

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

Academic Medicine: June 2014 - Volume 89 - Issue 6 - p 834  
doi: 10.1097/ACM.0000000000000256  
Letters to the Editor





# Entrustable Professional Activity #1

**Core Entrustable Professional Activities for Entering Residency**

**EPA 1: Gather a History and Perform a Physical Examination**

An EPA: A unit of observable, measurable professional practice requiring integration of competencies

**EPA 1**

**Key Functions with Related Competencies**

Obtain a complete and accurate history in an organized fashion

PC2

**Behaviors Requiring Corrective Response**

Does not collect accurate historical data

Relies exclusively on secondary sources or documentation of

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

Gathers excessive or incomplete data

Does not deviate from a template

Uses a logical progression of questioning

Questions are prioritized and not excessive

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

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



# Curricular Trends: Physical Examination



## Resources Used to Teach the Physical Exam to Preclerkship Medical Students: Results of a National Survey

Uchida Toshiko MD; Achike, Francis I. MD, PhD, MEd; Blood, Angela D. MPH, MBA; Boyle, Mary MD; Farnan, Jeanne M. MD, MHPE; Gowda, Deepthiman MD, MPH; Hojsak, Joanne MD; Ovitsh, Robin K. MD; Park, Yoon Soo PhD; Silvestri, Ronald MD

Academic Medicine: Post Acceptance: November 07, 2017

doi: 10.1097/ACM.0000000000002051

Research Report: PDF Only

- **Directors of Clinical Skills Courses (DOCS)**
- National Survey ( $n = 106$  medical schools)
- **Resources and Educational Practices**
  - Teach **Physical Examination** → **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%

