Educational Innovations from the ACE Schools Using Mobile Devices

George C. Mejicano, MD, MS, FACP
Senior Associate Dean for Education
Examples from the Schools

- Health Care by the Numbers
- Learner Assessment on Mobile Devices
- Electronic Portfolios Summarizing Learner Progression
- EPIC Sandbox to Learn about how to use an Electronic Health Record
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Health Care by the Numbers

This project is funded by the AMA Accelerating Change in Medical Education Program.

The NYU ‘Healthcare by the Numbers: Populations, Systems, and Clinically Integrated Data’ curriculum leverages an integrated partnership of our School of Medicine and NYU Langone Medical Center to transform our medical school curriculum. By creating a three-year long program of education for our students that is based on the real clinical data of our practices, we are accelerating changes in what we are teaching so as to be aligned with the future demands of practice.

“Our hope is that this robust curriculum will prepare our graduates to meet the future needs of the ever evolving healthcare delivery system by giving them the tools and skills necessary to care for not just an individual patient, but for an entire population of patients” ~ Marc Triola, MD, associate dean for educational informatics, principal investigator

NYU Project Team:
- Ruth M. Crowe, MD, PhD
- Greta Elysee
- Joseph Nicholson, MLIS, MPH
- Martin Pusic, MD, PhD
- Mark Schwartz, MD
- Marc Triola, MD

Quick links to Resources:

**Healthcare by the Numbers Curriculum**
Lecture materials, slides, small group session handouts, and links to projects.

**Clinical Data Student Project using SPARCS**
Student project using over 5 million patient records from NY State hospitals.

**Virtual Outpatient Practice Student Exercise**
Fictitious outpatient practice created from de-identified NYU, CDC, and NY state health data

**Clinical Data Resources for Student Projects**
Annotated list of freely available clinical data sets for student research and QI projects.
### 20 Most Common Admissions by APR-DRG Code for 2014

<table>
<thead>
<tr>
<th>Description</th>
<th>Count</th>
<th>Avg. LOS</th>
<th>Avg. Charges</th>
<th>Avg. Cost</th>
<th>Sum of all 2014 Charges</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEONATE BIRTHWT &gt;2499G, NORMAL NEWBORN OR NEONATE W OTHER PROBLEM</td>
<td>202,834</td>
<td>2.4</td>
<td>$7,291.02</td>
<td>$2,617.63</td>
<td>$1,478,865,743</td>
</tr>
<tr>
<td>VAGINAL DELIVERY</td>
<td>149,626</td>
<td>2.4</td>
<td>$14,597.30</td>
<td>$6,609.20</td>
<td>$2,184,134,500</td>
</tr>
<tr>
<td>SEPTICEMIA &amp; DISSEMINATED INFECTIONS</td>
<td>84,721</td>
<td>8.2</td>
<td>$57,544.10</td>
<td>$22,095.20</td>
<td>$4,875,191,739</td>
</tr>
<tr>
<td>CESAREAN DELIVERY</td>
<td>76,962</td>
<td>3.8</td>
<td>$24,822.10</td>
<td>$10,871.80</td>
<td>$1,910,359,919</td>
</tr>
<tr>
<td>HEART FAILURE</td>
<td>54,218</td>
<td>5.8</td>
<td>$36,847.40</td>
<td>$14,163.10</td>
<td>$1,997,791,842</td>
</tr>
<tr>
<td>OTHER PNEUMONIA</td>
<td>42,164</td>
<td>5.0</td>
<td>$29,996.30</td>
<td>$11,670.00</td>
<td>$1,264,764,931</td>
</tr>
<tr>
<td>CHRONIC OBSTRUCTIVE PULMONARY DISEASE</td>
<td>41,538</td>
<td>4.8</td>
<td>$28,459.40</td>
<td>$11,200.10</td>
<td>$1,182,144,567</td>
</tr>
<tr>
<td>CELLULITIS &amp; OTHER BACTERIAL SKIN INFECTIONS</td>
<td>36,769</td>
<td>4.4</td>
<td>$24,149.70</td>
<td>$9,756.38</td>
<td>$887,958,754</td>
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<tr>
<td>KNEE JOINT REPLACEMENT</td>
<td>36,503</td>
<td>3.4</td>
<td>$51,377.00</td>
<td>$21,922.30</td>
<td>$1,875,415,449</td>
</tr>
<tr>
<td>SCHIZOPHREIA</td>
<td>35,899</td>
<td>18.8</td>
<td>$50,945.60</td>
<td>$23,308.50</td>
<td>$1,828,894,718</td>
</tr>
<tr>
<td>CARDIAC ARRHYTHMIA &amp; CONDUCTION DISORDERS</td>
<td>32,996</td>
<td>3.6</td>
<td>$25,290.60</td>
<td>$9,168.44</td>
<td>$834,488,642</td>
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<tr>
<td>HIP JOINT REPLACEMENT</td>
<td>31,304</td>
<td>4.0</td>
<td>$57,490.30</td>
<td>$23,734.80</td>
<td>$1,799,676,656</td>
</tr>
</tbody>
</table>
Virtual Outpatient Practices

