



School of
Medicine

Health Systems Science in Medical Education

Edgar Pierluissi, MD
Professor of Medicine

Anna Chang, MD
Professor of Medicine
University of California San Francisco

November 7, 2022

Congratulations and Welcome!

There are far, far better things ahead than any we leave behind – C.S. Lewis



Workshop Agenda

Hour #1

1. Why are you doing Health Systems Science education? (10 min)
2. Introduction and Overview (10 min)
3. UCSF Experience: Early Learners in Health Systems (20 min)
4. Your Reflections, Next Steps, Concerns (10 min)
5. Break (10 min)

Hour #2

1. Small Group A (20 min)
2. Small Group B (20 min)
3. Closing Discussion (20 min)





Explain it to a friend over a cup of coffee or tea...

Why are you working to infuse health systems science in medical education?

Please share with a partner (7 min)



Please share with all of us (3 min)

I (or my colleague) chose to do this work because...



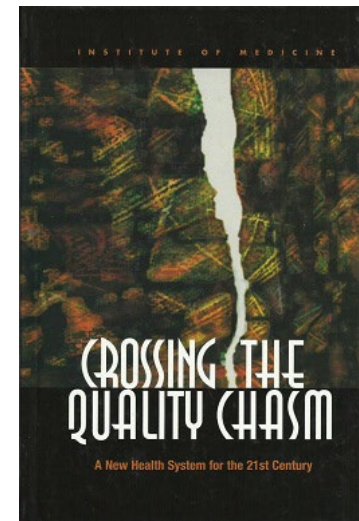
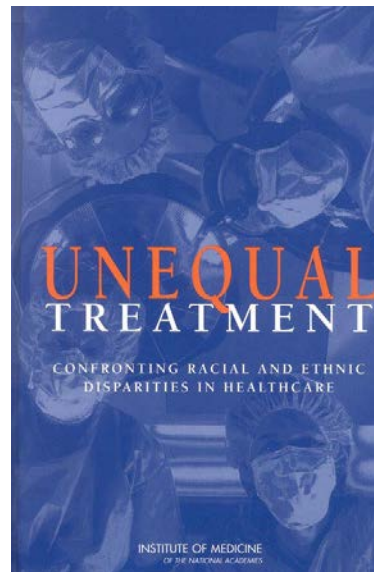
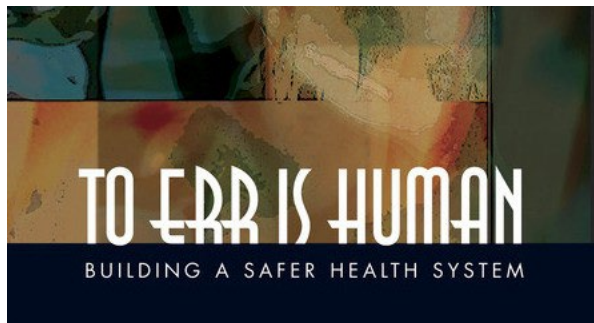


Health Systems Science in Medical Education: Rationale

Edgar Pierluissi, MD

The Problem: U.S. Health Care System

Despite being the costliest in the world;
quality, safety, disparity, patient, and provider experience
are lower than expected



Access

Rank (highest to lowest)	1	2	3	4	5	6	7	8	9	10	11
Access, %											
Able to get same- or next-day appointment ^a	NLD 77	Australia 67	UK 57	France 56	Germany 53	US 51	Sweden 49	Canada 43	CHE NA	Denmark NA	Japan NA

