AAMC Research on Care Community (ROCC)

Remote Learning Using Electronic Health Record Simulations during COVID-19

June 18, 2020

Speaker:

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Oregon Health and Science University
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Financial Disclosures

• Receive Funding From AHRQ

Quote of the Day

• “The Enemy of My Enemy is My Friend”
Agenda

- Discuss development of EHR Simulation Environment
- Illustrate examples on how this has been used in previous studies
- Demonstrate adoption for education during COVID-19

Development of EHR Simulation Environment

- Needs to replicate the clinical environment
  - Maintain user customization
- Needs to maintain temporal stability (data needs to represent day of testing)
- Test cases need to approximate the complexity observed with ICU cases
- Cases need to contain planned “deviations” or “errors” to uncover issues with blindspots and diagnostic momentum
  - Allows for simultaneous assessment in EHR skills, EHR workflow and clinical decision making
Development of EHR Simulation Environment

- EPIC Production is copied and this version is placed on separate virtual server. We have 9 instances (EPIC Sim)
- Specifically designed cases are created once and then can be cloned, time shifted and teleported out for storage
- Sim environment is reborn every 3-4 months to update health system changes and user customizations
- Cases are readmitted to Sim environment after each “rebirth”

Simulation Case Design

- Cases need to be designed for the learner group, educational activity and desired outcome
  - 1st year med student vs attending, Inpatient vs Outpatient, Specialty
- Ideally content is created to ensure you can assess effective use of EHR and learner decision making
  - E.g. blood pressure change over 36hrs, assesses data trending and then decision making
- Need a standard rubric for design element AND standardized data entry “cookbook” for data entry into EPIC
Simulation Case Design

<table>
<thead>
<tr>
<th>Patient Name</th>
<th>Case #1</th>
<th>Case #2</th>
<th>Case #3</th>
<th>Case #4</th>
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</thead>
<tbody>
<tr>
<td>Inpatient/Outpatient</td>
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<thead>
<tr>
<th>Physician EHR Workflow/Product Admission/Follow-Up/Discharge</th>
<th>Case #1</th>
<th>Case #2</th>
<th>Case #3</th>
<th>Case #4</th>
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<tr>
<th>Primary Diagnosis</th>
<th>Case #1</th>
<th>Case #2</th>
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<tr>
<th>Opioid Case (Y/N)</th>
<th>Case #1</th>
<th>Case #2</th>
<th>Case #3</th>
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<tr>
<th>Data Trending Domain (vitals/labs)</th>
<th>Case #1</th>
<th>Case #2</th>
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<th>Case #4</th>
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<tr>
<th>Best Practice Error</th>
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<th>Case #4</th>
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<tr>
<th>Data Omission Error</th>
<th>Case #1</th>
<th>Case #2</th>
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<tr>
<th>Medication Error</th>
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<th>Case #3</th>
<th>Case #4</th>
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<tr>
<th>Nursing EHR Workflow/Product</th>
<th>Case #1</th>
<th>Case #2</th>
<th>Case #3</th>
<th>Case #4</th>
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<th>Nursing Best Practice</th>
<th>Case #1</th>
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Types of Patient Safety Issues

<table>
<thead>
<tr>
<th>Table 1 Fourteen errors developed throughout the 5-day ICU course</th>
</tr>
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<tbody>
<tr>
<td><strong>Error safety issue</strong></td>
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<tr>
<td>Changes in patient condition</td>
</tr>
<tr>
<td>25% Drop in mean arterial pressure, 25% increase in heart rate</td>
</tr>
<tr>
<td>Recurrent sepsis</td>
</tr>
<tr>
<td>Increasing plateau pressure to &gt;30</td>
</tr>
<tr>
<td>Increase in WBC*</td>
</tr>
<tr>
<td>New fever</td>
</tr>
<tr>
<td>Medication errors</td>
</tr>
<tr>
<td><em>Inappropriate antibiotic dose (2)</em></td>
</tr>
<tr>
<td>Low antibiotic trough</td>
</tr>
<tr>
<td>Use of D5W in hyperglycemic patient</td>
</tr>
<tr>
<td>Failure to adhere to best practice</td>
</tr>
<tr>
<td>Glucose &gt;200 mg/dl</td>
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<tr>
<td>Tidal volume of 8 cc/kg IBW in acute respiratory distress syndrome</td>
</tr>
<tr>
<td>Over-sedation</td>
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<tr>
<td>Lack of daily awakenings</td>
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<tr>
<td>Recognition of fluid balance†</td>
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</tbody>
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March et al BMJ Open 2012
Trainees Fail to Recognize Patient Safety Issues

Simulation Improves Performance?
Simulation Improves Performance?