Lacdem Care Group
The Lacdem Care Group is a fictitious health care group that consists of three practices. The data for the providers and patients in this practice were created by aggregating problem lists and visit types from de-identified EMR data; payor and demographics from SPARCS; patient-level lab data, measurements (i.e. BP, weight, A1C, household income) from NHANES. Though they were created using real metrics and are authentic, these virtual patients were synthesized from several unrelated data sources and do not represent any actual individual patient or provider.

Mott Community Practice
The Mission of the Mott Community Practice is to improve health status, and expand access to the medically underserved. Mott strives to be a Center for Excellence by being a leader in providing quality and affordable health care.

- View Practice Profile
- 6,300 Unique Patients in this practice
- 6 Providers in this practice
- 7,676 Outpatient visits in the past year

University Practice Associates
UPA is proud to offer academic medical care in a private practice setting. Our offices are conveniently located and provide primary care in internal medicine as well as specialty care in gastroenterology and cardiology. As full-time faculty, our physicians have access to top specialists in a variety of areas.

- View Practice Profile
- 15,942 Unique Patients in this practice
- 13 Providers in this practice
- 26,462 Outpatient visits in the past year

Women's Medical Group
WMG has a highly trained health care team that offers comprehensive obstetrics and gynecology services from a patient's initial exam, to childbirth and through menopause and beyond. We are dedicated to providing our patients with high quality, individualized care with compassion and respect.

- View Practice Profile
- 7,891 Unique Patients in this practice
- 11 Providers in this practice
- 10,563 Outpatient visits in the past year
Examples from the Schools

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Example of a Commercially Available Product (MedHub) that Allows Faculty to Assess Learners on Mobile Devices
Evaluation History

Booth, Lynne  May 9, 2017
Clinical Assessment of Medical Student-Subspecialty

Morton, Jessica  May 9, 2017
Evaluation of Resident on Consult

Klein, Corinne  Apr 16, 2017
UH-ID-Consults Milestones

Salberg, Jonathan  Jan 17, 2017
UH-ID-Consults Milestones

Babiarz, Jane  Jan 6, 2017
Evaluation of Resident on Consult

Kirsch, Denise  Jul 19, 2016
UH-ID-Consults Milestones

Kirsch, Denise  Dec 30, 2016
UH-ID-Consults Milestones

Caballero, Andrea  Oct 1, 2015
UH-ID-Consults Milestones

Seyal, Shereen  Aug 14, 2015
Evaluation of Resident on Consult

Complete Evaluation

Program:
Infectious Disease, Level 2

Service name:
General ID Consults Team A- OHSU and VA

Rotation:
04/28/2017 to 05/16/2017

Introduction:
Please complete form. Contact Gina Touger if you have questions.

1. Gathers and synthesizes essential and accurate information to define each patient’s clinical problem(s).

   - Critical Deficiencies

   - Details

   - Details

   - Ready for unsupervised practice
Based on your experience with Dorothy today, select your rating of Dorothy’s current level of proficiency for **EPA 1: Gather a History and Perform a Physical Examination**.