JAMA. 2018;319(10):1024-1039

Clinical Outcomes

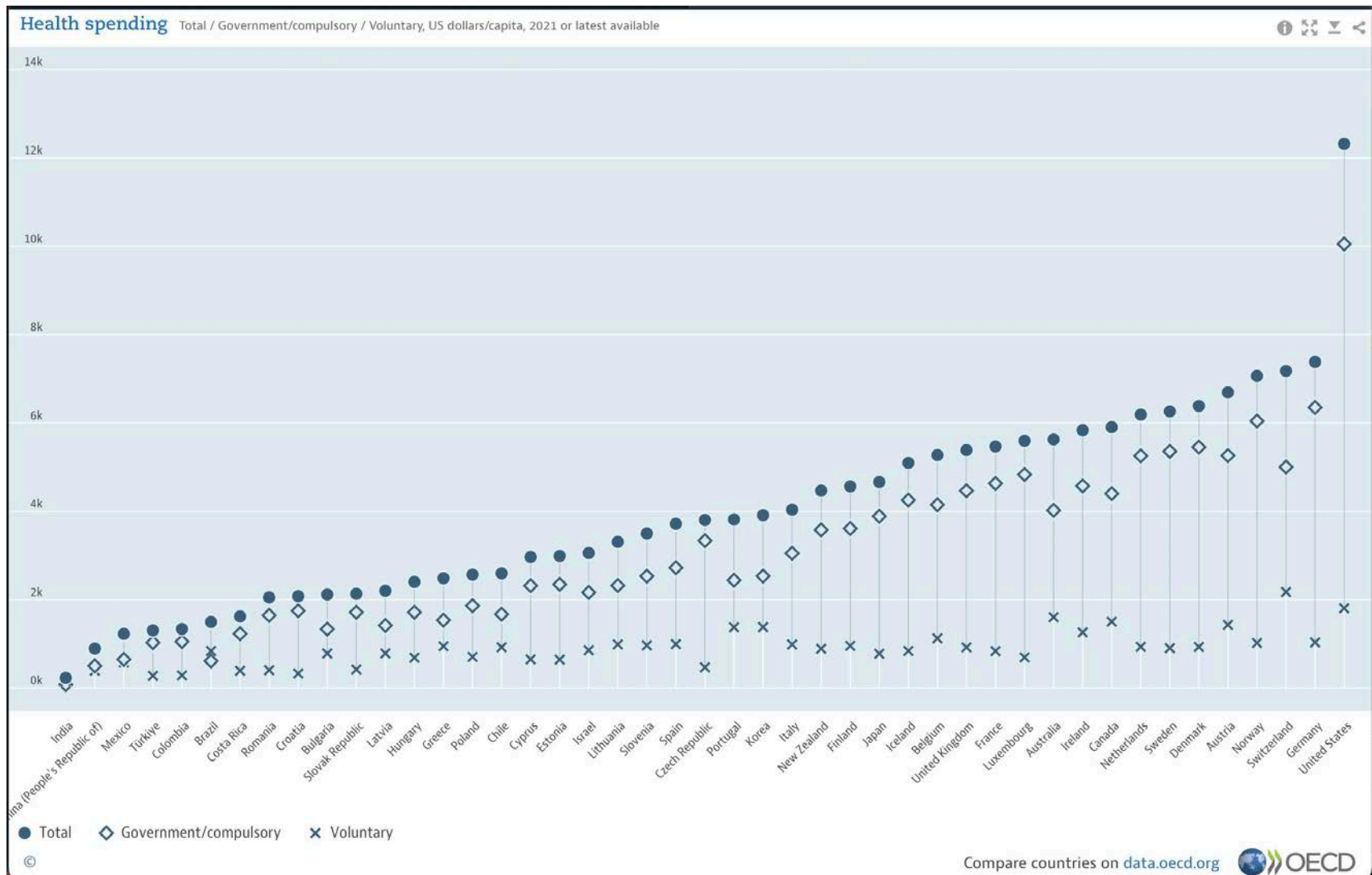
Rank (Highest to Lowest)	1	2	3	4	5	6	7	8	9	10	11
Clinical Outcomes											
30d Stroke Mortality per 1000 patients	Canada 10	Sweden 9.6	Australia 9.3	UK 9.2	France 7.9	CHE 6.9	Germany 6.4	US 4.2	NLD NA	Denmark NA	Japan NA
30d Mortality per 1000 patients with acute myocardial infarction	Germany 8.7	Sweden 8.3	CHE 7.7	UK 7.6	France 7.2	Canada 6.7	US 5.5	Australia 4.1	NLD NA	Denmark NA	Japan NA

