Application of Informatics in Long-Term Care Infection Prevention Programs

IPRAT

Infection Prevention Resource and Assessment Team

About IPRAT

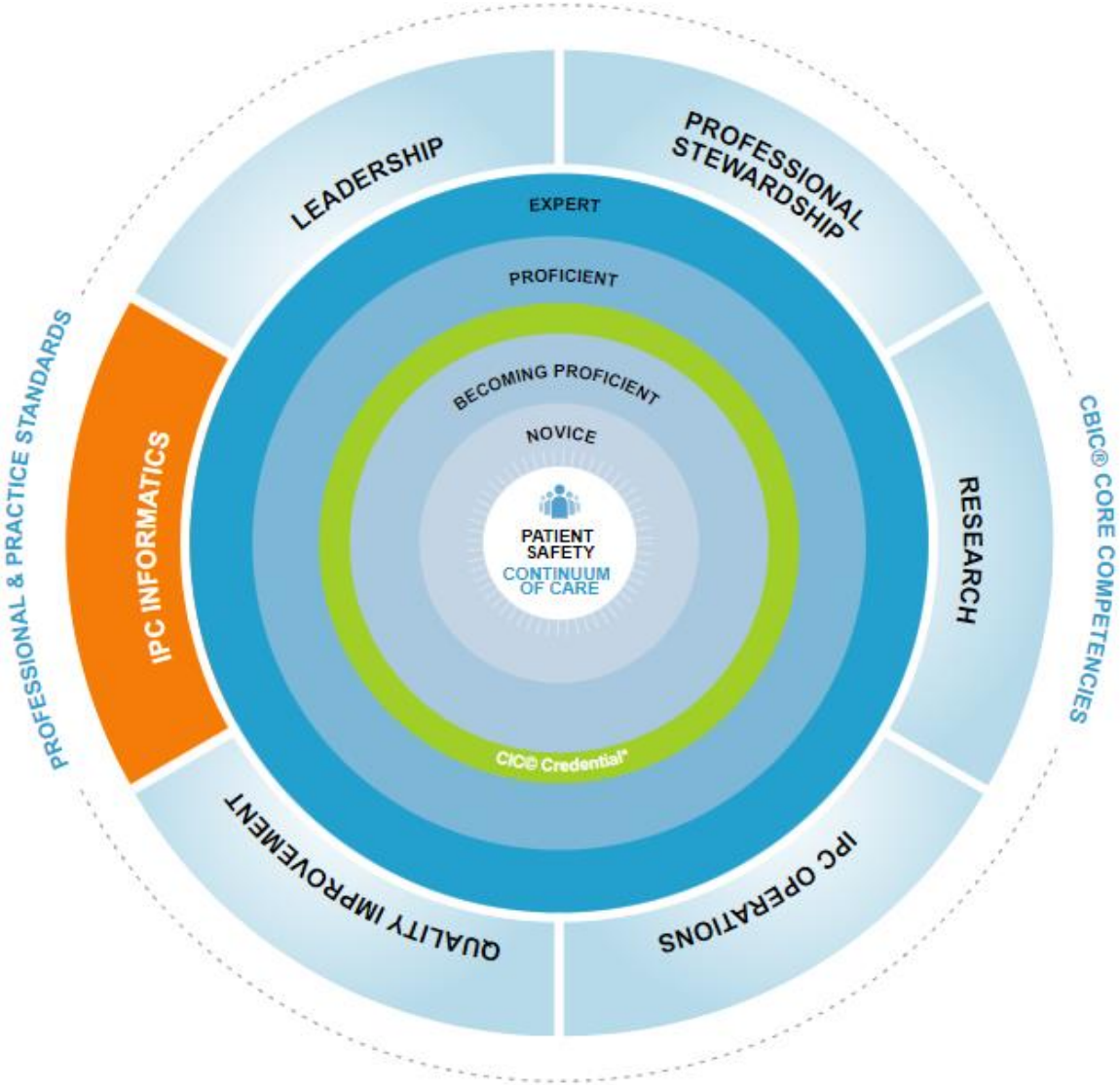
- Non-regulatory
- Consultative
- Free
- On-Site or Remote Assistance
- Experts in the field of IP
- Educational Resource
- ALL Infection Prevention Topics!

  (NOT Just COVID-19)

Objectives

- Understand elements of informatics IP competency domain
- Define informatics and surveillance
- Understand state and federal regulations regarding surveillance
- Describe difference between surveillance and clinical criteria
- Discern difference between process and outcome measures
- Understand data visualization methods and application
- Recognize need for integrated surveillance systems

APIC Competency Model



What is informatics?

- Science of data use, information, and knowledge
- Use of information technology is one component
- Driving action from data
- Catalyst for problem-solving and decision making
- Used to improve healthcare delivery
- Surveillance activities in infection prevention programs

What is surveillance?

