Meeting the PPMI Goals for Technology –
"Is a Puzzlement"

Drug Bug Mismatch

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The speaker has no conflict to declare.

University of Chicago Medicine

- A Non-For-Profit Hospital [1]
  - Bernard A Mitchell Hospital
  - Comer Children's Hospital
  - Chicago Lying-in Hospital
  - Duchossois Center for Advanced Medicine (DCAM)
  - University of Chicago Pritzker School of Medicine
  - NHP Pavilion set to open February 2013
- Patient Care Facts circa 2011 [1]

Fact	
Admissions	22,797
Average Beds in Service	550
Visits to DCAM	384,550
Emergency Visits	74,359

1. UCM Intranet. University of Chicago Medicine. 13 August, 2012.

Introductions

- How many of you have implemented an Antimicrobial Stewardship Program?
- How many of you have implemented Clinical Decision Support Tools integrated with CPOE (Computerized Physicians Order Entry)?

Self Assessment

- Which PPMI goals are associated with clinical decision support?

A. Order management and review organized around drug therapy management services.

B. Real-time monitoring systems that provide a work queue of patients needing review and possible intervention.

C. Both A and B

D. Avoid at all costs, could trigger a migraine.

PPMI Goals Related to Clinical Decision Support

- C2d. Clinical decision support integrated with CPOE.[2]
- C2e. Order management and review organized around drug therapy management services.[2]
- C2f. Real-time monitoring systems that provide a work queue of patients needing review and possible intervention. [2]

[2] Am J Health-Syst Pharm—Vol 68 Jun 15, 2011 1151

Additional Goals

- Recognize the PPMI goals related to clinical decision support implementation.
- Describe the functionality of antibiotic monitoring.
- Discuss the challenges and solutions associated with the antibiotic monitoring build.

Clinical Decision Support

Clinical Tools For Improved Patient Safety

- Drug Bug Mismatch
  - Antimicrobial Stewardship Program (ASP)
  - Alerts user when patient's culture is resistant to their current antimicrobial therapy

Antimicrobial Stewardship Program

- [3] The UCMC Antimicrobial Stewardship Program (ASP) is charged with
  - improving antimicrobial prescribing practices
  - enhancing the safety of antimicrobial use
  - ensuring the cost-effective use of antimicrobial agents
- [4] "Computer based surveillance can facilitate good stewardship by more efficient targeting of antimicrobial interventions"

3. ASP Intranet. University of Chicago Medicine. 13 August, 2012.
4. Dellit t, Owens R, McGowan J et al. Infectious Diseases Society of America and the Society for Healthcare epidemiology of America guidelines for Developing an Institutional Program to Enhance Antimicrobial Stewardship. CID 2007:44: 159-173

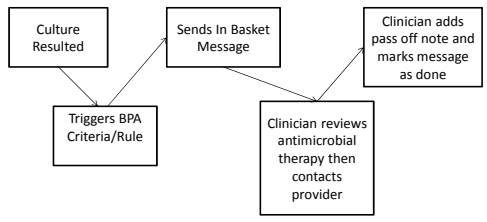
Preceding Surveillance Tools

- Electronic Medical Record
  - Clarity reports
    - Data not available until next day
  - Reporting Workbench
    - Inability to link culture with patient's antimicrobials

Drug Bug Mismatch Challenges/Solutions

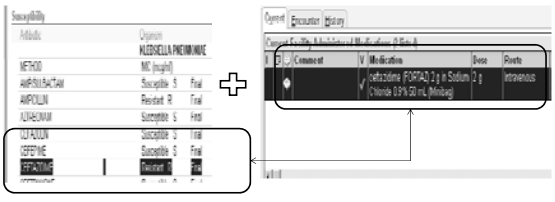
- Challenges
  - New functionality
  - Complex logic equals a large build
  - Multiple organism cultures = Multiple Messages
- Solution
  - Build basic rules and put the details in the report

Drug Bug Workflow



Drug-Bug Mismatch Example

- A patient's culture is resulted which is resistant to their current antimicrobial medication order (e.g. Ceftazidime)
- Alert triggered

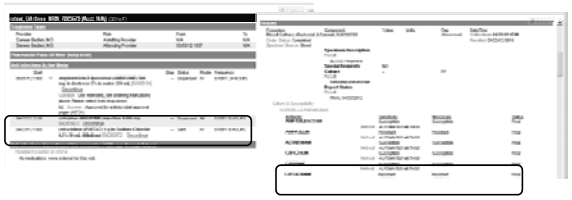


Drug-Bug Mismatch Example Con't

- Alert sends and In Basket message to the ASP team
- Clinician utilizes message time to determine resistant culture to patient's antimicrobial