Intern EHR Workflow Training

- All IM interns received basic EHR training at orientation
- At 2 months, given 1 week bootcamp-dedicated EHR sessions
  (Dversdal JGME 2019, March JGME 2017)
- 1 hour reviewing simulated EHR chart with dedicated script
- After given second chart for independent review
- Screen tracking used to see navigation patterns-compared to prior simulation exercises
Comments

• Helpful! Maybe prompting the independent portion just a little more.
• Great case to challenge cognitive biases. The pre-walkthrough of Epic was extremely useful.
• Practice case was hard, but great learning experience
• Very useful to have this after a few weeks of actually being in the hospital (versus orientation)
• Second session going through pt on our own, then debriefing was very helpful.
• Very valuable. Wish I'd had a session like this in medical school.
Impact on Screen Utilization

6 Month Follow Up
Impact of Training to Alter Practice

Key Steps
1. **Run Epic ReFuel** – Get Epic build closer to Foundation to increase efficiency of work
2. **Revamp training program** – See four levels below
3. **Ongoing 1:1 training of Epic and standard workflow available for scheduled visits/on-demand**
4. **Optimize staffing to support Epic workflow**

Training Levels

<table>
<thead>
<tr>
<th>Training Levels</th>
<th>Key Steps</th>
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</thead>
<tbody>
<tr>
<td><strong>1. Basic</strong></td>
<td>• Can the person use a computer with Windows, knows the conventions and how to maneuver?</td>
</tr>
<tr>
<td><strong>2. Basic Epic Training</strong></td>
<td>• Can the person navigate Epic and know where the various functions are in the window?</td>
</tr>
</tbody>
</table>
| **3. Workflow Specific Training with Epic** | • Ideally done in simulation environment  
• Instant feedback/coaching  
• Integrates workflow, medical content and patient safety/best practice |
| **4. One-on-one training and re-training** | • Additional training for providers who are not as efficient (e.g., documentation lacking, workflow not optimized, etc.)  
• May be on-demand or scheduled |

Optimization of Epic Training-Epic Optimization Overview

Instructors
- CES
- Asynchronous

Instructors
- MD Champions
- CI Fellows

Instructors
- Whatever I am called

Instructors
- MD Champions
- CI Fellows

Instructors
- Whatever I am called

Instructors
- MD Champions
- CI Fellows

Instructors
- Whatever I am called
# EHR Onboarding Training Algorithm

<table>
<thead>
<tr>
<th>Onboarding, Level 1 assessment</th>
<th>All New Clinicians</th>
</tr>
</thead>
<tbody>
<tr>
<td>Know Workflow?</td>
<td>Yes</td>
</tr>
<tr>
<td>Know Epic?</td>
<td>Yes</td>
</tr>
<tr>
<td>Training level needed</td>
<td>Level 3</td>
</tr>
</tbody>
</table>

### In The Time of COVID......

![WHERE'S WALDO? SOCIAL DISTANCING EDITION](image)

*Chattanooga Times Free Press*
EHR Training With COVID-19-Provider Onboarding

• Redeployment of staff from ambulatory to inpatient wards
• Onboarding of new staff
• 2 hr workflow training curriculum
• 3 simulated charts
  – ED Admit, ICU transfer to ward and Discharge Home
• Each case with 5 days of data and ambulatory encounters
• Each case with set curriculum for EHR functionality including navigator use, template creations, data trending, order entry

Feedback

• As a new inpatient provider with experience using EPIC only in the outpatient setting, Jeff and Jonathan did a great job tailoring this one on one session to give me a quick lay of the land and as well as helpful tips to efficiently and effectively chart review while working on a consult service inpatient. Already in my first week of work, I’ve found their tips incredibly helpful. There was quite an advantage to having a session in-person-- thank you so much!
EHR Training With COVID-19-Student Education