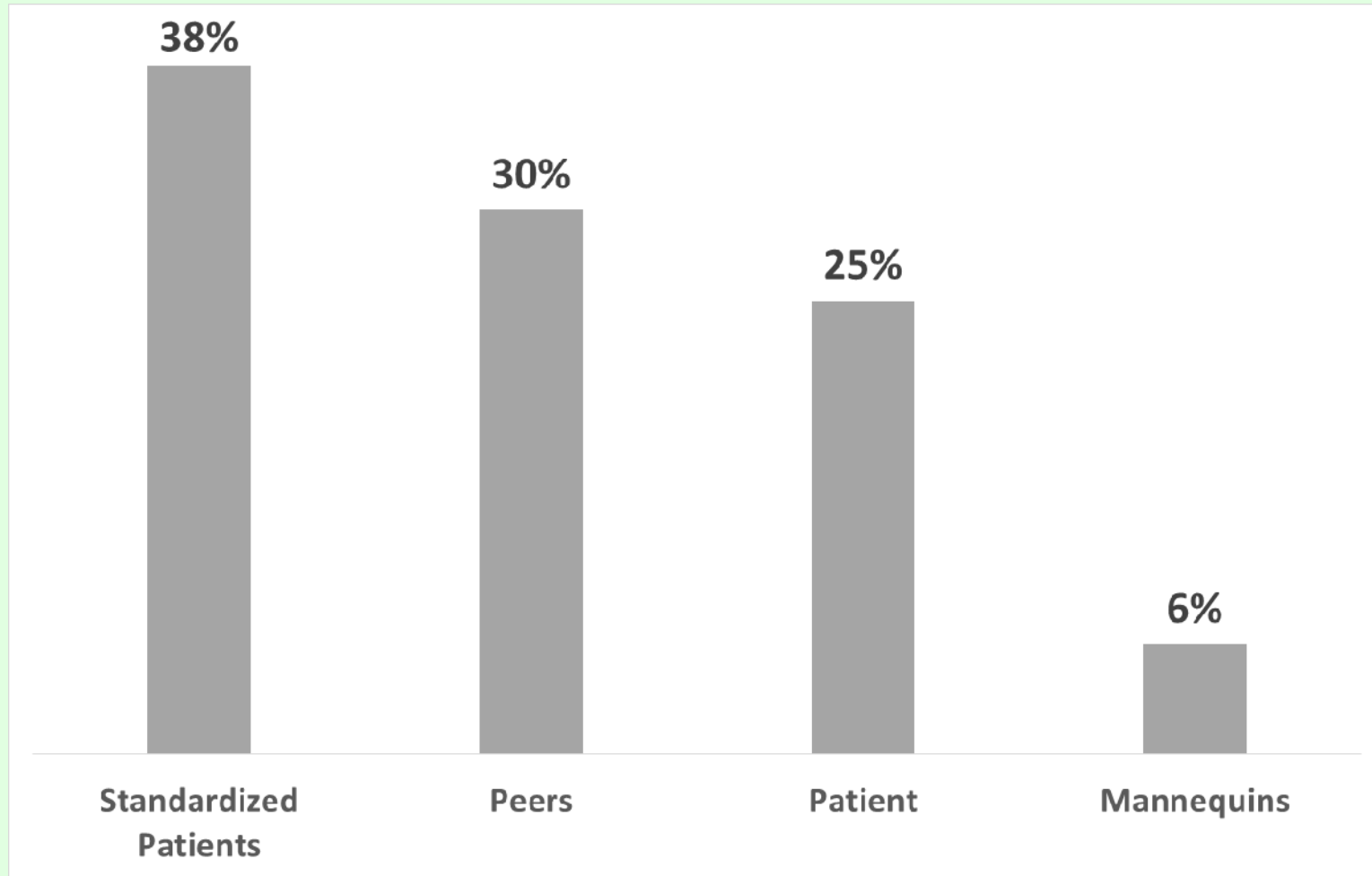


# Results

- **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%



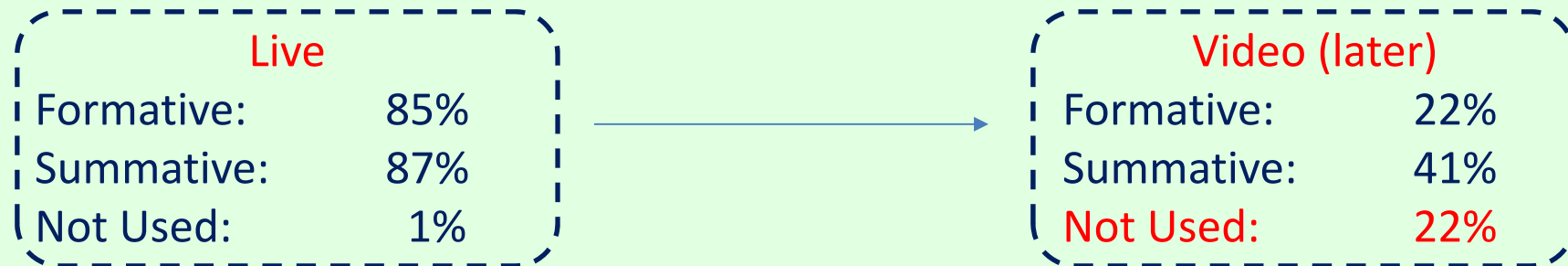


# Assessment (1)

## Developing checklist

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

## Scoring





# Assessment (2)

## Who Serves as Patient?

### Standardized Patient

Formative:	79%
Summative:	92%

### Real Patient

Formative:	25%
Summative:	3%
Not Used:	47%

### Student

Formative:	26%
Summative:	10%
Not Used:	44%



# Assessment (3)

## Who Scores the Checklist?

### Standardized Patient

Formative:	8%
Summative:	16%
Not Used:	41%

### Faculty

Formative:	63%
Summative:	62%
Not Used:	5%

### Student

Formative:	14%
Summative:	10%
Not Used:	42%



# 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%

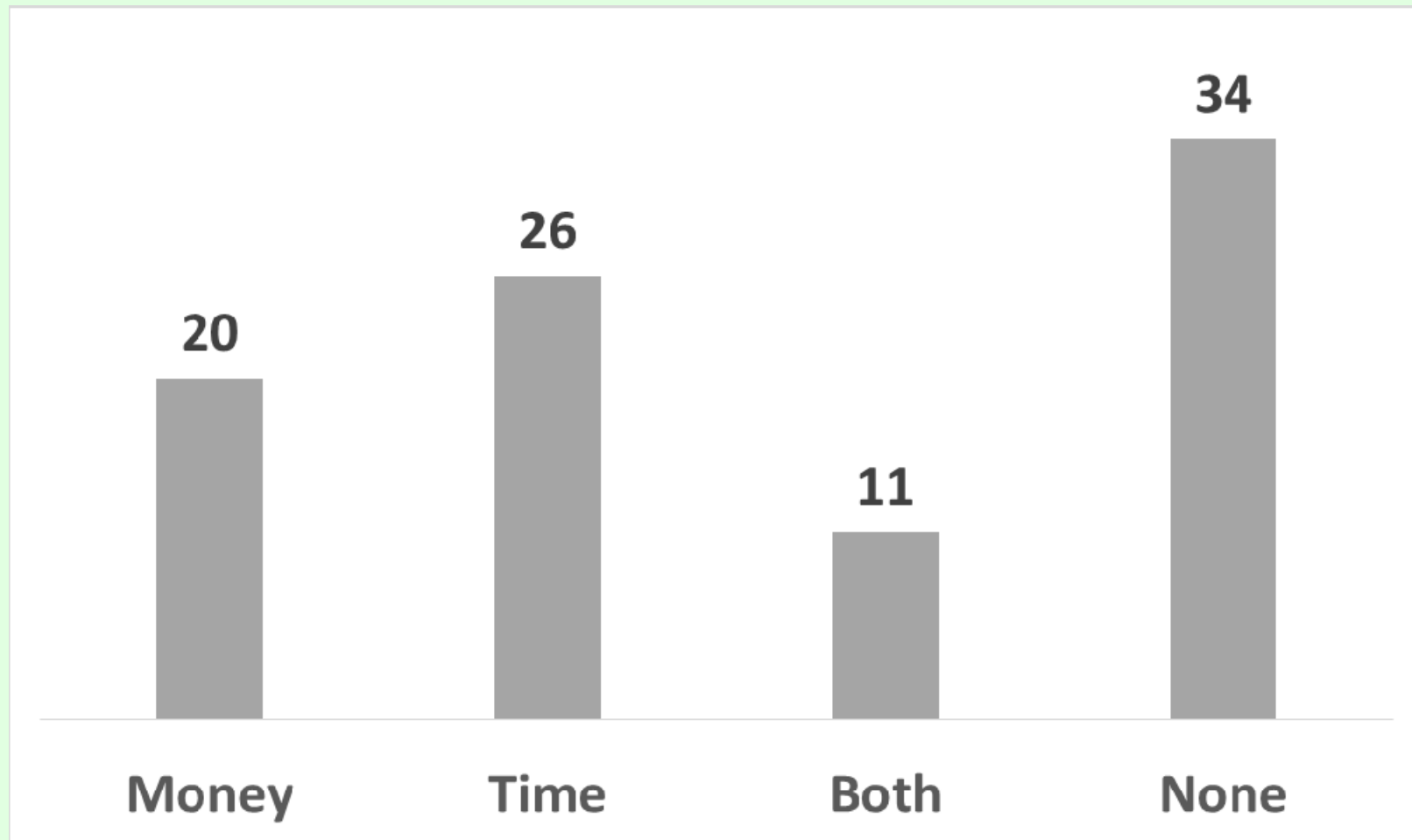
## Number of Physical Examination assessments

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



# Compensation (1)

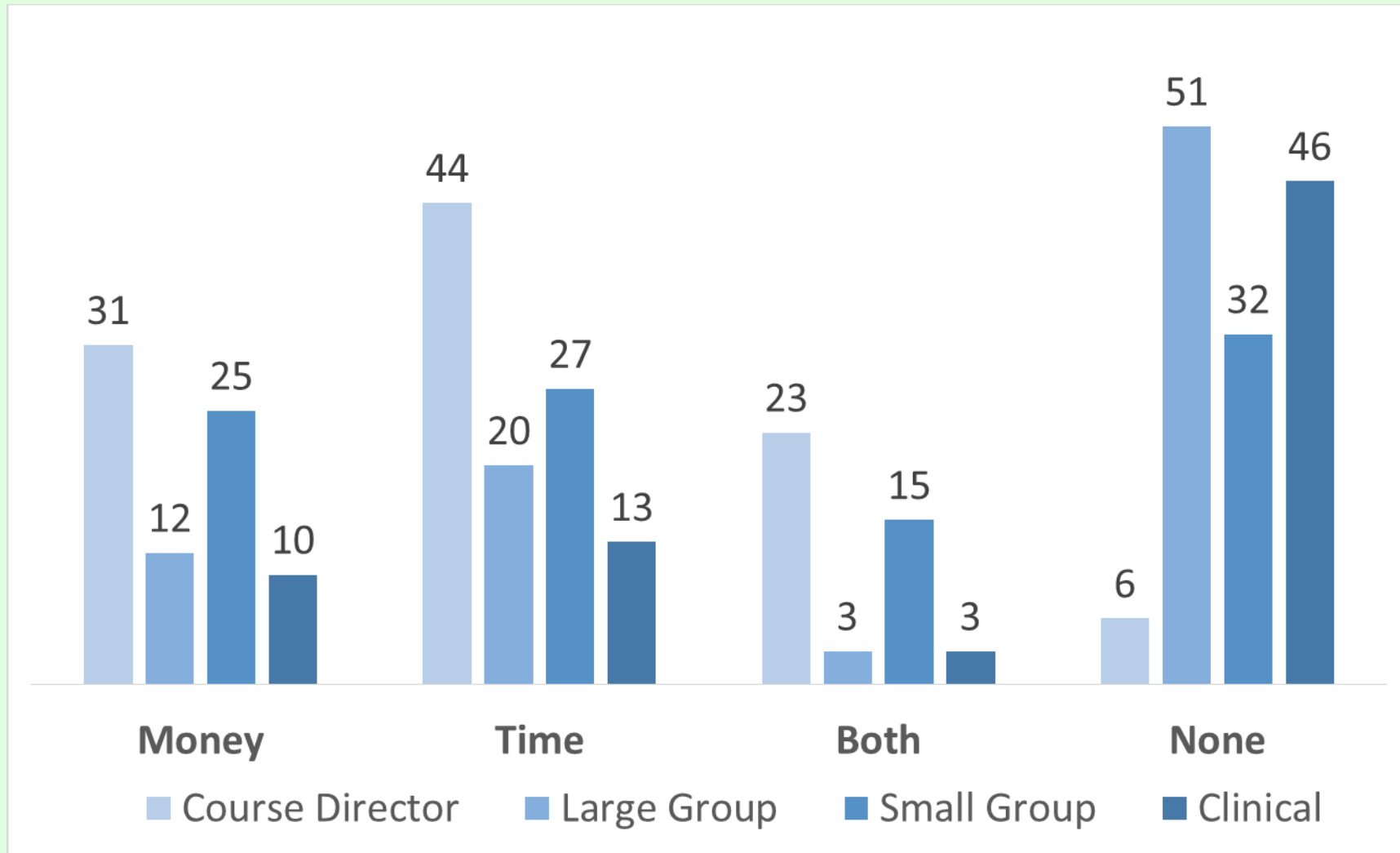
Compensation of Physical Examination Faculty: Overall (%)





