Infection Control

Data Mining with MIDAS+

Patty Dietz RN, BSN, CPHQ
Regional Consultant
ACS-MIDAS+
Why ??

• According to the CDC, HAI are the 4th leading cause of death in the US – killing 88,000 patients each year

• HAI have a major impact on hospital operating margins
  – Financial loss on 5% of patient acquiring infections erodes 63% of average hospital’s net IP operating revenues
  – PA no longer reimbursing for HAI
  – CMS to follow Oct 2008
What is Data Mining?

• Technology that identifies actionable opportunities for intervention

• Actual IC interventions are not expensive, they involve changing human behavior

• Data mining allows ICPs to be more proactive in protecting patients from infections, while improving operating margins in a measurable way
Types of Computer Programs

• Information Tools — collect and store information

• Workflow Tools — improve quality and efficiency of daily work activities
Clinical Data Integration

• Automates daily information gathering and eliminates duplicate data entry
  – efficient and effective management of workflow

• Using SmarTrack Worklist Rules and Indicators ensures that critical events are not overlooked

• Access to virtually an unlimited array of discrete data fields
  – supports data mining activities enhancing quality improvement and patient safety activities
The 5 W’s of Clinical Data Integration

**Who**
Virtually any MIDAS+ user can take advantage of these automated worklist alerts. Rules can be tailored to meet each MIDAS+ user’s unique needs based on their roles & responsibilities.

**What**
Discrete quantitative and predictable textual data can easily be utilized for rules-based processing.

**When**
Alerts are delivered at the point when the reviewer is ready to evaluate the case and has the information necessary to take appropriate action.

**Where**
The Worklist provides the necessary vehicle for delivery of these automated alerts. By defining the appropriate access function in SmarTrack Worklist Rule definition, the reviewer is directed to the specific MIDAS+ electronic form that must be completed as a result of the alert.

**Why**
These alerts serve to enhance workflow efficiency, to more accurately identify cases that require a specific intervention.
Is this your ICP ?????
Why MIDAS+ ?

- Completely automated data acquisition
- Customized e-mail alerts for events needing attention
- Reports with summary rates & analysis
- Routine rates & trend analysis by location & service
- Drill down to patient & lab details to facilitate investigation
MIDAS+ Benefits

• Reduced non-reimbursed costs of HAI
• Increased time for interventions
• Demonstrated commitment to patient safety
• Prepared for mandatory reporting
IC Module Implementation

• Review current processes & need for reports & other information
• Address securities & needed access to other modules
• Determine Site Parameters
  – SURGICAL ENTRY FUNCTION LINK TO INFECTION CONTROL
  – SURG-ENTRY FUNCTION
• Dictionaries (CDC)
• Define any needed EUF
• NHSN Set Up (info on website)
  – Dictionary 195, Dictionary 10
Related Modules

– Encounter Location History

– Surgery Module
  • Interfacing Data into Surgery
  • Extended User Fields
  • Linking with Infection Control

– Critical Care Module
  • Collect Device Usage

– Focus Studies / EUF
  • Collect Additional Infection Control Data
  • IHI Bundles
Reporting Options

• SmarTrack Worklist Rules for Notification (e-mail)
• Infection Worksheet & Standard Reports
• SmarTrack Indicators and Profiles
  – Counts, Sums and Rates
  – Patient Days on Supports or in a Location
  – Infection Control Profiles
• ReporTrack Tabular and Worksheet Reports
Interfacing Microbiology to Infection Control

- Diagnostic Test
- Culture Source
- Culture Date
- Location & Room
- Organisms
- Drug associated Sensitivities
### Infection Control Entry

**Onset Date:** 2/27/2006  
**Infection:** SS-Deep Wound

#### Organisms/Antibiotics

<table>
<thead>
<tr>
<th>Organism</th>
<th>Resistant Drug - Methicillin Resistant Staph Aureus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methicillin Resistant Staph Aureus</td>
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</tr>
<tr>
<td>*</td>
<td>Clindamycin-Resistant</td>
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<tr>
<td></td>
<td>Erythromycin-Resistant</td>
</tr>
<tr>
<td></td>
<td>Vancomycin-Susceptible</td>
</tr>
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</table>