- 1a. Not trusted to practice EPA - Inadequate knowledge/skill; not allowed to observe (e.g., sterile field issues)
- 1b. Not trusted to practice EPA - Adequate knowledge; some skill; allowed to observe
- 2a. Trusted to practice EPA only under proactive/full supervision as coactivity with supervisor
- 2b. Trusted to practice EPA only under proactive/full supervision with supervisor in room ready to step in as needed
- 3a. Trusted to practice EPA under reactive/on-demand supervision with supervisor immediately available, all findings double-checked
- 3b. Trusted to practice EPA under reactive/on-demand supervision with supervisor distantly available (e.g., by phone), findings reviewed
- 3c. Trusted to practice EPA under reactive/on-demand supervision with supervisor immediately available, key findings double-checked
- 4. Trusted to practice EPA unsupervised
- 5. Trusted to supervise others in practice of EPA

Describe any strengths you noticed for Dorothy in performing **EPA 1: Gather a History and Perform a Physical Examination**. Note any specific knowledge, skills, or behaviors that were particularly strong.

Describe any opportunities for improvement you noticed for Dorothy in performing **EPA 1: Gather a History and Perform a Physical Examination**. Note any specific knowledge, skills, or behaviors that could be improved.
Examples from the Schools

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OHSU’s Electronic Portfolio

REDEI
Research & Evaluation Data for Educational Improvement.
Created by the

SCHOOL OF MEDICINE
Oregon Health & Science University
Research and Evaluation Data for Educational Improvement (REDEI)

Process Assessments
- Formative Assessments
  - Reflective Essays
  - Self & Peer Assessments

Clinical Educational Exposures
- (e-folio) (Self & Direct Observation)

Attitudes/Professionalism
- Life long learning

Institutional Knowledge
- (Tests/Quizzes)

National Knowledge
- (USMLE)

Clinical Skills Exams
- (Communication, Hx, PE, Clinical Reasoning) Acadia/B-line

Pre-matriculation
- Selected variables from AMCAS all applicant data
  - Undergrad GPA
  - MCAT
  - Prior Experience
  - MMI (multiple mini-interviews)

Learners

Course/Clerkship/Faculty Evaluations
- Blue (Provost System)

Hidden Curriculum
- (C3)

Surveys of Educational Settings

Career/Program Advising

Learning Setting

GME
- Residency Director Survey

CME/CPD
- Post Residency Survey
Component 2: Skills Assessments

SA:Med18:Foundation of Medicine:HODI: Hormones & Digestion (Component 2)

Scores

<table>
<thead>
<tr>
<th>Categories</th>
<th>Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anatomy</td>
<td>70</td>
</tr>
<tr>
<td>Histology</td>
<td>30</td>
</tr>
<tr>
<td>CSA</td>
<td>100</td>
</tr>
<tr>
<td>CSA5</td>
<td>90</td>
</tr>
<tr>
<td>CSA7</td>
<td>80</td>
</tr>
</tbody>
</table>

Class Mean (All)  
Student (Chung, Pat)
EPA: Entrustable Professional Activity
DOC: Domain of Competence
C: Competency
M: Milestone
Milestone Judgments:
- Pre-Entrustable
- Approaching Entrustable
- Entrustable

43 UME Competencies
- linked to courses, clinical experiences, & scholarly projects

**Entrustment Assessor**
- In situ observation and judgment of specific EPA(s) for individual student (KSAs, discernment, truthfulness, conscientiousness)

**Entrustment Group Review**
- Longitudinal student performance & assessment data (REDEI)
- Competency attainment
- Artifacts/evidence
- Narratives
- Entrustment Assessor data

**Required Number of “Entrustable” Milestones**
- By Competency
- By Competency Domain
- By EPA
- Defined artifacts/evidence for each EPA

**Ad hoc entrustment decisions for specific EPA(s) by a directly observing supervisor**

Multiple direct observers of students’ performance

**Qualified Assessor (QA)** defined as: educational leader (e.g., clinical experience or course director) who provides a milestone judgment of individual student’s performance for all linked competencies based on data gathered in course

Granular Competency and EPA Assessment (Bottom Up)

Holistic EPA Assessment (Top Down)