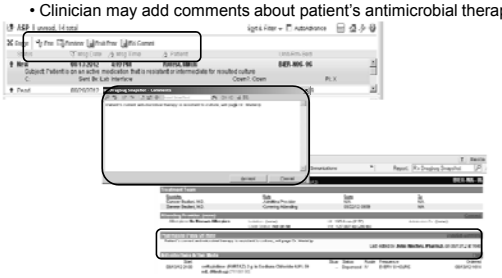
Drug-Bug Mismatch Example Con't

- In Basket report consolidates patient information for review by clinician.
  - Patient demographic information
  - Active anti-infectives
  - Latest culture results



Drug-Bug Mismatch Example Con't

- Clinician reconciles antibiotics
- In Basket buttons allow access to patient's chart for further evaluation
- Clinician may add comments about patient's antimicrobial therapy.



Drug-Bug Mismatch Build

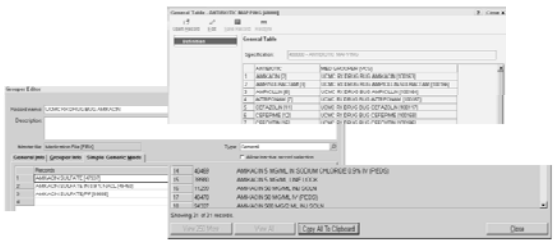
- Components
  - General Table/VCGs
  - Best Practice Alerts (BPA)
  - Rules
  - In Basket
  - Report/Print groups
- Estimated build time one month >> Depends on the build!

Drug-Bug Mismatch Build General Table/VCG

- General Table
  - Maps antibiotic to medication records
- VCG
  - groups medication records
  - one VCG group for each antibiotic
  - ☺ for easier maintenance use generic medication med

Drug-Bug Mismatch Build General Table/VCG

- General Table/VCG Example

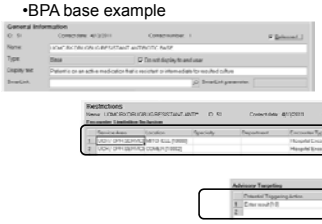


Drug-Bug Mismatch Build
Best Practice Alerts

- BPA
  - Triggered when culture resulted
  - Multiple settings allow for further customization of criteria
    - Restrict to inpatient anti-infective orders
    - Restrict to certain hospitals
    - Link to rules
  - Sends In Basket message if all criteria are met
    - Customize In Basket message
    - Assigns In Basket pool

Drug-Bug Mismatch Build
Best Practice Alerts

- BPA base example

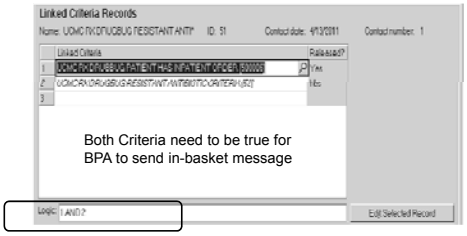


Drug-Bug Mismatch Build
Best Practice Alerts

- BPA base In Basket setup

Drug-Bug Mismatch Build
Best Practice Alerts

- BPA criteria example



Drug-Bug Mismatch Build
Best Practice Alerts

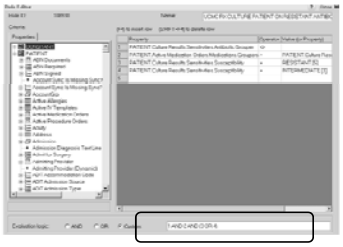
- BPA criteria example

Drug-Bug Mismatch Build
Rules

- Rules
  - Processes each line of the culture
    - e.g. CEFTAZIDIME RESISTANT
  - Compares general table VCG (CEFTAZIDIME) to patient's active medications.
  - Custom logic allows flexibility in rules

Drug-Bug Mismatch Build Rules

•Rules Example
- Rule is true if patient is on an active antibiotic order that is resistant or intermediate.