#### Antibiotics

<table>
<thead>
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<th>Start Date</th>
<th>End Date</th>
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</thead>
<tbody>
<tr>
<td>Clindamycin</td>
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<td></td>
</tr>
</tbody>
</table>

### Comments

- Clindamycin-Resistant
- Erythromycin-Resistant
- Vancomycin-Susceptible
Laboratory Studies to Focus

• Chemistry
  – Glucose Monitoring
  – Drug Levels

• Hematology
  – CBC (WBC, H/H)
  – Coagulation Studies (PT, PTT, INR)

• Serology
  – Disease-specific Screening
    • C. diff, HIV, Influenza, Rapid Strep,
Interfaced Fields

• Encounter-based Focus
  – Ordering Physician
  – Collection Date & Time
  – Panel Name
  – Test Name
  – Result
  – Reference Range
  – Unit of Measure
  – Abnormal Flag
  – Status
Rules-based Processing

• Record selection using any combination of data fields
• Efficiently & Effectively Manage Workflow
• Automated Critical Event Alerts
• Improve Quality of Care
Surveillance Activities/Lab Triggers

- Positive Cultures
- Infection Rates by Unit
- Monitoring Resistance Patterns
- Communicable Disease Tracking
- Isolation Precautions
- Device Related Infection Rates
- Statistical Reporting
- Outbreak Monitoring
IC Surveillance & MIDAS+

• Post discharge surveillance
  – Utilize report from Surgery Module of previous month’s procedures
  – send to surgeons for determination of post discharge SSI
Reporting

Standard Reports

• IC Detail
• IC Worksheet
• QM Readmission
  – Run by Service, Payer, Location, DRG, Dx, Procedure
  – Prints previous visit Dx & Procedure & current Dx
  – Can assist with identifying infection related readmissions
• Infection Control Profile
  – Use for trending & reporting to IC Committee
Examples of Worklist Rules

• Laboratory
  – Rapid influenza positive
  – MRSA growth on wound culture

• Encounter
  – Readmissions
  – LOS > X days

• IHI Global Triggers for Adverse Events
  – Positive Blood Culture
  – Infection of any kind (CL, SSI, UTI)
  – C. diff +
  – Pneumonia in ICU
SmarTrack Indicator Examples

- Patients with Infections
- Encounters with Infections
- Total Infection Episodes
- Total Patient Days
- Infections by Type
- Infections by location (unit)
SmarTrack Indicator Examples (cont)

• Reportable Infections
• Provider specific infection rates (use on reappointment profile)
• HAI Rate (total, Proc, Loc)
• Infections by wound class
• Critical Care Module
  – Device days (vent, CL, foley) – or use manual indicators
  – Days at risk
SmarTrack Indicator Examples (cont)

- Percent of central line associated primary bloodstream infections per 1000 central line days by unit
- Rate of post-operative sepsis per 1000 elective surgical discharges
- Incidence of bacterial pneumonia
- Rate of hospital acquired urinary track infections
- Percent of patients with documented infection placed in appropriate isolation precautions
SmarTrack Indicator Examples (cont)

- Automated reporting of communicable diseases to state agencies
- Incidence of ventilator associated pneumonia by unit
- Rate of C.Diff positive cultures by unit
- Ratio of healthcare acquired to community acquired Acinetobacter infections
SmarTrack Indicator Examples (cont)

- Use final coding to get even more info ……
  - TB cases
  - Meningitis
  - Post-Op & other coded infections
  - Anthem RFI - indicators w/ specific exclusions

- SCIP – use core profile
NHSN Specific Indicators

• VAP rate per 1000 vent days
• Vent Utilization Ratio: vent days/pt days by location
• CLA BSI per 1000 CL days
• CAUTI: SUTI & ASB rates per 1000 urinary cath days
NHSN Specific Indicators (cont)