Award/Deny EPA Badge(s)
- Gateway to:
  - Entry to clinical experiences
  - Entry to sub-internship
  - Readiness to graduate/enter residency

Programmatic Entrustment
<table>
<thead>
<tr>
<th>#</th>
<th>Competency Domain: Interpersonal and Communication Skills (ICS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>ICS 1 – minimum of 6 different assessors in a variety of clinical contexts</td>
</tr>
<tr>
<td>21</td>
<td>ICS 2 – minimum of 3 different assessors in a variety of clinical contexts</td>
</tr>
<tr>
<td>22</td>
<td>ICS 3 – minimum of 3 different assessors in a variety of clinical or non-clinical contexts</td>
</tr>
<tr>
<td>23</td>
<td>ICS 4 – minimum of 3 different assessors in a variety of clinical contexts</td>
</tr>
<tr>
<td>24</td>
<td>ICS 5 – minimum of 7 different assessors in a variety of clinical contexts</td>
</tr>
<tr>
<td>25</td>
<td>ICS 6 – minimum of 3 different assessors in a variety of clinical contexts</td>
</tr>
<tr>
<td>26</td>
<td>ICS 7 – minimum of 3 different assessors in a variety of clinical contexts</td>
</tr>
<tr>
<td>27</td>
<td>ICS 8 – minimum of 3 different assessors in a variety of clinical contexts</td>
</tr>
</tbody>
</table>
Example of Portfolio Data for a Current 3\textsuperscript{rd} Year Medical Student

<table>
<thead>
<tr>
<th>Competency</th>
<th># of Not Able To Access (Level 0)</th>
<th># of Pre-Entrustables (Level 1)</th>
<th># of Approaching Entrustables (Level 2)</th>
<th># of Entrustables Achieved (Level 3)</th>
<th>Min # of Entrustables Required by Assessors</th>
<th># of Entrustables Remaining</th>
<th>Competency Progress (% complete)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICS1</td>
<td>6</td>
<td>6</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td>100% Complete</td>
</tr>
<tr>
<td>ICS2</td>
<td>1</td>
<td>3</td>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td>33% Complete</td>
</tr>
<tr>
<td>ICS3</td>
<td>1</td>
<td>3</td>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td>33% Complete</td>
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<tr>
<td>ICS4</td>
<td>2</td>
<td>3</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td>67% Complete</td>
</tr>
<tr>
<td>ICS5</td>
<td>5</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>71% Complete</td>
</tr>
<tr>
<td>ICS6</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td>0% Complete</td>
</tr>
<tr>
<td>ICS7</td>
<td>2</td>
<td>3</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td>67% Complete</td>
</tr>
<tr>
<td>ICS8</td>
<td>2</td>
<td>3</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td>67% Complete</td>
</tr>
</tbody>
</table>
Example of Portfolio Data for a Current 3rd Year Medical Student

<table>
<thead>
<tr>
<th>All Domains</th>
<th>Overall Competencies Progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICS</td>
<td>Demonstrate interpersonal and communication skills that result in the effective exchange of information and collaboration with patients, their families, and health professionals. 55% Complete</td>
</tr>
<tr>
<td>MK</td>
<td>Demonstrate knowledge of established and evolving biomedical, clinical, epidemiological, and social-behavioral sciences, as well as the application of this knowledge to patient care. 66% Complete</td>
</tr>
<tr>
<td>PBLI</td>
<td>Demonstrate the ability to investigate and evaluate the care provided to patients, to appraise and assimilate scientific evidence, and to continuously improve patient care based on analysis of performance data, self-evaluation, and lifelong learning. 39% Complete</td>
</tr>
<tr>
<td>PCP</td>
<td>Provide patient-centered care that is compassionate, appropriate, and effective for the treatment of health problems and the promotion of health. 31% Complete</td>
</tr>
<tr>
<td>PPPD</td>
<td>Demonstrate a commitment to carrying out professional responsibilities, an adherence to ethical principles, and the qualities required to sustain lifelong personal and professional growth. 56% Complete</td>
</tr>
<tr>
<td>SBPIC</td>
<td>Demonstrate an awareness of and responsiveness to the larger context and system of healthcare, as well as the ability to effectively call upon other resources in the system to provide optimal care, including engaging in interprofessional teams in a manner that optimizes safe, effective patient and population-centered care. 100% Complete</td>
</tr>
</tbody>
</table>
Summative Entrustment Decision for Each EPA