Rank (Highest to Lowest)	1	2	3	4	5	6	7	8	9	10	11
Avoidable Hospitalizations											
Diabetes hospitalizations as a ratio of people with diabetes	Japan 2.8	Australia 2.8	Germany 2.4	US 2	Sweden 1.9	Denmark 1.8	UK 1.7	Canada 1.3	France 1.2	NLD 1.2	CHE 1.2
Asthma hospitalizations as a ratio of people with asthma	US 1.2	UK 1.0	France 0.8	Denmark 0.8	Germany 0.7	NLD 0.7	Australia 0.6	CHE 0.4	Sweden 0.3	Japan 0.3	Canada 0.2

Patient Perceptions

Perceptions, %											
System works well	Germany 60	CHE 58	France 54	UK 44	Sweden 44	Australia 44	Canada 35	US 19	NLD NA	Denmark NA	Japan NA

Developed Countries Healthcare Spending per capita



If we do nothing to slow these skyrocketing costs, we will eventually be spending more on Medicare and Medicaid than every other government program combined. Put simply, our health care problem is our deficit problem. Nothing else even comes close.

Sep 9, 2009

Drivers for Health Systems Science in Medical Student Education

1. Quality
2. Cost
3. Patient Complexity



Why Health Systems Science?



1. Quality of Care Problem

There are many areas where American medicine doesn't deliver care that we know can be achieved, although there are some areas of excellence.

Why Health Systems Science?

2. Cost Problem

The U.S. spends more, by far, on health care than other wealthy countries



Why Health Systems Science?



3. Patient Complexity Problem

The number of patients with complex medical and psychosocial factors is increasing

These patients disproportionately account for poor health outcomes and health care costs

What do the problems of quality, complexity, and cost have to do with medical education?



By failing to address these issues in medical education, we contribute to them

Medical Education Consensus

Clinical Review & Education

Special Communication

Medical Education

Part of the Problem and Part of the Solution

Catherine Reiss Lucy, MD

VIEWPOINT

Transforming From Centers of Learning to Learning Health Systems
The Challenge for Academic Health Centers

Kevin Grumbach, MD
Department of Family
and Community
Medicine, University of

Health care organizations face intensifying pressure to achieve the triple aims of better patient experience, better health, and affordability. Although all health sys-

tem nities who voice concern that clinical operations already do not adequately accommodate the other academic missions. They are apprehensive that the

Preparing Medical Students to Improve Health Care

Preparing Medical Students for the Continual Improvement of Health and Health Care: Abraham Flexner and the New "Public Interest"

Donald M. Berwick, MD, MPP, and Jonathan A. Finkelstein, MD, MPH

Health Systems Science: The "Broccoli" of Undergraduate Medical Education

Jed D. Gonzalo, MD, MSc, and Greg Ogrinc, MD, MS

Perspective

Medical Education and Health Care Delivery: A Call to Better Align Goals and Purposes

David P. Sklar, MD, Paul A. Hemmer, MD, MPH, and Steven J. Durning, MD, PhD

Opinion

Value-Added Medical Education: Engaging Future Doctors to Transform Health Care Delivery Today

Steven Y. Lin, MD¹, Erika Schillinger, MD², and David M. Irby, PhD³

Teaching Systems Improvement to Early Medical Students: Strategies and Lessons Learned

Monica W. Harbell, MD, Descartes Li, MD, Christy Boscardin, PhD, Edgar Pierluissi, MD, and Karen E. Hauer, MD, PhD

TRAINING
TOMORROW'S DOCTORS

The Medical Education Mission of Academic Health Centers

A Report of The Commonwealth Fund
Task Force on Academic Health Centers

April 2002

ARTICLE

Validity of the Health Systems Science Examination: Relationship Between Examinee Performance and Time of Training

Michael Dekhtyar, BA¹, Linette P. Ross, MA¹, Jean D'Angelo, BA¹, Jeanne Guernsey, MA¹, Karen E. Hauer, MD, PhD¹, Luan Lawson, MD, MAEd¹, Martin V. Pusic, MD, PhD¹, and Richard E. Hawkins, MD^{1,4}

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Definition



Health systems science is the study of how health care is delivered. It seeks to improve the quality of health care for patients and populations.