• Students have been removed off the wards
• Due to lost clinical time, remaining rotations have been compressed
• Goal, to design pre-rotation course to allow for optimization of workflow PRIOR to starting a rotation.
  – EHR is a main driver of workflow
• Begin with OHSU IM Sub-Internship preparation
• Used same OHSU simulation environment BUT student credentials changed to that of housestaff
  – They get full order entry and CDS

EHR Remote Learning Curriculum-General Structure

• Integrated into a 2 week course designed to help students prepare for their SUB-I
• Course instructor is Clinical Informatics fellow
• Each week a 2-hour session where high fidelity EHR case is used to demonstrate necessary EHR skills
• Students provided their own instance of a chart and an independent learning activity to complete based on finding information/entering information into the EHR
  – Integrates information gathering, clinical decision making and plan implementation
• Group debrief at end of the week going over answers in worksheet
• All done via Webex
• All EHR cases previously published and known use characteristics
EHR Remote Learning Curriculum-Week 1
Efficient and Effective Information Retrieval

• Synchronous Learning-Instructor Driven EHR Skill building
  – Understand Epic Hyperspace terminology
  – Learn workflow for efficient and effective chart review
  – Understand how each screen tells a part of a patient’s story
  – Copy and edit smartphrases
  – Begin to think clinically in interpreting EMR data, understanding the limits of
    EMR, and filling in the gaps with available resources (technology & people)

• Asynchronous Activity- Given Hospital chart off patient in hospital for 5 days
  and asked to fill out worksheet on various clinical questions

• Debrief at end of week to go over answers and practice order entry

Week 1 Worksheet Example

• What was Walter's baseline hematocrit from prior to this admission? You may have to
  look at prior notes and/or labs.
• Which of Walter’s labs and workup were abnormal from his initial set at admission?
  (Hint: Use the Results activity, scroll to find his oldest labs from admission day, and
  look at the abnormal flags)
• What are the trends (up or down or stable) of Walter's hemoglobin (Hgb) and white
  blood cell count (WBC) over the course of his admission to date?
• When did Walter last receive his Lisinopril?
• When was Walter last febrile? (Temp >= 38 C)
• What is Walter’s cumulative net fluid balance this admission
• Try to write a brief SINGLE sentence summary of the patient. Use the format: Walter is
  a 74yo male with history of ***, who is admitted for ***, complicated by ***
EHR Remote Learning Curriculum-Week 2
Collaborative Transfer Note

- Synchronous Learning-Focuses on accepting a transfer from ICU and writing transfer note
  - Interpret EMR data and Evaluate how information fits into patient's story/context
  - Generate new questions from uncovered information
  - Investigate patient's chart for answers
  - Recognize care gaps & discrepancies in prior documentation
  - Understand limits of EMR and when to rely on outside (human) resources: conversation, physical exam, or other healthcare team members
  - Summarize hospital course by system in succinct manner
- Each student takes turn finding information for section of note and presenting
- Asynchronous Learning-Given another ICU transfer and have to evaluate chart and write transfer note

Feedback

- This course was very helpful, especially since I’ll be taking my medicine sub I in a few weeks. The practice and discussion about important journal articles was invaluable.
- The Epic portion was super helpful!
- 1) This taught a lot about clinical reasoning which I appreciated. Thinking about a case again was very helpful including thinking about assessment and plan.
- 2) I think the case review was so helpful, I would recommend adding another.
Upcoming Activities

• Likely will be incorporated into curriculum long term
  – Post course survey has been created and will be deployed
• Designing similar activities for other specialties
• Have created COVID specific cases to allow for deliberate practice with specific CDS
• Will continue with using high fidelity cases for onboarding and bootcamps
• Integrating cases into RN, ANP programs

Summary

• EHR simulation with cases specifically designed for a given specialty can assess and train for EHR use and clinical decision making
• EHR training can be fun and enjoyable
• The EHR is uniquely suited as a conduit for remote and asynchronous learning
The Team

• Vishnu Mohan-DMICE
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• Jane Coffey-PCCM
• Sky Corby-PCCM
• Rebecca Harrison-SOM/UME
• Cort Garrison-CMIO

Thank You