Optimizing pharmaceutical care via Health Information Technology: The Epic Challenge

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Pharmacy Grand Rounds
01/03/2017
The medication management team requests you do not share this document with anyone outside of Mayo Clinic.

Note that screenshots included are still under development and may change.
Objectives

• State the current gaps in pharmaceutical care
• Identify tools within electronic health record that can assist pharmacists in improving care
• List challenges in optimizing pharmaceutical care with Health Information Technology (HIT)
Which of the following is the greatest limitation in providing optimal pharmaceutical care?

A. Limited pharmacist resources
B. Difficulty identifying high risk patients
C. Obtaining a complete patient home medication list
D. Numerous applications for patient care
Patient Scenario
US Emergency Department Visits for Outpatient Adverse Drug Events, 2013-2014

US Emergency Department Visits for Outpatient Adverse Drug Events, 2013-2014

- Public surveillance in 58 EDs located in the US
- Objective was to describe characteristics of ED visits for adverse events in the US

Background

Data from 42,585 cases, an estimated 4.0 (95% CI, 3.1-5.0) ED visits for adverse drug events occurred per 1000 individuals annually in 2013 and 2014.

27.3% (95% CI, 22.2%-32.4%) of ED visits for adverse drug events resulted in hospitalization.

Anticoagulants, antibiotics, and diabetes agents were implicated in an estimated 46.9%.
US Emergency Department Visits for Outpatient Adverse Drug Events, 2013-2014

**Background**
- Public surveillance in 58 EDs located in the US
- Objective was to describe characteristics of ED visits for adverse events in the US

**Results**
- Data from 42,585 Adverse Drug Events were reviewed
- 27.3% (95% CI, 22.2%-32.4%) of ED visits for adverse drug events resulted in hospitalization

US Emergency Department Visits for Outpatient Adverse Drug Events, 2013-2014

**Background**

- Public surveillance in 58 EDs located in the US
- Objective was to describe characteristics of ED visits for adverse events in the US

**Results**

- Data from 42,585 Adverse Drug Events were reviewed
- 27.3% (95% CI, 22.2%-32.4%) of ED visits for adverse drug events resulted in hospitalization

**Conclusions**

- The prevalence of ED visits for adverse drug events is estimated to be 4 per 1000 individuals in 2013 and 2014
- Anticoagulants, antibiotics, diabetes agents and opioid analgesics

Transitions of Care

60% of all medication errors occur during times of care transition

Transitional Care Model

“A set of actions designed to ensure the coordination and continuity of healthcare as patients transfer between different locations or different levels of care within the same location”
Pharmacist Impact Potential in Transitional Care

50%

Reduction in preventable 30-day readmission due to pharmacist intervention

Source: FPA/UCare Fairview Transition Pilot
Areas of Pharmacist Intervention

• Admission medication reconciliation
• Daily patient medication review
• Participation on rounds
• Medication education for patients
• Discharge coordination
Gaps in Pharmacist Medication Reconciliation

• Access to patient home medication list
• Identifying high-risk patients
• Limited pharmacy resources
How can HIT optimize pharmaceutical care?
Objectives

• State the current gaps in pharmaceutical care
• Identify tools within electronic health record that can assist pharmacists in improving care
• List challenges in optimizing pharmaceutical care with Health Information Technology (HIT)
History - HIT

- American Recovery and Reinvestment Act (ARRA)
- HIT infrastructure
- $150 billion total for healthcare reform
- $34 billion focused on HIT
HIT Tools

Pharmaceutical Care

- Clinical Decision Support
- Patient Scoring
- CPOE
- Automation
- Reporting/Analytics
- HIE

HIE = Health Information Exchange
CPOE = Computerized Prescriber Order Entry
Medication History Data

EHR → SureScripts

SureScripts → PBMs

PBMs → Pharmacies

PBM = Pharmacy Benefits Manager
Medication History Elements

Included

• Medication name
• Medication strength
• Medication route
• Medication form
• Dispense date
• Days supplied
• Quantity dispensed

Not Included

• Dose per administration
• Frequency of administration
Benefit of Medication History Data to Prevent Medication Errors

• Objective
  • Assess the potential of Surescripts claims data to reduce medication history errors at hospital admission
  • Interconnectivity between the EHR and Surescripts Electronic Pharmacy Claims Data

Cedars-Sinai Medical Center

Pevnick JM, et al. J Am Med Inform Assoc 2016;0:1–9
Photo source: Cedars-sinai.edu
Retrospective Study Within a Randomized Study

• Randomized Study
  • 3 Arms
    • Admission Medication History (AMH)
      • Usual Care (RNs/MD)
      • Pharmacy Technician
      • Pharmacist
  • Within 1 day of admission
    • Research pharmacist conducts a medication history to identify errors on the initial AMH
Retrospective Study Within a Randomized Study

• Randomized Study
  • Inclusion Criteria
    • > 10 chronic prescription medications
    • AMI or CHF
    • Admission from SNF
    • History of transplant
    • Active anticoagulant, insulin or narrow therapeutic index medications
  • Exclusion Criteria
    • Admission to pediatric or trauma services
    • Admission to a transplant service that already used pharmacist to obtain AMH
283 patients from the RCT

194 patients with 1017 errors identified in their 194 initial AMH

Excluded 89 Patients without errors in AMH

Excluded 124 patients who had no prior SureScripts download

70 patients with 315 errors remain

For each of the 315 errors, would SureScripts have prevented the error?