- American Medical Association



UCSF Experience: Early Learners

Anna Chang, MD

Health Systems Improvement



Direct Patient Care



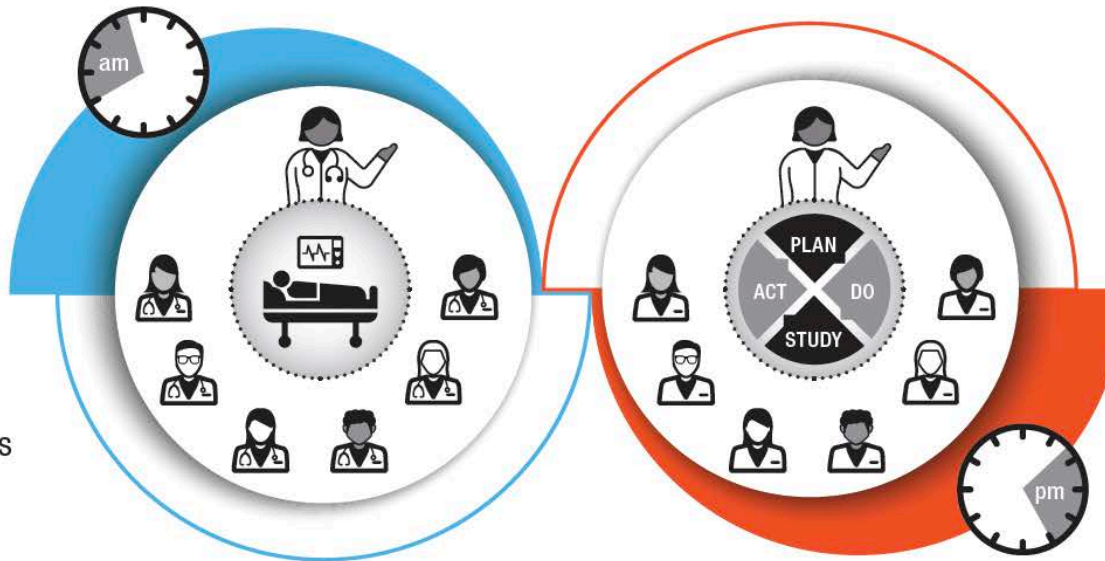
Interprofessional Collaboration

UCSF Clinical Microsystems Clerkship (CMC) for MS1 and MS2s

UCSF Clinical Microsystems Clerkship Day (MS1 & MS2)

AM / Direct Patient Care:

- Medical history
- Physical examination
- Clinical reasoning
- Patient communication
- Notes and presentations



PM / Health Systems Improvement

- Identify a problem
- Set concrete goals
- Perform a gap analysis
- Conduct interventions
- Measure outcomes

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Design Principles: UCSF Clinical Microsystems Clerkship

- All MS1s and MS2s (n=150 per year) immerse in three clinical systems for health systems science
- Required (not elective)
- Experiential workplace learning (not didactic)
- Integrated with clinical and basic sciences
- Small group learning communities: physicians, students, patients, and interprofessional clinicians (nurses, etc.)
- Students participate in authentic roles in health system improvement aligned with health systems priorities
- Students demonstrate learning in assessments



