Effective Presentation of Infection Control Data
Bonnie Barnard, MPH, CIC
A Webber Training Teleclass

What are we going to do today?
- Outline the process of transforming data into information and knowledge
- List the components of a well-designed data display
- Describe factors to consider in the process of designing a meaningful report
- Discuss the issues related to the use of comparative or benchmarking information

What is surveillance?

Systematic method of collecting, consolidating, and analyzing data concerning the distribution and determinants of a given disease or event, followed by dissemination of that information to those who can change the results

Recommended Practices for Surveillance
- Assess the population
- Select the outcome or process to survey
- Apply surveillance definitions
- Collect surveillance data
- Calculate rates and analyze surveillance findings
- Apply risk stratification methods
- Report and use surveillance information

The Data Model

Data
Information
Knowledge
Wisdom

The goal of data presentation is to create wisdom by converting data into information, information into knowledge, and knowledge into wisdom.

Why Analyze, Display and Report Data?
- Tracking and Trending
  - Trends/changes over time
  - Seasonal occurrences
  - Outbreaks
  - Sentinel events
- Benchmarking/Comparison
  - Compare to others
  - Detect areas for improvement
  - Use to improve performance
The Toolbox
- Case Finding / Marker Tools
- Collection and Storage Tools
- Analysis Tools
- Presentation Tools

Case Finding / Marker
- Tasks
  - Finding potential nosocomial infections
- Tools
  - Manual review of multiple data sources using ICP knowledge
  - Data mining using artificial intelligence/logic (MedMined, Theradoc, Cereplex)

Data Sources
- Laboratory
- Operating Room
- Employee Health
- Respiratory Care
- Admitting
- Emergency Room

Data Mining
Most of the ICP’s time is spent reviewing laboratory and patient data, generating reports, etc. Time spent on these tasks takes away from the teaching and interventions that prevent infections.
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Collection and Storage

- Tasks
  - Data entry
  - Data warehousing
  - Data relationships
- Tools
  - IC surveillance software (e.g., AICE, Epi Info, EpiQuest, Softmed)
  - Database (Access, Oracle)
  - Spreadsheet (Excel)

Analysis

- Tasks
  - Rate calculations
  - Statistical calculations
  - Trend Analysis
- Tools
  - Spreadsheets (Excel / Lotus)
  - Statistical Software (SPSS, SAS)
  - IC Surveillance (AICE, Epi Info)
  - Database (Access)

Summarizing Data

- Comparisons among categories
  - Bar charts, pie charts, pareto charts
- Frequency of events
  - Rates, ratios, proportions
  - Variability analysis (numerical)
    - Mean, median, mode
    - Range, standard deviation
- Variability analysis (graphical)
  - Line graphs, histograms, control charts

Presentation

- Tasks
  - Generating reports
  - Creating tables
  - Creating graphs and charts
- Tools
  - Business Graphics (Powerpoint)
  - Spreadsheet (Excel)
  - IC Surveillance Software (AICE, Epi Info)

Line List – A Data Table

<table>
<thead>
<tr>
<th>First Name</th>
<th>MR#</th>
<th>Age</th>
<th>Admit Date</th>
<th>Cult Date</th>
<th>Cult Site</th>
<th>Organism</th>
<th>Org Code</th>
<th>HA</th>
<th>NI</th>
<th>Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>315489</td>
<td>60</td>
<td>5/30/1998</td>
<td>6/10/1998</td>
<td>URINE</td>
<td>SEM</td>
<td>Y</td>
<td>UTC</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Pivot Table – A Data Analysis Table

Annotated Run Chart

Anatomy of a Graphic Display of Data

Guide to Selecting a Graph or Chart to Display Data

Bar Charts

- Visual display using one coordinate
- Display summary data, e.g., rates for categories of a variable
- Allows comparisons of magnitude between categories of data
- Can display vertically or horizontally

Bar Chart - Example

Histogram

- Displays the frequency distribution for categories of a variable (individual data points grouped into classes)
- Can identify normal versus skewed distributions
- Example - epidemic curve for an outbreak