Outcomes

• SureScripts Medication History
  • Unrelated to the error
  • Probably would have not prevented the error
  • Might have prevented the error
  • Probably would have prevented the error
### Example of Error Prevention Potential Categories

<table>
<thead>
<tr>
<th>Example of SureScripts Data</th>
<th>Definition</th>
<th>Error prevention potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Several fills for amlodipine only</td>
<td>Unrelated to error</td>
<td>None</td>
</tr>
<tr>
<td>One fill for warfarin 6 months ago</td>
<td>Probably would not have prevented error</td>
<td>Low</td>
</tr>
<tr>
<td>Several refills for warfarin</td>
<td>Might have prevented error</td>
<td>Medium</td>
</tr>
<tr>
<td>Several recent fills for dabigatran</td>
<td>Probably would have prevented error</td>
<td>High</td>
</tr>
</tbody>
</table>

## Results

<table>
<thead>
<tr>
<th>Would SureScripts have prevented the error?</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No.</strong> Unrelated to AMH error</td>
<td>94 (30)</td>
</tr>
<tr>
<td><strong>Probably would NOT</strong> have prevented the AMH error</td>
<td>83 (26)</td>
</tr>
<tr>
<td><strong>Might have</strong> prevented the AMH error</td>
<td>24 (9)</td>
</tr>
<tr>
<td><strong>Yes, probably would have</strong> prevented the AMH error</td>
<td>110 (35)</td>
</tr>
</tbody>
</table>

## Results

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<thead>
<tr>
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<td>110 (35)</td>
</tr>
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Conclusion

• Electronic pharmacy claims data had a substantial potential to prevent admission errors
• Greater potential to prevent more severe errors
Epic medication history

Home Medications

New medications from outside sources

Medications need attention. Go Reconcile

Ongoing Comment: None Entered Add Note

New home med Add

Sort by Patient Reported Show Details

Prescribed

amlODIPine-atorvastatin (for_CADUET) 10-80 mg per tablet
Outside Data if Available

Reconcile Outside Info

<table>
<thead>
<tr>
<th>Medications</th>
<th>Problems</th>
<th>Immunizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleveland Clinic - TST</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outside name: FLuoxetine (PROZAC) 10 mg capsule</td>
<td>Local name: FLUOXETINE 10 MG CAPSULE</td>
<td>New</td>
</tr>
<tr>
<td>Source: Cleveland Clinic - TST</td>
<td>Updated on: 6/6/2016</td>
<td>Add</td>
</tr>
<tr>
<td>Sig: Take 1 capsule by mouth every evening. Dose: 10 mg</td>
<td>6/6/2016</td>
<td></td>
</tr>
<tr>
<td>Community Health Network</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outside name: aluminum &amp; magnesium hydroxide-simethicone (MAALOX MAXIMUM STRENGTH) 400-400-40 mg/5 mL suspension</td>
<td>Local name: ALUMINUM-MAG HYDROXIDE-SIMETHICONE 400 MG-400 MG-40 MG/5 ML ORAL SUSP</td>
<td>New</td>
</tr>
<tr>
<td>Source: Community Health Network</td>
<td>Updated on: 4/6/2016</td>
<td>Add</td>
</tr>
<tr>
<td>Sig: Take 15 mLs by mouth every 6 (six) hours as needed for Indigestion. Dose: 15 mL</td>
<td>4/6/2016</td>
<td></td>
</tr>
<tr>
<td>Outside name: amoxicillin (AMOXIL) 500 MG capsule</td>
<td>Local name: AMOXICILLIN 500 MG CAPSULE</td>
<td>New</td>
</tr>
<tr>
<td>Source: Community Health Network</td>
<td>Updated on: 3/5/2015</td>
<td>Add</td>
</tr>
<tr>
<td>Sig: Take 1 capsule (500 mg total) by mouth 3 (three) times daily. Dose: 500 mg</td>
<td>3/5/2015</td>
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<tr>
<td></td>
<td>Dispensed</td>
<td>Written</td>
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<tr>
<td>-------------------------</td>
<td>------------</td>
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</tr>
<tr>
<td>ALBUTEROL SULFATE</td>
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<tr>
<td>INHAL SOLN</td>
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<td></td>
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</tbody>
</table>
Which of the following is NOT included in the surescripts data elements?