4 Implementation Components: UCSF CMC



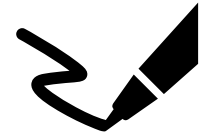
EDUCATION / HEALTH
SYSTEM PARTNERSHIP



HEALTH
SYSTEMS
CURRICULUM




FACULTY
DEVELOPMENT



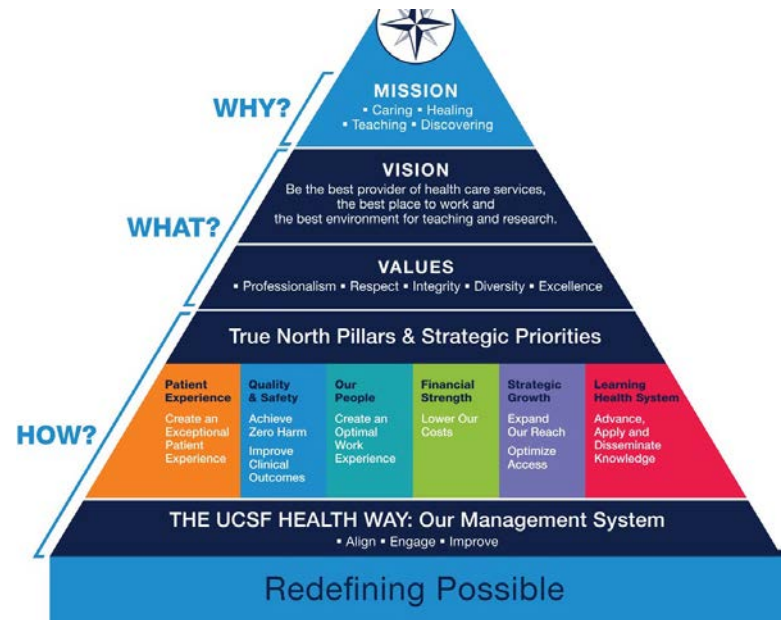
LEARNER
ASSESSMENT
AND EVALUATION

1. Education/Clinical Partnership: Learning Health System

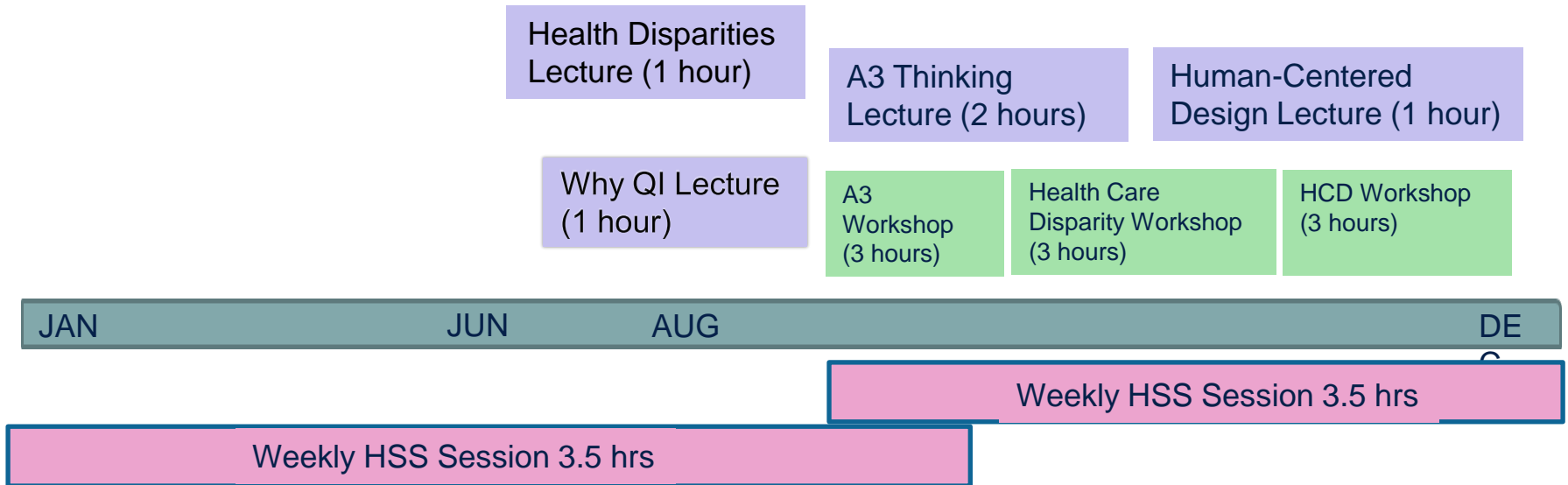
 **Medical Students**

 **Residents and Fellows**

 **Faculty and Clinicians**



2. Curriculum Example: Health Systems Improvement





4. Learner Assessment Example: Health Systems Improvement

UCSF School of Medicine / Clinical Microsystems Clerkship (CMC)
Systems Improvement Template