Custom logic allows for further flexibility

Drug-Bug Mismatch Build Rules

•Rules Example con't
- Line #2 Maps Culture Antibiotic to Patient's Active Antibiotics

PATIENT.Active Medication Orders.Medications.Groupers = PATIENT.Culture Results.Sensitivities.Antibiotic Grouper

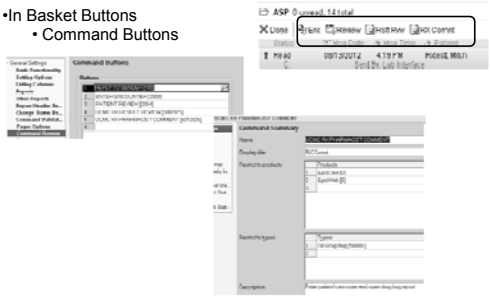
Drug-Bug Mismatch Build In Basket

•In Basket Setup – A Presentation in Itself!
- Recipients of message are assigned to a message pool

- Message type defines In Basket build

Drug-Bug Mismatch Build In Basket

•In Basket Buttons
- Command Buttons



Drug-Bug Mismatch Build In Basket Report

•Report
- Consolidate information in one location
- Customized print groups
  - Patient demographics
  - Pharmacist pass off note
  - Active antibiotics
  - Discontinued antibiotics
  - Culture results

Drug-Bug Mismatch Build In basket Report

- Custom print groups
  - Active antibiotics
    - Print Group # 46100
    - Must create LPP filter to only list antibiotics

  - Pharmacist pass off note "Sticky Note"
    - Print Group #46541
    - Must assign a key to sticky note (e.g. RXDRUGBUG)
    - Note is per patient encounter

Limitations

- No functionality exists to indentify triggering culture/antibiotic
  - Work around: clinician must match time of message to time of culture result then reconcile antimicrobials.
- Rule cannot restrict to only inpatient antimicrobials
  - Work around: BPA criteria requires that the patient is on at least one active inpatient anti-infective
- Clinicians have no way to mark an alert as reviewed
  - Work around: created pharmacist pass off note.
- Cultures can have several "Preliminary Results", which trigger duplicate messages.

Feedback

- Positive
  - Alerts were found to be accurate when compared against lab data
  - In-basket report allows for quick analysis of messages
  - Pass off note allows for more efficient follow up.
- Negative
  - Messages are triggered to many times
  - No way to mark alerts as reviewed.

Enhancements

- Print group to identify triggering culture/antibiotic
- Rules specific to inpatient medications
- Ability to mark messages as reviewed
- Page/email clinician when alert is trigger

Self Assessment

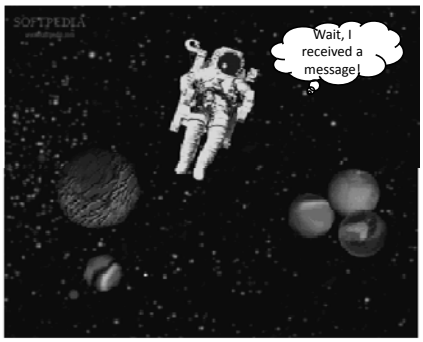
- Once an alert is triggered where is the message sent?

A. Pager

B. In Basket

C. A&B

D. Outer space



Questions?

Meeting the PPMI Goals for Technology – "Is A Puzzlement"

Barcoding to Achieve PPMI Goals

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I have no conflicts of interest to report.

Additional Goals

- Recognize the PPMI Goals related to barcoding
- Identify methods of overcoming barriers to achieving barcode verification for medication administration
- Identify methods of integrating barcode verification into compounding and preparation processes

PPMI Goals Related to Barcoding

- C2j: Use of bar-code technology during the inventory, preparation, compounding, and dispensing processes.
- C2l: Use of bar-code technology during medication administration.

PPMI National Dashboard

- Percentage of hospitals/health systems that routinely use machine readable coding (e.g., bar coding technology with or without a robot) in the inpatient pharmacy to verify doses during dispensing [C2j].

33.9%

PPMI National Dashboard

- Percentage of hospitals/health systems that use machine-readable coding (e.g., Bar-Code Medication Administration [BCMA] system) to verify the identity of the patient and the accuracy of medication administration at the point-of-care [C2l].

50.2%

Self-Assessment Question

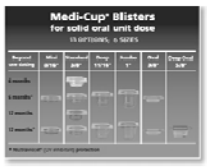
Which of the following are PPMI Goals related to barcoding?

A. Barcode verification at the time of medication administration.
B. Use of barcode verification in inventory functions.
C. Use of barcode verification during compounding.
D. All of the above.