# Compensation (2)

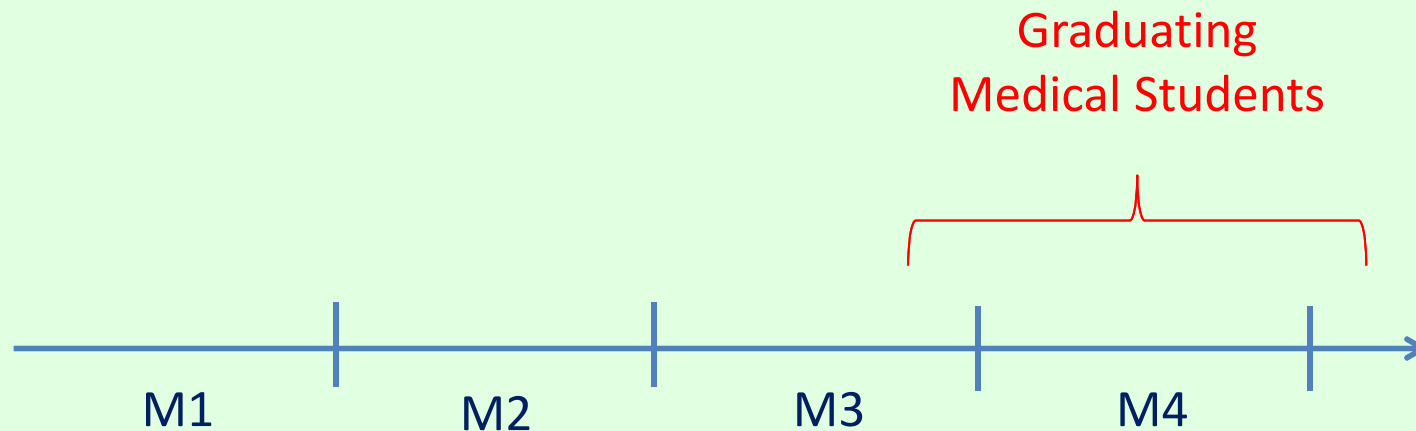
## Compensation by Role (%)





# Example 2: Competency-Based Curriculum (Graduating Medical Students)

## Clinical Years



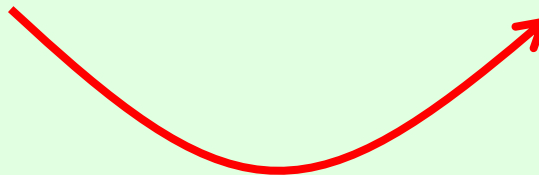


# Graduating Year of Medical School

- **Unstructured**, lacking clear goals and objectives
- **Scrutiny** with demands from **accreditation agencies**
  - ACGME Milestones
  - AAMC Core Entrustable Professional Activities (EPA)

4<sup>th</sup> 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 **4<sup>th</sup> 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%