Title:

Site: UCSF / SFVAMC / ZSFG

Coach:

Date:

Student Team:

1. Background: *What problem are you talking about and why?*

1. Problem

5. Experiments: *What countermeasures do you propose and why?*

5. Experiments

2. Current Conditions: *Where do things stand now?*

2. Current State

Problem Statement:

6. Action Plan: *How will you implement?*

6. Action Plan

3. Target Conditions (Goals): *What specific outcome is desired?*

3. Target

7. Study, Reflect, Plan Next Steps: *How will you assure ongoing PDCA?*

7. Reflection

4. Gap Analysis: *Why does the problem exist?*

4. Gap Analysis



UCSF Outcomes: Early Learners in Health Systems

Edgar Pierluissi, MD

Outcome: UCSF CMC Student Projects

- To date, 776 students completed
 - 258 projects
 - 3 health systems
 - 15 departments
- 10,000 hours of student effort each year over 16 months.
- 72% projects improved microsystem



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Outcome: UCSF CMC Sample Projects

	Project Aim (Fall 2017)	Project Outcome (Fall 2018)
<i>Academic Medical Center</i>		
Primary Care	Reduce disparities in hypertension control for Black patients	Increased percentage of patients with at-goal blood pressures by 38%
Gynecologic Oncology	Improve safety of opiate use after minimally-invasive surgery	Decreased prescriptions for discharge opiates by 30%
Neurology	Improve access of multiple sclerosis neurogenic bladder treatment	Increased provider knowledge of pelvic floor physical therapy referral to 80%
Endocrine Surgery	Improve experience of post-surgical discharge process	Increased patient understanding of discharge instructions in 5/5 patients
Pediatrics	Improve experience by reducing clinic wait times	Decreased average vaccination wait time from 9 to 5 minutes
<i>Public Safety Net Health System</i>		
Psychiatry	Decrease readmissions after discharge from inpatient psychiatry	Achieved 64% attendance at first outpatient mental health appointment
Obstetrics	Improve safety of vaginal and cesarian obstetric hemorrhage	Implemented quantitative blood loss measurement in 84% of deliveries
Emergency Department	Improve quality in acute stroke treatment with thrombolysis	Achieved goal door-to-needle time of <45 min for 84% of stroke patients
Pediatrics	Improve quality in management of second-hand smoke for children	Improved smoking cessation intervention implementation rate from 36% to 88%
Primary Care	Improve disparities in depression screening	Increased screening rate to 63% for non-English speaking and visually-impaired

Outcome: UCSF CMC Student Quotes

Quality improvement is always a goal when it comes to patient care. In clerkship and residency, I will likely see how I can use my power and experience to change parts of the system

I learned a lot in this project and will definitely talk about my CMC project in my residency application.

This project was a really good way of reminding me there's more than just the one patient in front of us. When you're treating one patient, you're really treating the system

Outcomes: Student Satisfaction & Professional Identity

Student Satisfaction:	Mean Rating (SD; N=50)
Overall quality of the CMC	4.10 (SD 0.92)
Value to development as a physician	4.14 (SD 0.86)

Professional Identity:	Mean Rating (SD; N=55)^a
I believe that clinical skills and health systems knowledge are both important to patient experience and clinical outcomes	4.73 (SD 0.48)
A physician needs to have both clinical skills and health systems knowledge to be successful	4.40 (SD 0.63)

Scale of 1 (poor) to 5 (excellent)

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Outcomes: Student Assessment

	MS1 Assessments (N=152)	MS2 Assessments (N=152)
Direct Patient Care	Clinical Skills Examinations Mean Percentage (SD)^a	
Patient Communication	90% (SD 5.3)	86% (SD 5.7)
Medical History	85% (SD 5.9)	96% (SD 4.6)
Physical Examination	78% (SD 6.2)	70% (SD 7.4)
Interprofessional Collaboration	Interprofessional Feedback Percentage of All Students^b	
Communication and Teamwork	98%	<i>Assessed as MS1s</i>
Health Systems Improvement	Health Systems Improvement Knowledge Tests Percentage of All Students^c	
QIKAT-R	80%	<i>Assessed as MS1s</i>
	Health Systems Improvement Project Skills Percentage of All Students^c	
Project: Problem and Aims	90%	<i>Assessed as MS1s</i>
Project: Gap Analysis	93%	<i>Assessed as MS1s</i>
Project: Interventions	<i>Assessed as MS2s</i>	88%
Project: Reflections	<i>Assessed as MS2s</i>	100%