A. Medication name
B. Frequency of administration
C. Medication strength
D. Medication route
Improving the Medication Review Process

- Targeting high risk patients
- Risk stratification
Development of an electronic patient prioritization tool for clinical pharmacist interventions

- Middlemore Hospital, Auckland, New Zealand
- Implemented electronic medication reconciliation
- Large patient numbers and high patient turnovers
- Purpose was to develop an electronic tool to help prioritize patient review

Nazanin F et. al; AJHP February 2014, 71 (4) 311-320
Design

Scoring Tool

Patient Profile

Chronic Disease

High risk medications

Admission History

Laboratory Values

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Nazanin F et. al; AJHP February 2014, 71 (4) 311-320
Scoring

• Top 10\textsuperscript{th} percentile = High Risk
• Next 15\textsuperscript{th} percentile = Medium Risk
• Remaining 75\textsuperscript{th} percentile = Low Risk
Results and Conclusion

- During 8 month period
  - 765 high-risk patients were prioritized for discharge support services

- 526 medication errors were prevented
  - 174 errors deemed moderate to major

- Positive clinical pharmacist feedback
# Inpatient pharmacy scoring dashboard

<table>
<thead>
<tr>
<th>Patient Name</th>
<th>MRN</th>
<th>Room/Bed</th>
<th>Length of Stay (Days)</th>
<th>Med Rec</th>
<th>Unverified Orders</th>
<th>Needs Review</th>
<th>Anticoag</th>
<th>ID</th>
<th>Naph</th>
<th>Pain</th>
<th>Target Drug Monitoring</th>
<th>Open vents</th>
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</thead>
<tbody>
<tr>
<td>AdmMedrec, Kirstenfive</td>
<td>555565</td>
<td>290/290-P</td>
<td>90</td>
<td>3</td>
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<th>Open i-vents</th>
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<tr>
<td>90</td>
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<td>2</td>
<td>4</td>
<td></td>
<td>0</td>
<td></td>
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</table>
## Discharge summary dashboard

<table>
<thead>
<tr>
<th>Expected Dischrg</th>
<th>Discharge order signed?</th>
<th>Pharmacy Education</th>
<th>Dischrg Med Rec</th>
<th>LACE+ Score</th>
<th>Discl Rx</th>
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<tr>
<td>11/22/2016</td>
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<tr>
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<td>30</td>
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<tr>
<td>12/1/2016</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>66</td>
<td>—</td>
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</table>
### MTM Scoring Report

<table>
<thead>
<tr>
<th>PCP</th>
<th>Patient</th>
<th>Pt Comm Pref</th>
<th>MRN</th>
<th>Care Gap</th>
<th>General Risk</th>
<th>Medication Risk</th>
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<tr>
<td>Richard J Ina, M.D.</td>
<td>Overview, Joe</td>
<td>11-001-910</td>
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<td>3</td>
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<td>Batchtesting, Edsix</td>
<td>11-002-634</td>
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<td>Andresson, Imogen</td>
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<td>Test, Mark Timothy Jr.</td>
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<td>11-001-292</td>
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<td>44</td>
</tr>
</tbody>
</table>

**Medication Therapy Risk Score**

This score indicates an adult patient's general health risk as it pertains to medication therapy.

**Points Metrics:**
- Age: 67
- Hospital Admissions: 2
- ED Visits: 0
- Has chronic obstructive pulmonary disease: No
- Has congestive heart failure: Yes
- Has diabetes: No
- Has liver disease: No
- Has depression: No
- Current PCP: Not on file
- Has Medicaid: No
- Elderly High Risk Meds: Not on file
- Count of Current Outpatient Meds: 15
- MC MTM Count AMI High Alert Meds: 2

Never reviewed: 0

[9/6/16]
# MTM Scoring Report

## Medication Therapy Risk Score

This score indicates an adult patient's general health risk as it pertains to medication therapy.

### Points Metrics

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Objectives

• State the current gaps in pharmaceutical care
• Identify tools within electronic health record that can assist pharmacists in improving care
• List challenges in optimizing pharmaceutical care with Health Information Technology (HIT)
Challenges and Barriers

- Financial
- Work force
- Technical
- Cultural
- Structural
- Privacy and security issues
Financial Challenges

• Most of these features are not out of the box
• Cost of implementing HIT systems can be high
Workforce

- Resources for development of these tools can be challenging
  - Electronic patient prioritization tool
    - 2000 hours to program the tool
    - 320 hours of testing
    - 160 hours to review flags
Technical

• Interoperability
• Communication standards
• Electronic Pharmacy Claims Data
  • Capture of over the counter medications
  • Not all pharmacies send data to surescripts
• Pharmacy Scoring Tools
  • Use of discrete data fields
Which of the following is NOT a challenge identified with implementing HIT

A. Financial constraints
B. Workforce resources
C. Converged workflows
D. Technical considerations
Summary - Patient Scenario
Questions & Discussion
badamas.rilwan@mayo.edu