Histogram - Example

Pie Charts

- Display proportion or each category of a variable
- Identify relative size of proportions

Distribution of Nosocomial Infections, U.S., NNIS Jan 93 - Dec 00

CDC, NNIS Semiannual Report, Dec 2000
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Nosocomial Infections by Body Site

- UTI 20%
- SRWD 20%
- LRES 30%
- BSI 30%

Exploded Pie Chart - Example

Pneumococcal Vaccine Order Status
N=31
- Not Indic 20%
- Don't Give 13%
- Give 45%

Line Graph
Run Chart and Control Chart
- Plots the movement of something over a given period of time
- Used with any type of data
- Run Chart vs Control Chart

Outbreak Detection
VRE Line Listing by Onset Date

AVERAGE WAIT TIME (IN MINUTES) TO See a Physician in the ED

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Putting It All Together
- Dashboards
- Instrument Panels
- Balanced Scorecards
- Report Cards

Dashboard
Infection Control Dashboard - St. Elsewhere Hospital
Q1FY04
- Nosocomial Infections
  - VVCU: WOU: WOU: BE: NW: SB
  - MRSA: VRE: VRE: VRE: VRE: VRE
- Process Measures
  - Appropriate Hand Hygiene
  - IV Dressing Documentation
  - IVC: CVC: CVC: CVC: CVC: CVC
- * - above NNIS 75th percentile
- ** - between NNIS 50th and 75th percentile
- *** - at or below NNIS 50th percentile

From Data to Presentation
- Collect and organize your data!
- Begin with a sketch of your finished display
- Select the data to present
- Begin with a basic display, then format it
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Data Graphics Principles

- Above all else, show the data
- Maximize the data-ink ratio, within reason
- Erase non-data-ink, within reason
- Erase redundant data ink, within reason
- Don’t misrepresent the data
- Revise and edit

The Visual Display of Quantitative Information

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Visuals in Presentations
- Enhance
- Aid in comprehension
- Simple - less is more
- Use color, typeface and clipart carefully
- Continually ask "How will this reinforce my message?"

Who is your audience?
- Administration
- Physicians
- Clinical Department Directors
- Clinical Staff
- Non-Clinical Department Directors
- Non-Clinical Staff
- Nursing

Data Display Summary
- Be sure of what you want audience to understand from your display!
- Attract audience attention
- If data are not compelling, don’t use them
- Use appropriate display type
- One key message per visual display

Research Paper Analogy
- Background / rationale (why)
- Methods
  - Population (who)
  - Setting (where)
  - Time period (when)
  - Event reporting on (what)
    - Case finding (how)
    - Criteria for inclusion

Research Paper Analogy (cont’d)
- Findings
  - Numerator / denominator
  - Visual displays
- Discussion
- Limitations
- Recommendations
- Dissemination

Graphic Presentation Output Options
- Handouts
- Presentation books - “flip ’n tell”
- Black & white overheads
- Color overheads
- 35mm slides
- Screen shows

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Benchmarking

Process of comparing oneself to others performing similar activities, so as to continuously improve

----- Lenz et. al.

Benchmarking Requirements

- Standard criteria to define cases
- Criteria applied consistently
- Surveillance methodology consistent
- Rates and ratios calculated the same
- Large enough denominator
- Standardized risk adjustment

Process of Using Data to Improve Care

- Decide what you want the project to accomplish
- Gather information
- Set up management processes
- Obtain and analyze data
- Decide what information to convey to audience
- Determine how to present data to audience
- Test materials with audience
- Select best way to package info for audience
- Distribute info to audience
- Create ways for audience to use info
- Evaluate progress

Source: www.talkingquality.gov

Communication Guidelines

- Most affected first
- Implications understood
- Respect for audience
- Involve the affected parties in translation from data to intervention
- Commitment to communication skills


Plan, plan, plan!
Goal of Presentation of Data

To synthesize and summarize data in a way that is easily understood by the intended audience so that they are empowered to take action.

Resources

- Kosslyn SM. Elements of graph design. 1994
- Tufte ER. The visual display of quantitative data. 1996