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Outcome: UCSF CMC on GME Transition

Career Development:	Percentage of Students^b
I listed my CMC health systems improvement project in my residency application curriculum vitae	85% Yes (N=44)
I disseminated my CMC health systems improvement project (e.g. as a local or national poster or oral presentation, or a paper in a journal)	54% Yes (N=28)
I discussed my CMC health systems improvement project in my residency personal statement or interview	31% Yes (N=16)

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Example: UCSF CMC Scholarship Dissemination



A Student-Run Outreach and Vaccine Administration Clinic Provides Longitudinal Workplace-Based Learning and Improves Patient Care

Alexander F. Haddad*, Lillian Lai*, Jason Parad*, Lakshripriya Subbaraj*, Sarah W Takimoto*, Tenessa MacKenzie MD

University of California, San Francisco School of Medicine
UCSF Family Medicine at Lakeshore

*These authors contributed equally to this work.



BACKGROUND

- UCSF School of Medicine's new educational curriculum features the clinical microsystem clerkship (CMC), which groups first-year students into teams of 5-6 to learn systems quality improvement and clinical skills through a longitudinal workplace-based experience.
- Five students assigned to UCSF Family Medicine at Lakeshore piloted and refined a student-run vaccination clinic by implementing Plan-Do-Study-Act (PDSA) cycles.
- The clinic provided the opportunity to meaningfully increase influenza vaccination uptake and progress toward mastery in all UCSF MD graduation competencies.*

Patient Care	Professionalism
Medical Knowledge	Systems-Based Practice
Practice-based Learning & Improvement	Interprofessional Collaboration
Interpersonal & Communication Skills	*Based on competencies adopted by the Accreditation Council for Graduate Medical Education

METHODS

Administrative Preparation

A faculty physician at Lakeshore worked with UCSF leadership to approve the clinic and student training process. Students were trained in vaccination administration by reviewing CDC online vaccine modules, completing a UCSF nursing vaccine administration certificate course, and receiving hands-on training and initial supervision from nursing and physician staff.

Daily Activities

The clinic ran for 3 hours each week during influenza season. For each patient visit, students reviewed the electronic medical record and checked for health maintenance notifications. They then administered the recommended vaccines and addressed additional patient concerns. Students also attended to clinic workflow and conducted PDSA cycles for continual improvement.

QUALITY IMPROVEMENT

Date	Plan	Do	Study	Act
Problem: Not knowing when patients arrive leads to inefficient visits				
10/13/16	Design method to indicate patient arrival	Adapt current patient flow notification "dot" system at Lakeshore to electronic vaccine clinic schedule	Accurate dots improved workflow efficiency	Adopt
Problem: Pre-ordering vaccines for all scheduled patients results in open encounters for no-show patients				
10/20/16	Implement system to reduce time wasted on ordering and canceling unnecessary vaccines	Write order only upon patient arrival	Eliminated unnecessary opening and closing of patient encounters	Adopt
Problem: Additional coordination needed between students and attending physician				
10/20/16	Adapt dot system to note ongoing status of patient encounter	Implement color-coded dot system ● = patient arrived ● = order signed ○ = encounter ready for attending to close	Allowed for faster closing of encounters	Adopt
Problem: Lack of data on patient vaccination habits may hinder optimal clinic programming				
10/27/16	Formulate questions to ask patients about their vaccination habits	Use smartphrase: "I kscmv vaccine" to prompt standardized list of questions on EMR	Smartphrase elucidated patient habits, which confirmed value of vaccination clinic within family medicine practice	Adopt
Problem: Confusion over student-patient pairings				
10/27/16	Create system to track student intake of patients	Input initials of student who is seeing the patient on schedule	Initials system reduced confusion	Adopt
Problem: Submaximal student participation at beginning of clinic due to sequential patient visits				
11/3/16	Start clinic with overlapping appointments	Schedule two patients at 8:20 AM and 8:40 AM	Overlapping appointments put undue burden on attending physician	Need to further adjust timing of schedule