Barcoding For Medication Administration

- Goal: Barcode verification from manufacturer to patient
- Software & Hardware Requirements:
  - Electronic medical record support
  - Integrated barcode validation
  - Mechanism for applying barcodes to all products
  - Strategically placed computers and scanners (bedside, pharmacy)
  - Repackaging equipment (or outsourced)

Medi-Dose Packaging



Medical Packaging Inc

Automed FastPak EXP

Barriers: Barcode Verification During Medication Administration

- Expense – EMR, Repackaging/Outsourcing
- Barcode Variables:
  - Package size
  - Overwraps and outer packaging
  - Different types of barcodes (scanner programming)
  - EMR generated versus manufacturers' barcode (repackaged products)
- Compliance: setting expectations, sharing the data, troubleshooting issues

Sample Compliance Report

Patient Scanning Compliance	Medication Scanning Compliance	Total Administrations	# of Admins With Patient Not Scanned	# of Admins With Medication Not Scanned	# of Admins With Neither Medication Nor Patient Scanned
96.97%	96.97%	33	1	1	1
100.00%	100.00%	5			
99.42%	99.42%	172	1	1	1
91.67%	91.67%	36	3	3	3
100.00%	0.00%	1		1	
100.00%	100.00%	7			

Self-Assessment Question

Barcoding for medication administration requires:

A. Hardware and software support
B. A clearly communicated compliance plan
C. Packaging plans that ensure a scannable bar code on every product
D. All of the above

Integration of Barcoding into Compounding

- TPN and batch compounding capability
- Scanning during patient specific compounding
- Fully automated IV compounding
- Robotic Chemo compounding

Baxa Exactamix 1200

Epic Dispense Preparation

Baxa Intellifill IV

Cytocare

Self-Assessment Question

Technology options for integrating barcoding into compounding range from batch/TPN compounders to fully automated IV preparation systems.

A. True
B. False

References

- The Consensus of the Pharmacy Practice Model Initiative. Am J Health-Syst Pharm. 2011; 68:1148-52. http://www.ajhp.org/content/68/12/1148.full.pdf+html
- Pharmacy Practice Model Initiative and the PPMI National Dashboard. http://www.ashpmedia.org/ppmi/docs/ppmi_national_dashboard.pdf
- MediDose Web Site: http://www.medidose.com/medidose.aspx

References

- Medical Packaging Inc: http://www.medpak.com/v1/Main/Default.aspx?expand=Home
- Amerisource Bergen Drug Corporation Web Site – FastPak EXP: http://www.amerisourcebergen.com/abcdrug/PDFs/Global/FastPakEXP_12_09.pdf Baxa DoseEdge Web Site: http://www.baxa.com/doseedge/

References

- Baxa em1200 Web Site: http://www.baxa.com/PharmacyProducts/AutomatedCompoundingDevices/ProductDetail/?id=2CA80FF5-A21F-9E08-20BC7D50A42B557A
- Baxa/For Health Technologies Web Site: http://www.fhtinc.com/benefits.html
- Health Robotics Cytocare Web Site: http://www.health-robotics.com/en/solutions/cyto-care/

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PPMI & "Ideal" Work Queue

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** I have no disclosures. **

Additional Goals

- Recognize PPMI goals related to technology that support optimal pharmacy practice models
- Identify methods for implementing technologies to support pharmacists as clinical medication managers

Get to Know You…

- Show of Hands….
- How many have electronic medical records system?
- Currently use real time clinical monitoring system to support pharmacists as clinical medication managers?

Overview

- PPMI – Technology
- NorthShore
- "Ideal" Work Queue
- Global Immunization
- Ideal Transitions

Self Assessment Question

- Which of the following supports pharmacists as clinical medication managers?
  a. Systems supporting hands on oversight of distribution systems
  b. Operational systems driven by product distribution
  c. Decision support systems containing order entry alerts
  d. Decision support systems that provide a prioritized work queue

PPMI – Technology Opportunities[1]

- Pharmacists as clinical medication managers
- EMR – standardized format
- Operational systems that drive behavior around clinical care
- Decision-support systems that maintain appropriate context
  - Real-time, continuous monitoring
  - Prompts only appropriate users
  - Queues interventions by priority
  - Supports documentation

Siska MH , Tribble DA. *AJHP.* 2011; 68:1116-1126.