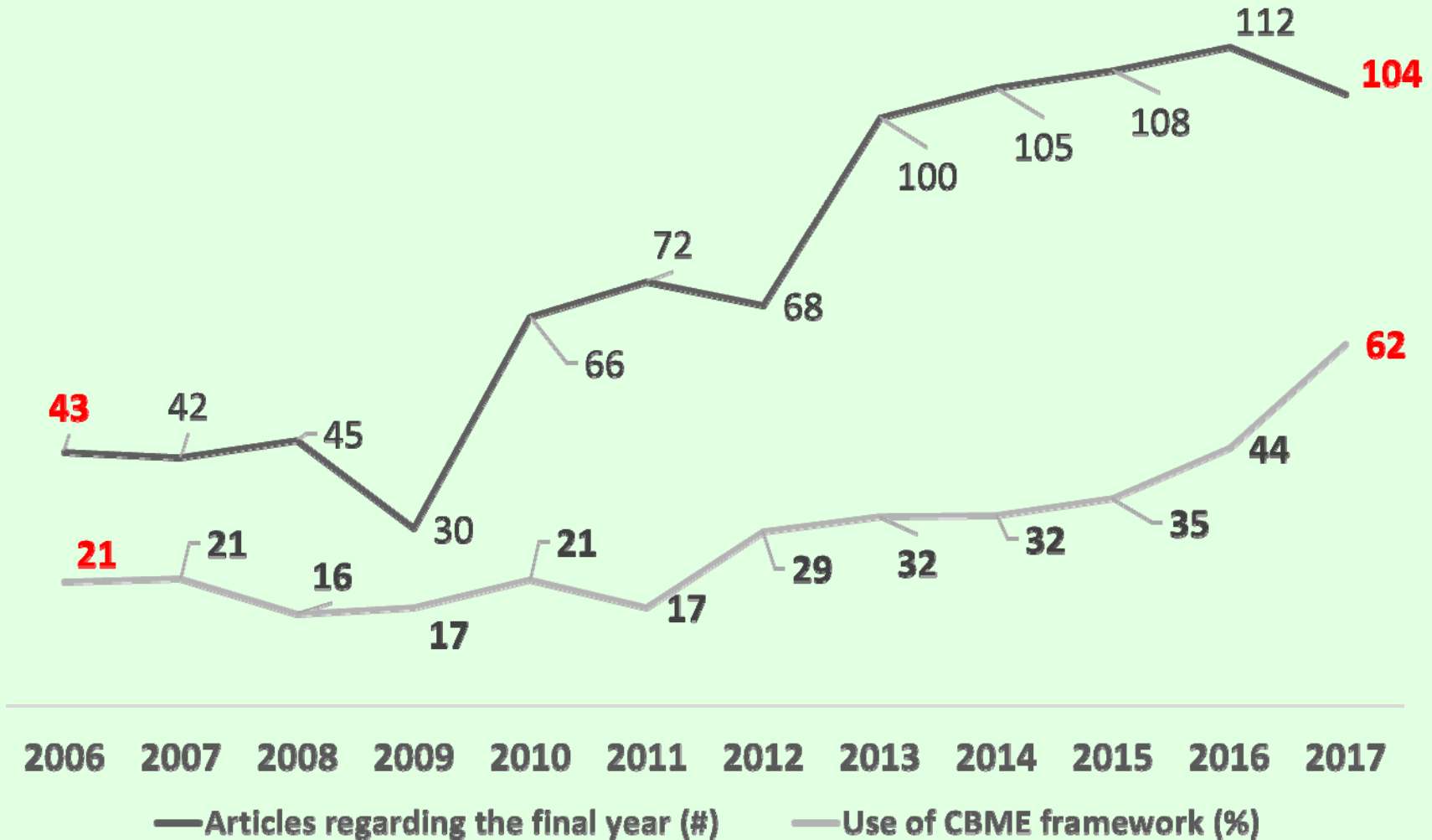


## Articles Reviewed (2)

- **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:  $n = 35$



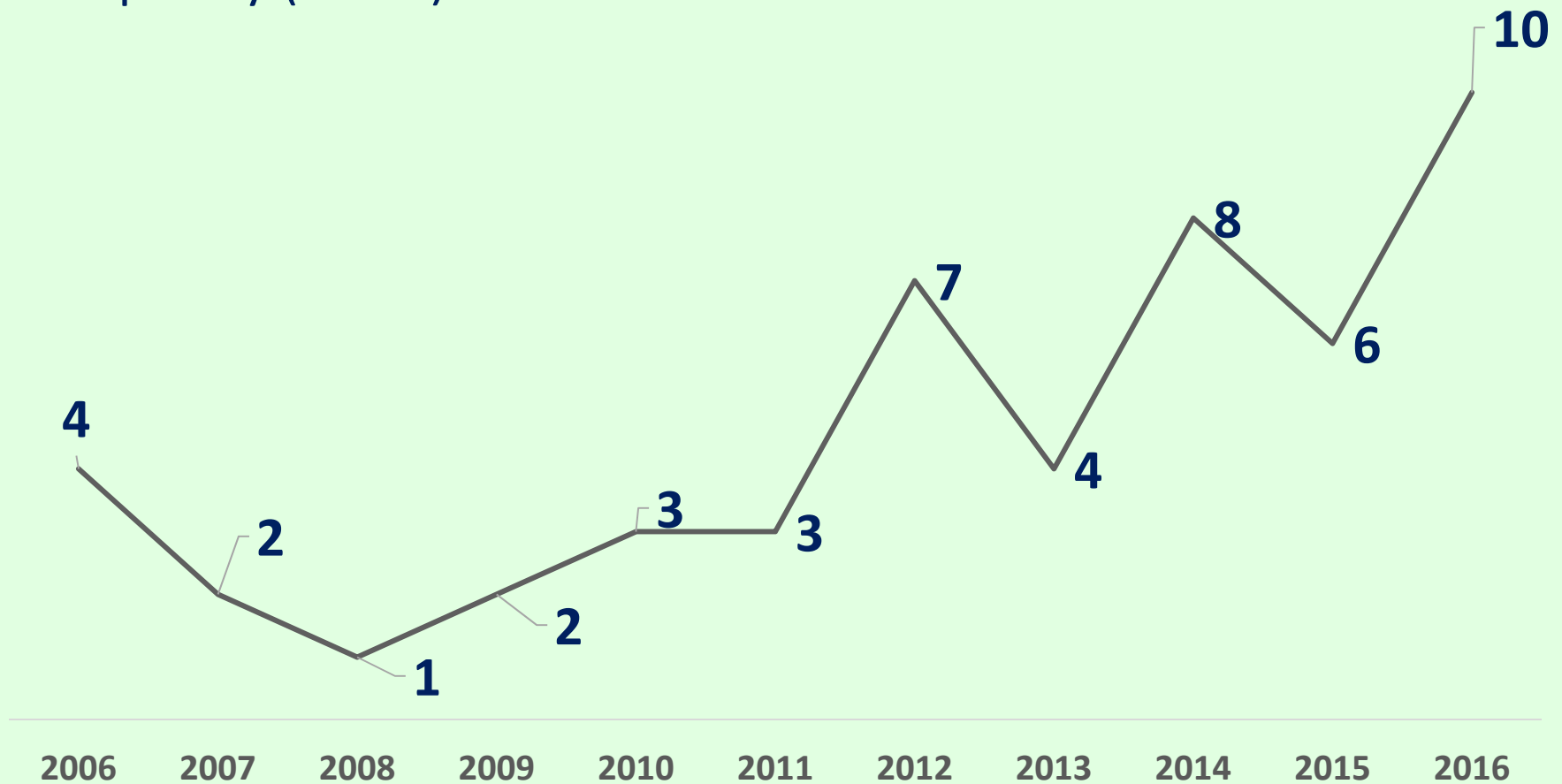
# Number of Peer-Reviewed Articles





# Number of Articles: Senior Year Preparatory Courses

Frequency (count)





# 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%

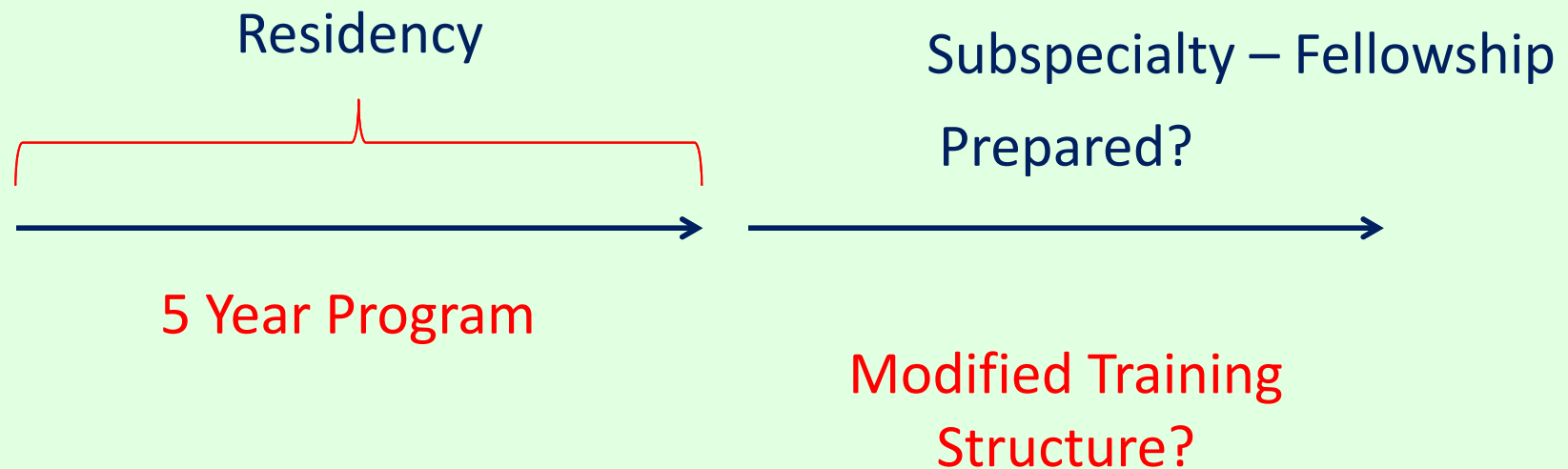
- Geriatrics: 2%

- Pharmacology: 2%



# Example 3: Competency-Based Curriculum (General Surgery)

## Postgraduate Training





# Residency 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 Gabler Blair, MPH](#), [Yoon Soo Park, PhD](#), [Linda K. Lupi, MBA](#), [Rachel Williams Newman, MS](#), [Ajit K. Sachdeva, MD, FRCSC, FACS](#)