EDUCATIONAL OUTCOMES

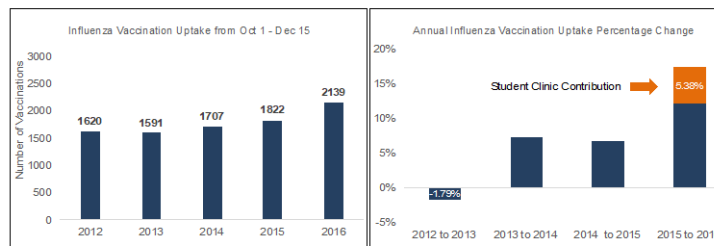
UCSF MD Competencies	Learning Experiences
Patient Care	Provided vaccination for illness prevention; obtained focused patient information to screen for vaccination contraindications; performed injection with attention to patient comfort; documented patient encounter in electronic health record
Medical Knowledge	Learned the immunology, epidemiology, and rationale of vaccination; reviewed age-appropriate preventive care including cancer screenings, vaccinations, and blood pressure management
Practice-based Learning & Improvement	Accessed and applied national vaccination guidelines; selected proper needle gauge, injection location, and dosage based on patient age and vaccine type; addressed other health maintenance issues during vaccine clinic visit
Interpersonal & Communication Skills	Established rapport and communicated effectively with patients and families of diverse cultures and backgrounds; elicited and addressed concerns over vaccination
Professionalism	Respected patient privacy by maintaining confidentiality of patient information; navigated the balance of autonomy and need for supervision; acknowledged errors and limits of expertise
Interprofessional Collaboration	Conferred with nurses, medical assistants, and clerical staff about room availability, patient flow, stock supplies, and equipment; contacted interpreters for language translation
Systems-Based Practice	Implemented the student-run clinic as a quality improvement project to increase vaccination uptake; tested changes using PDSA cycles

CONCLUSIONS

- The student-run vaccination clinic increased influenza vaccination uptake by 5.38% from 2015 to 2016
- The student-run vaccination clinic provided students an early educational opportunity to:
 - Enhance all 7 MD competencies
 - Make meaningful quality improvements to clinic workflow
 - Increase uptake of flu vaccination and thus improve patient care

FUTURE DIRECTIONS

- Expand vaccination clinic to include HPV and other routine childhood vaccines
 - Implement objective measures to evaluate vaccine clinic's alignment with MD competencies and impact on student learning
- Sustainability**
- Present benefits of vaccination clinic to UCSF School of Medicine administration to garner support for its continued operation
 - Compile handbook of vaccination clinic practices to aid students in future implementation of the clinic
 - Petition UCSF administration to allow use of standing order for influenza vaccines to increase clinic efficiency



From 2015 to 2016, influenza vaccination uptake increased by 17.4%. A total of 98 vaccinations were given through the student vaccination clinic, which constitutes the 5.38% increase.



Please share with everyone (10 min)

As you look ahead to engaging learners in your health systems....,

What are your reflections, next steps, concerns?

Break (10 minutes)



Small Groups (20 min, then switch)

Best practices in working with...



Group A (Dr. Pierluissi)

Engaging health system
leaders and clinicians

...health system leaders who
want to understand the
return on investment for HSS

... clinicians who view HSS
as “something you learn on
the job, like I did”

Group B (Dr. Chang)

Engaging educators/learners

...educators who feel the full
curriculum and struggle to
add HSS teaching,
assessment, or evaluation.

... learners who do not see
value of HSS in exams or
residency applications

Closing Discussion and Questions





University of California
San Francisco

Thank you!

Anna.chang@ucsf.edu

Edgar.pierluissi@ucsf.edu