• Urinary Cath Utilization Ratio: cath days/pt days by loc
• Post Procedure Pneumonia (PPP)PP/ # op proc x 100 by risk group
• SSI rates per 100 operative proc (separate calculations for each risk group) / NHSN
• Antimicrobial use & resistance (AUR) – with lab & RX interface
Data Awareness

• Must understand overriding premises

• Based on STW rule, the ICP:
  – Classifies the infection type & complete rest of fields based on data you wish to track
    • Don’t enter if you won’t use the data
  – ICP should have option to decide

• Only count data based on what was classified as infection & infection type

• If do repeat cultures, could have same growth: don’t classify twice
Data Awareness

- Overriding premises need to be understood
- Be aware of how the data is populating & how that affects the indicators you write
- Use of qualifying variables (with lab interface)
  - Never count episodes unless qualify with type
    - Can crosstab by infection !
  - SmarTrack Worklist
    - Must know how you are managing cases (do correlation: OK to delete off STW)
    - every culture drawn vs actual growth
    - write rules against diagnostic tests ??
ReporTrack Reports

- Health Department Reporting
- Pathogen/Organism Summary Report
- Worksheets
- Letters for follow-up
- Daily scheduled reports to identify clusters/trends/resistance patterns
  - By loc, organism, Dx, etc
- File submission to NHSN
- ... the possibilities are endless !!!!!
Additional Resources

- HCM
- Quality
- Risk
  - How could you use these folks or modules to assist with surveillance & notification of possible infection related events?
Infection Control
The Changing Face of Information Technologies

Linda Justice, RN, MCSM
MIDAS+ System Manager
Spartanburg Regional Healthcare System
Problem

- Paper Microbiology reports
- Multiple days of reports before final result
- No Interface - all results had to be hand entered to return data
- Why enter in MIDAS+ when you can count tick marks and put in Excel?
Road Blocks

• BUDGET - BUDGET – BUDGET
  – Cost of new system
  – Cost of interfaces both from Vendor and HIS system
• Interface Analyst time constraints - 3 to 5 year waiting list for new interfaces
• Does Automation decrease ICP input?
Steps to Solution

• Issue addressed at Quality sub-committee of board
• Directive to find solution and report back to board
• Meeting with key players- IC, IS, Quality
• Search for solution
• Consider in-house possibilities
Case for Automation based on Cost
Infection Control Specific Vendors

• Cost: Quotes with wide range - 30K to 250K per year
• All still need multiple interfaces or mean manual entry
• Implementation resources
• Needed a timely solution
• No money budgeted
MIDAS+?

• Infection control already used MIDAS+ but very limited
• Interface issue- we were in process of changing lab systems
• Still no interface analyst time to assist (no more than 20 minutes or project is no go)
<table>
<thead>
<tr>
<th>Onset Date: 10/20/2006</th>
<th>Infection:</th>
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</table>

**Organisms/Antibiotics**

<table>
<thead>
<tr>
<th>Organism</th>
<th>Resistant Drug - Proteus mirabilis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proteus mirabilis</td>
<td>AMIKACIN-SUSCEPTIBLE</td>
</tr>
<tr>
<td>Pseudomonas aeruginosa</td>
<td>AMPICILLIN-SUSCEPTIBLE</td>
</tr>
<tr>
<td></td>
<td>AMPICILL/SULBAC-SUSCEPTIBLE</td>
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</table>

**Antibiotic**

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Start Date</th>
<th>End Date</th>
</tr>
</thead>
</table>

**Isolation**

- Isolation: [ ]
- Start Date: 
- End Date: 

**Isolation Type**

- Isolation Type: 
- Start Date: 
- End Date: 