- Ad Hoc Entrustment Decisions
- Simulation Experiences
- Reflection Exercises
- Procedures & Required Encounters
- Peer and/or Patient Input
- Fixed Tools from the AAMC Pilot
- OHSU’s Four Components from Clinical Experiences
- Gateway Assessments
- Qualified Assessor

Reflection Exercises
Simulation Experiences
Procedures & Required Encounters
Fixed Tools from the AAMC Pilot
Peer and/or Patient Input
OHSU’s Four Components from Clinical Experiences
Gateway Assessments
Qualified Assessor
Digital Badges

- Purpose: Visual method to communicate entrustment to a variety of stakeholders
- Time Limited: 2 years that must cross graduation
- Linkage:
  - Evidence in support of entrustment decision
  - Process used to make entrustment decision
- Potential Placement:
  - MSPE & post-match update to GME program directors
  - Portfolio to attending preceptors
  - Official university transcript
Milestone Dashboard

John Doc

Date Filters: Start Date 10/08/2014 - End Date 04/08/2015
Filter by type: Self Assessment, Faculty Assessment, Open Assessment, Peer Assessment

Systems-Based Practice: Physicians must understand and respond to the larger context and system of healthcare and effectively call on system resources to provide care that is of optimal value. Learn more

SBP2

Explain basic principles of systems science and the ways in which people, processes, technology and policy combine to form systems.

Scores

Entry

Sub

Nov '14    Dec '14    Jan '15    Feb '15    Mar '15

sbp2a     sbp2b     sbp2c     sbp2d     sbp2
Portfolios to Help Develop Individualized Learning Plans

**My Portfolio**
- Medical Knowledge
  - Competencies
  - Milestones/Goals
  - Evidence
- Patient Care
- Communication Skills
- Professionalism
- Practice-Based Learning & Improvement
- Systems-Based Practice
- Leadership
- Scholarship

**Student Reflective Summary**
- Informed self-assessment
- Personal career goals

**Joint Review**
Reconciliation of any differences in interpretation of evidence

**Faculty Review**
Portfolio Coach

**Promotion Committee**

**Personalized Learning Plan**
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Sandbox to Learn to use an EHR

Week 3

CASE GOAL

You will review the anatomy of the coronary arteries; understand atherosclerosis and coronary artery disease, and how it relates to myocardial infarction (MI). You will learn about the presentation, diagnosis, management and complications of MI including arrhythmias and anti-arrhythmic drugs, as well as the application of adrenergic pharmacology. Additionally you will learn about aneurysms/dissection as manifestations of atherosclerosis or connective tissue disorders and pericardial disease.

THIS WEEK’S CASE: SUSAN

Susan is a 64 year old woman who is brought by ambulance to the Emergency Department with chest discomfort and shortness of breath. The paramedics gave her an aspirin to chew, administered 2 liters of oxygen via nasal cannula, and placed an IV in her left forearm so they could give her 25mcg of fentanyl for her discomfort. She has been admitted to KPV 12 Cardiovascular ICU.

Reminder: in Epic you can find Susan’s chart by using Patient Station, or the KPV 12 unit in System Lists.

Patient names for Susan can be found here.

Teaser of the Week

Dr. Bart Moulton introduces week 3.

Dr. Irarorri’s Cardiac Concept Map (added 3/14)

Clinical Informatics Pearl

Dr. Bart Moulton guides you through an introduction to view After viewing this Pearl, you should be able to: Effective

Informatics Integration Assignment

Assignment instructions can be found here. This assignment will take place in Epic Train > SOM e This assignment is due Tuesday 3/14, by 5:00pm.
Sandbox to Learn to use an EHR

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Clinical Informatics Pearl

Gretchen Scholl offers a refresher on placing **Medication** orders in the EHR.

After viewing this Pearl, you should be able to place medication orders in the EHR, paying attention to the detail fields.
Thank You!