PlumX Metrics

DOI: <http://dx.doi.org/10.1016/j.jsurg.2017.07.008> | CrossMark



- 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

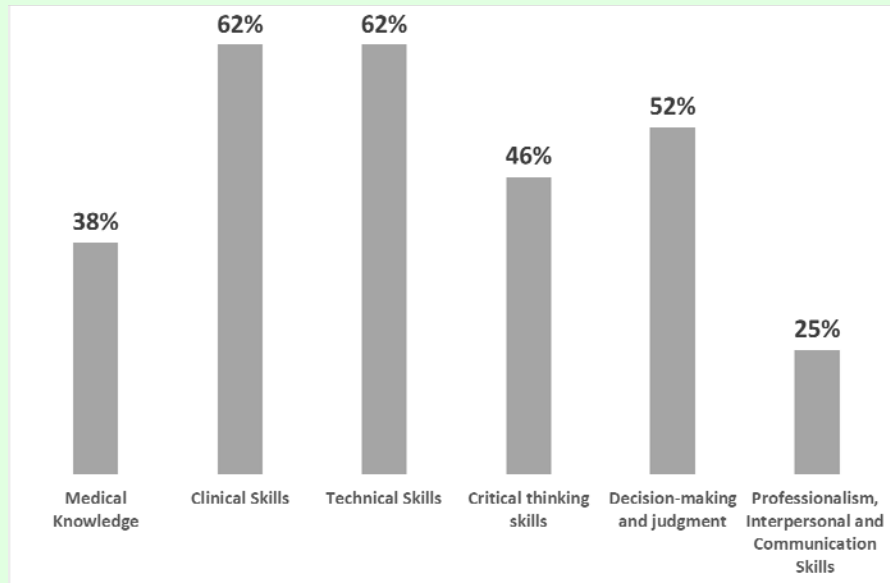
- Goals of residency education
- Areas of greatest need
- Proficiency-based training
- Autonomy
- Structured curricula
- Best practices
- Faculty development
- Resources
- Models for surgery residency



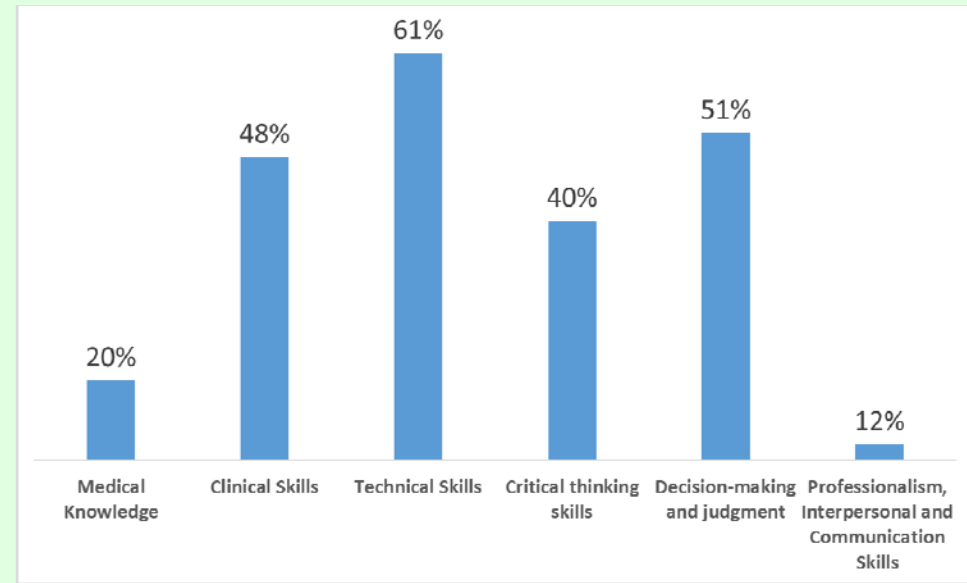
# Comparison of Today's Residents (to 10 Years ago)