**Comments:**
All is not MICRO

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<tr>
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<tr>
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<tr>
<td>Focus ID</td>
<td>06-29</td>
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<tr>
<td>Providers</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
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| Assessment Number | MP06174007                                      |
| Panel Name        | CLOSTRIDIUM DIFF STOOL                          |
| Collection date and time | 6/23/2006 5:58 PM                              |
| Specimen source   | Specimen: STOOL                                 |
| Status            | FINAL                                           |
| Result (1)        | Clostridium difficile toxin A/B Direct Assay-Positive |
| Result (2)        | PHONED TO:                                      |
| Result (3)        | ROBIN ON 3SOUTH AT 16:00 6-24-06                |
| Result (4)        |                                                 |
| Result Date/Time  | 6/24/2006 3:54 PM                               |
| Additional Results|                                                 |
How Does that Work?
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<th>Value</th>
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<tr>
<td>Email Address</td>
<td><a href="mailto:slanhair@she.is">slanhair@she.is</a></td>
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Must have employee e-mail address in employee dictionary.
# Trend Identification

## Infection Control Unit Report

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<th>ONSET_DATE</th>
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<td></td>
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<td>SPUTUM</td>
<td>Pseudomonas aeruginosa</td>
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<td>URINE CLEAN CATCH</td>
<td>Klebsiella pneumoniae</td>
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<tr>
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<td>Escherichia coli</td>
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<td><strong>3 WEST Peds</strong></td>
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<td><strong>4 HEART</strong></td>
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<td><strong>5 HEART</strong></td>
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<tr>
<td><strong>5 NORTH MED SURG</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Account Number</td>
<td>Start Date</td>
<td>Onset Date</td>
<td>Days to Infection</td>
<td>Location</td>
</tr>
<tr>
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## MRSA Screenings

<table>
<thead>
<tr>
<th>Account Number</th>
<th>Patient</th>
<th>Onset Date</th>
<th>Assession Number</th>
<th>Lab Comments</th>
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<tbody>
<tr>
<td>0629701225</td>
<td></td>
<td>10/24/2006</td>
<td>KW06297032</td>
<td>METHICILLIN RESISTANT Staphylococcal infection</td>
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<tr>
<td>0629500055</td>
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<td>KW06295013</td>
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<tr>
<td>0627800501</td>
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<td>10/24/2006</td>
<td>KW06297030</td>
<td>NASOPHARYNGEAL/NARES Collected: 10/24/2006 16:00 Status: Final Last Updated: 10/26/2006 08:11</td>
</tr>
</tbody>
</table>
Dear Mr. [Name],

On [Date] I had lab test done to check for infection in NASOPHARYNGEAL. This was done by Dr. [Name], an outpatient or inpatient at Spartanburg Regional Medical Center, but the results were not ready before discharge.

The germ found was **STAPHYLOCOCCUS AUREUS METH RES**.

Attached is information given to patients found to have **STAPHYLOCOCCUS AUREUS METH RES** in the hospital. At home, good hand washing is the most important way to protect yourself and others from infection.

If you have any questions, feel free to call Spartanburg Regional Infection Control Department at (864) 560-6957 or call your doctor.

Sincerely,

Lynn Cromer, RN MT (ASCP), CIC

cc: Dr. [Name]
Needed Surgery Data to Link
From there we can produce reports by NHSN Risk

<table>
<thead>
<tr>
<th></th>
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<th></th>
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</table>
Options for NHSN

• Data entry of denominator data for each surgical procedure in surveillance plan
  – Additional FTE?

• Upload Comma Delimited file directly to CDC-NHSN
  – Need data available in MIDAS+ from Surgery system
  – Must make sure dictionaries match NHSN guidelines
<table>
<thead>
<tr>
<th>ID</th>
<th>Date of Birth</th>
<th>First Name</th>
<th>Date of Admission</th>
<th>Sex</th>
<th>Age</th>
<th>Race</th>
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Are We Finished? NO

- Need Antibiotic administration data for pulling Drug Biograms- roadblock: IS staff unable to locate unique identifier in medication administration to identify each drug
Never Let the Road Blocks Stop Your Progress

Option #1

Option #2
Questions ???