PPMI – Technology Solutions[2]

- Order management and review around drug therapy management services
- Real time monitoring systems
- Work queue supporting drug therapy management and documentation
- Automated notification of labs/ tests outside of normal range

AJHP Vol 68, June 15 2011.

PPMI – Technology Recommendations[2]

- C7. EMRs designed to align pharmacists' documentation outlining care provided and a method to ensure the quality of care provided
- C9. Technology designed to demonstrate the impact of pharmacy services on patient outcomes
- C10. Technology designed to support pharmacy processes to improve patient outcomes

AJHP Vol 68, June 15 2011.

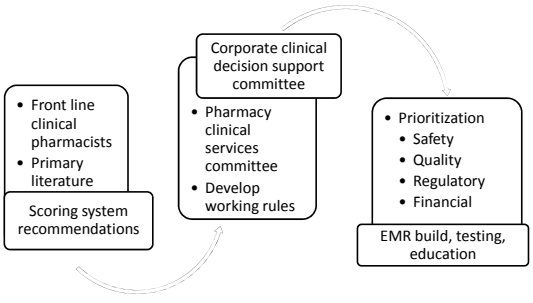
NorthShore University Health System

- Four Community Teaching Hospitals
  - Evanston, 354 beds
  - Glenbrook, 169 beds
  - Highland Park, 149 beds
  - Skokie, 195 beds
- Medical Group, Research Institute, Foundation
- Fully automated electronic medical records (EMR) system

NorthShore – Work Queue

- Clinical surveillance system internal to EMR
- Scoring system based on changing clinical status and documentation
- Notification for patients requiring review and possible intervention
- Supports pharmacist documentation
- Developed & maintained by informatics personnel

NorthShore – Work Queue Build



Self Assessment Questions

- Building an ideal work queue integrated within a health system's EMR can be achieved with pharmacy informatics specialists
  - True
  - False

Global Immunizations[3]

- Jan 2012: CMS and The Joint Commission require healthcare organizations to publicly report immunization compliance rates
  - IMM-1a Pneumococcal Immunization – Overall rate
  - IMM-1b Pneumococcal Immunization – Age 65 and Older
  - IMM-1c Pneumococcal Immunization – High Risk Populations (Age 6 through 64 years)
  - IMM-2 Influenza Immunization

http://www.jointcommission.org/core_measure_sets.aspx

Vaccination at NorthShore

- Nursing responsible for influenza vaccination program
  - Clinical decision support in EMR
- Pneumococcal vaccination program
  - Pediatricians to order for 6-18 years old
  - Pharmacists accountable for all adult patients

Pneumococcal Vaccine Work-Flow

- Nurse completes initial assessment, including vaccine history
- Clinical decision support based on patient problem list, vaccine history, and allergies
- Point flags to pharmacist for patients requiring vaccination (work queue)
- Pharmacists place order for vaccine and documentation per protocol

Ideal Transitions - High Risk

- Evaluation of current status at NorthShore
  - Patients readmitted within 30 days
- Multidisciplinary team identified variables for re-admission risk (evidence based)
  - Co-morbidities, labs, # meds, encounters
  - Statistical analysis using simple regression model
- Developed model engineered to our patient population

Ideal Transitions

- Targeted care by multidisciplinary team for patients at high risk for re-admission
- "High Risk List" generated daily based on variables within EMR
  - Currently list emailed to pharmacists (limitation of system)
- EMR contains diagnosis-specific patient lists (ex. myocardial infarction, heart failure)

Ideal Transitions

- Unit-based pharmacists utilize "high risk" list and diagnosis-specific lists to screen patients for targeted education
- Medication education consult order placed
- Patient education by pharmacist using teach back method
- Documentation to next care provider
  - Information taught, further need, goals

Challenges

- Clinical surveillance tool
  - Resources, education, culture
- Ideal transitions
  - Integration of clinical decision support tool into EMR (currently emailed)
  - Documentation to next care provider
- Management of medication preparation and distribution

References

1. Siska MH , Tribble DA. Opportunities and challenges related to technology in supporting optimal pharmacy practice models in hospitals and health systems *AJHP.* 2011; 68:1116-1126.
2. The Consensus of the Pharmacy Practice Model Initiative. Am J Health-Syst Pharm. 2011; 68:1148-52. http://www.ajhp.org/content/68/12/1148.full.pdf+html
3. The Joint Commission Core Measures Set. Available at: http://www.jointcommission.org/core_measure_sets.aspx. Accessed August 12, 2012.

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