**% Less Prepared**

## Entering Residents



## Graduating Residents





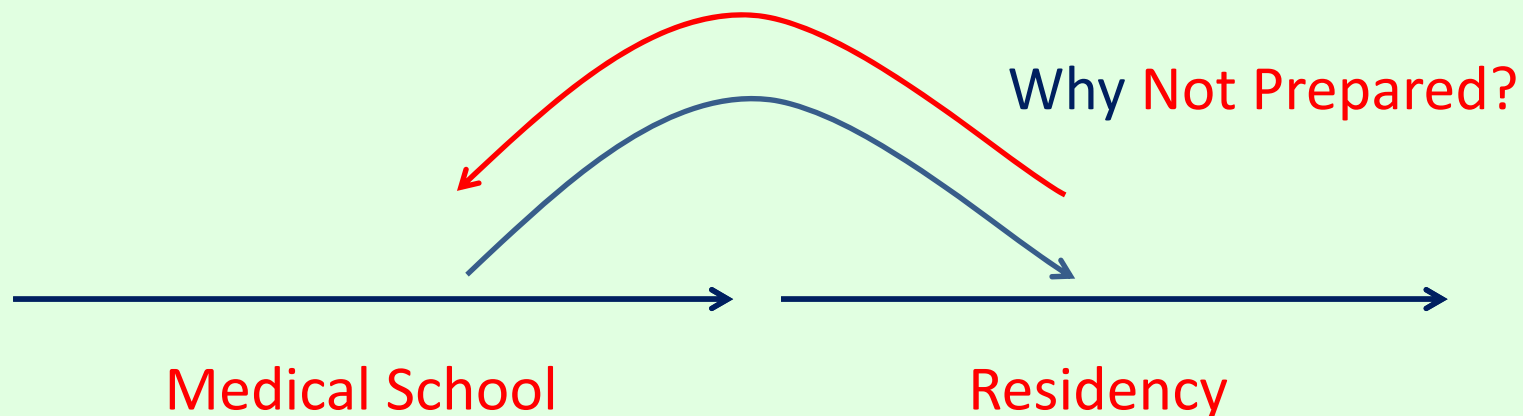
# Challenges

## Limiting Resident Autonomy

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

## Final Year of Medical School

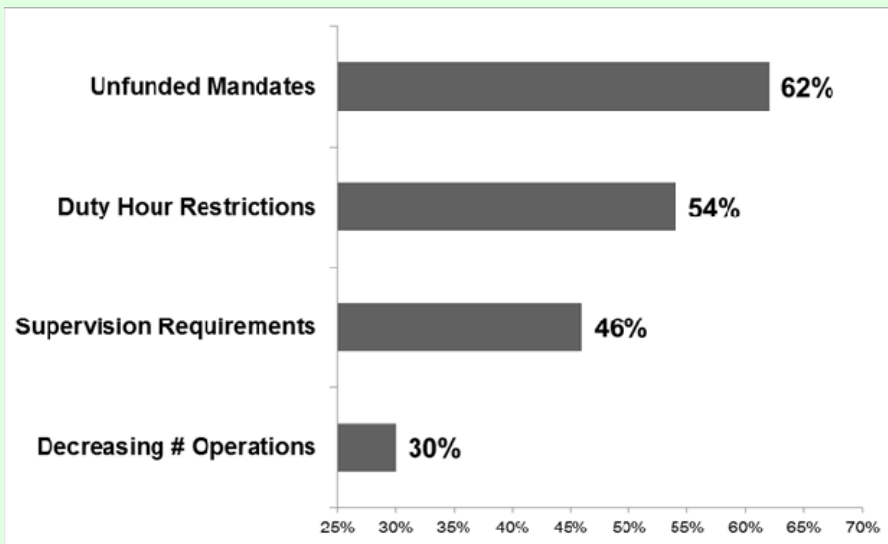
- 62% suggest significant overhaul of 4<sup>th</sup> year of medical school



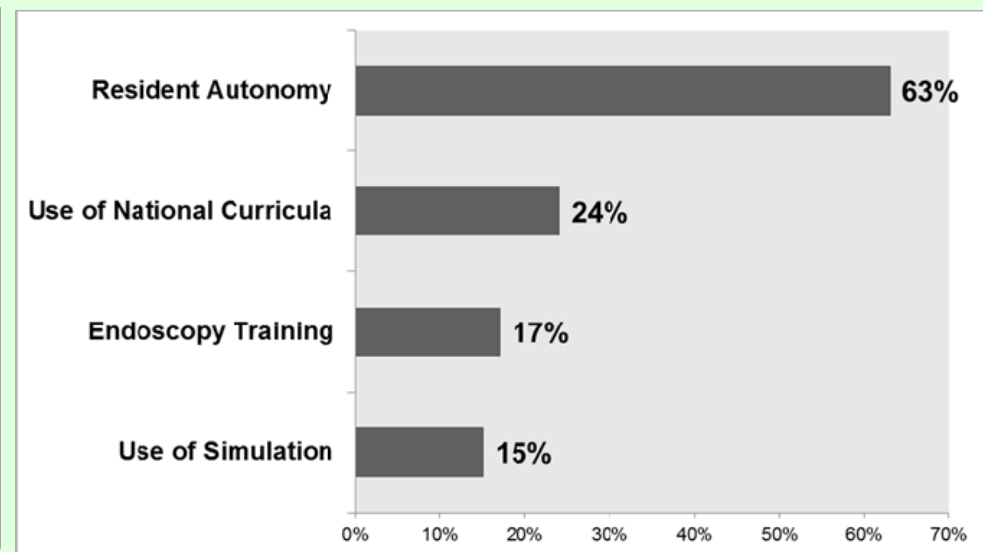


# Factors Posing Challenges / Needing Increased Activity – Current 5-Year Structure

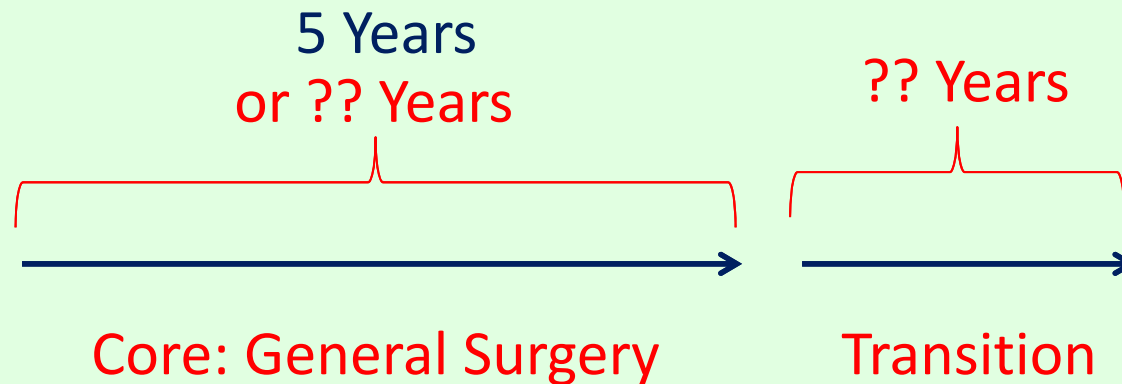
**Factors Posing Challenges**



**Areas Needing Increased Activity**



# 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



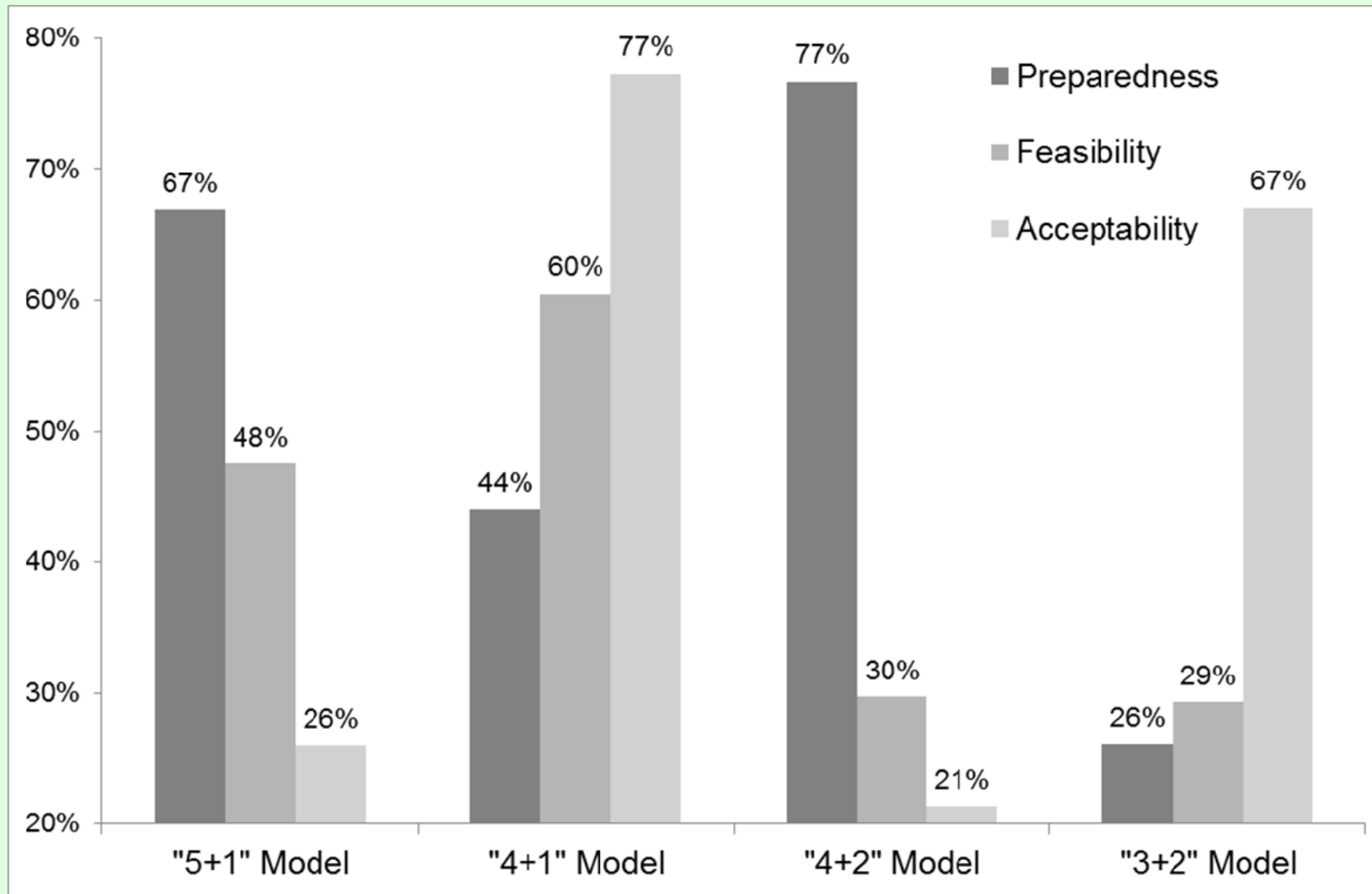
## Curricular Models (2)

### One Best Recommendation?

Structure	Overall
Keep existing 5-year structure	22%
Keep existing 5-year structure + 6 <sup>th</sup> year of formal transition (5+1)	12%
Keep existing 5-year structure + 6 <sup>th</sup> year of fellowship	3%
Move to 4-year core training + 5 <sup>th</sup> year of transition (4+1)	11%
Move to 4-year core training + 5 <sup>th</sup> & 6 <sup>th</sup> year of specialization (4+2)	28%
Move to 3-year core training + 4 <sup>th</sup> & 5 <sup>th</sup> year of specialization (3+2)	13%



## Curricular Model (3): Preparedness, Feasibility, and Acceptability



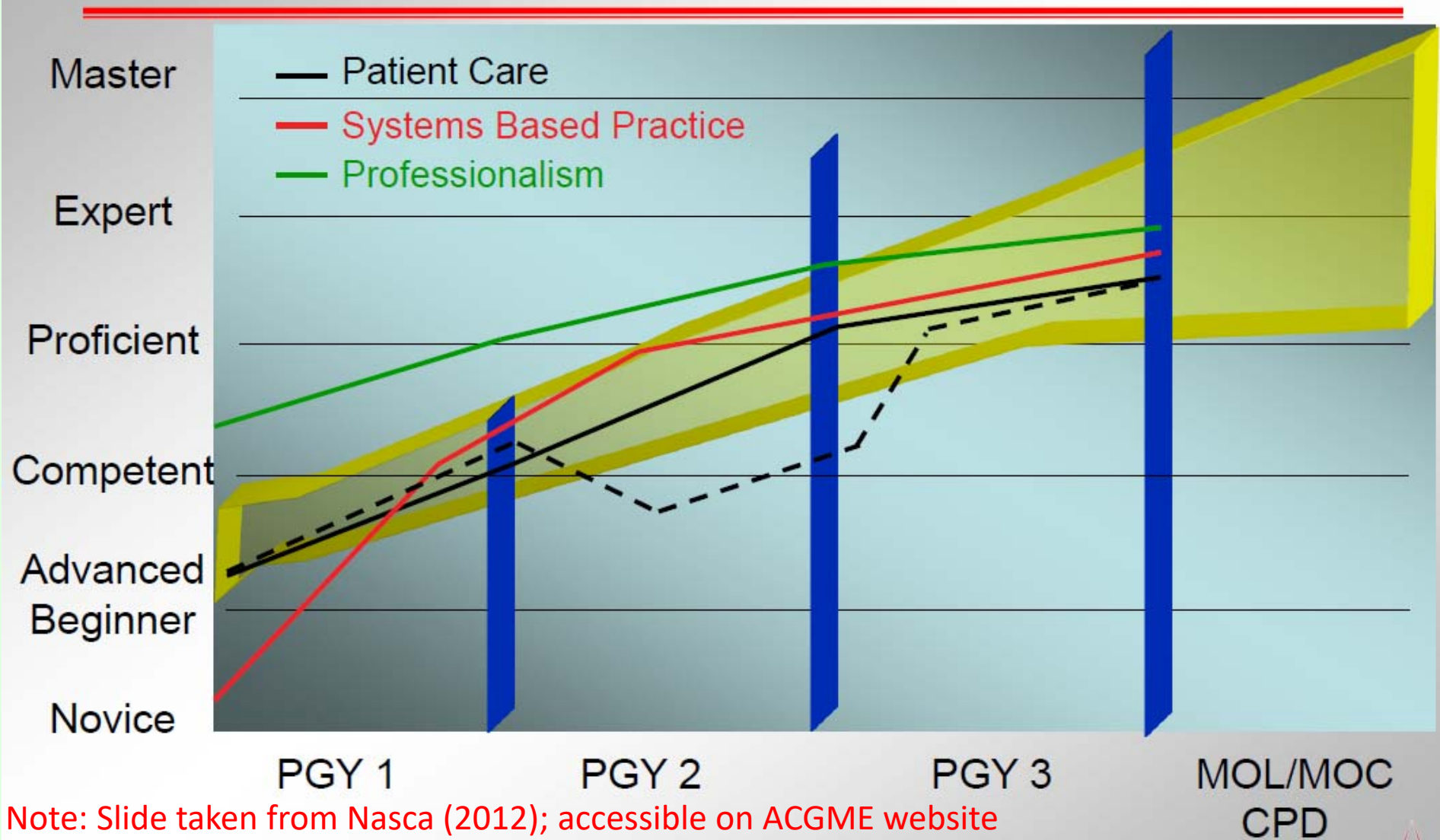


# Implications





## The Goal of the Continuum of Clinical Professional Development in a 3 Year Specialty Program

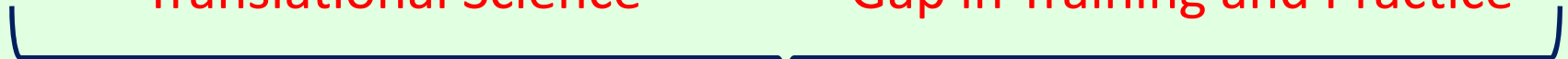


Note: Slide taken from Nasca (2012); accessible on ACGME website

# Recent Changes in North America

National Institutes of Health  
Translational Science

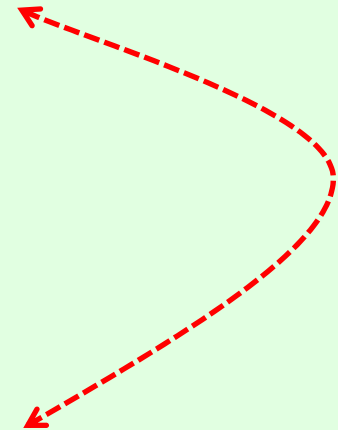
Institute of Medicine  
Gap in Training and Practice



Graduate Medical Education  
Accreditation and Funding



Undergraduate Medical Education  
Licensure Examination

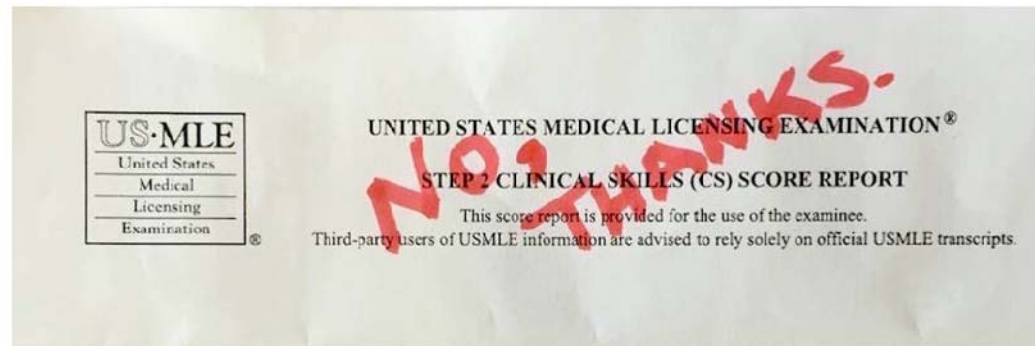


# Motivation for Change

- **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

ACADEMIC  
MEDICINE  
Journal of the Association of American Medical Colleges



## 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, Felise B. MD; Cassese, Todd MD; Faran, Jeanne M. MD, MHPE; Madigosky, Wendy S. MD, MSPH; Massie, F. Stanford Jr MD; Mendez, Paul MD; Obadia, Sharon DO; Ovitsh, Robin K. MD; Silvestri, Ronald MD; Uchida, Toshiro MD; Daniel, Michelle MD, MHPE

Academic Medicine: Post Author Corrections: August 22, 2017

doi: 10.1097/ACM.0000000000001874

Perspective: PDF Only

ACADEMIC  
MEDICINE  
Journal of the Association of American Medical Colleges



## 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

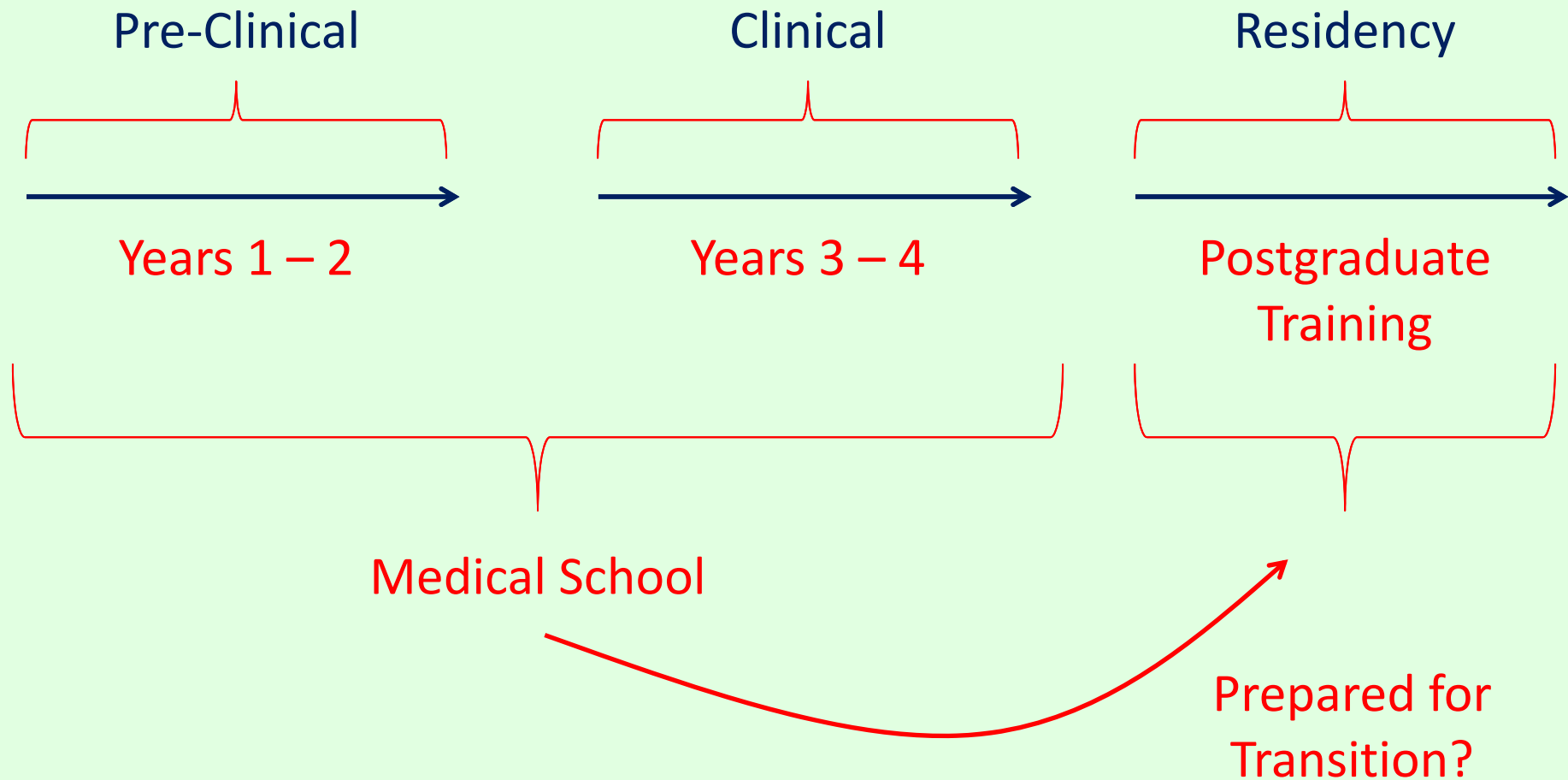
Academic Medicine: Post Author Corrections: August 22, 2017

doi: 10.1097/ACM.0000000000001867

Invited Commentary: PDF Only



# Medical Education Structure





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CHICAGO PEORIA ROCKFORD URBANA

# Questions

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