- Measurement of outcomes and data analysis
- Providing information to program stakeholders (internal and external)
- Essential component to infection prevention programs
- Based on grounded epidemiological and statistical principles
- Identification of risks and risk reduction
- Monitoring effectiveness of risk reduction strategies
- Identification of emerging risks (outbreaks)

State Regulations

- Ongoing surveillance and prevention program
- Communicable disease reporting
- Detect infection through ongoing analysis
- Prevent, control, and investigative healthcare-associated infections
- Oversight of infection prevention program operations
- Active & Passive

Federal Regulations

- Routine collection, analysis, and dissemination of data
  - Identification of infections and practice gaps
  - Program outcomes communication plan (internal and external)
- Surveillance program based on national standards and risk assessment
  - Populations served
  - Services provided
  - Use of national-recognized surveillance criteria

Surveillance vs. Clinical Criteria

Surveillance Criteria

- Standardized criteria and definitions
- Applied to all cases
- Nationally accepted definitions
- Requires precise application
- Not intended for clinical diagnosis
- Examples:
  - McGeer's Criteria
  - NHSN Criteria

Clinical Criteria

- May differ from surveillance criteria
- Guidelines developed for:
  - Clinical diagnosis
  - Treatment plans
  - Prevention
- Example:
  - IDSA clinical practice guidelines
  - ACG C. diff clinical definitions

Outcome Measures

- Affect infection prevention program interventions
- Risk-adjusted
  - Numerator (number of infections)
  - Denominator (at-risk group) multiplied by a constant

$$\frac{\text{Number of catheter-associated UTIs}}{\text{Number of catheter days}} \times 1000$$

- Examples:
  - Infection rates (UTI, pneumonia, COVID-19)
  - Rate of deaths caused by infection (mortality rate)

Process Measures

- What healthcare personnel do to prevent infections
- Informs about care provided to residents
- Reflect national recommendations for clinical practice
  - Hand hygiene
  - Cleaning and disinfection
  - PPE use
  - Care bundles
- Usually expressed as a percent

Process or outcome measure?

Rate of compliance with PPE donning and doffing procedures.

Knowledge Check

Process or outcome measure?

The utilization rate of indwelling urinary catheters.

Knowledge Check

Process or outcome measure?

Rate of healthcare-associated pneumonia.

Knowledge Check

Program Oversight

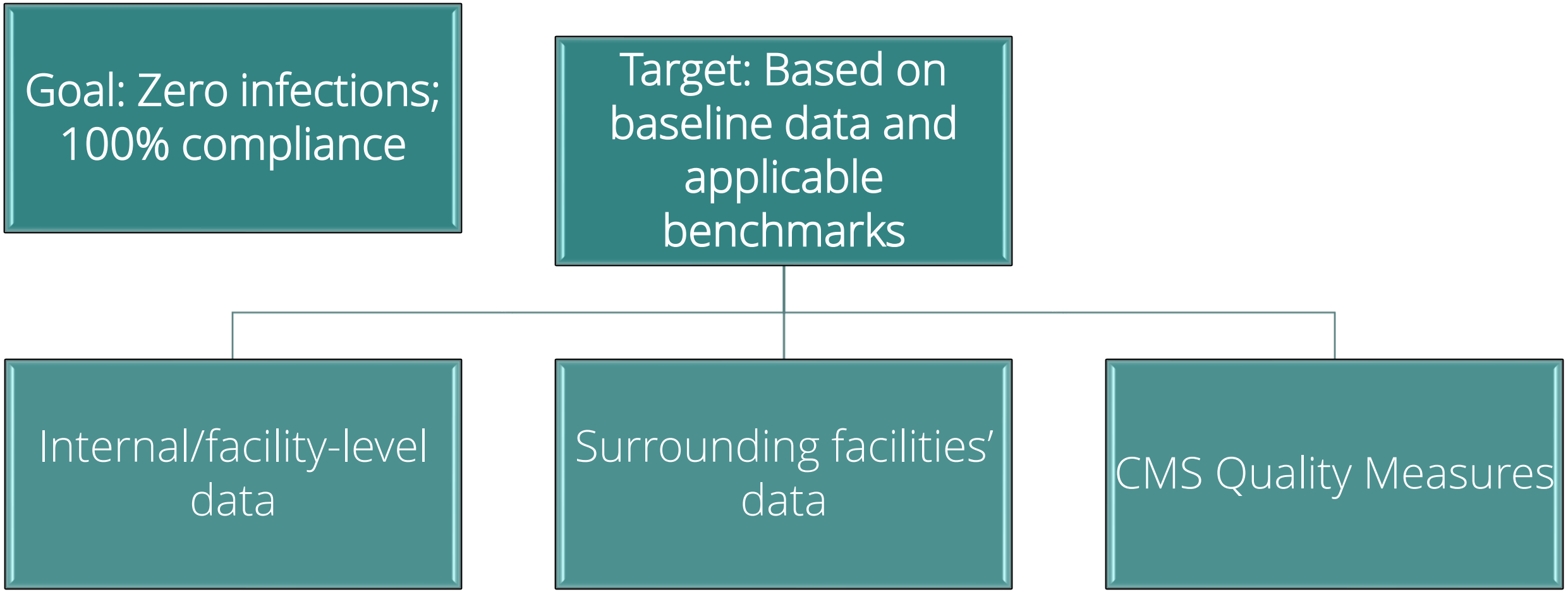
Outcomes

- Infection case forms
- COVID-19 test result reporting to NHSN
- Line lists

Processes

- Compliance rates from auditing programs
- Antibiotic stewardship program compliance
- Rounding

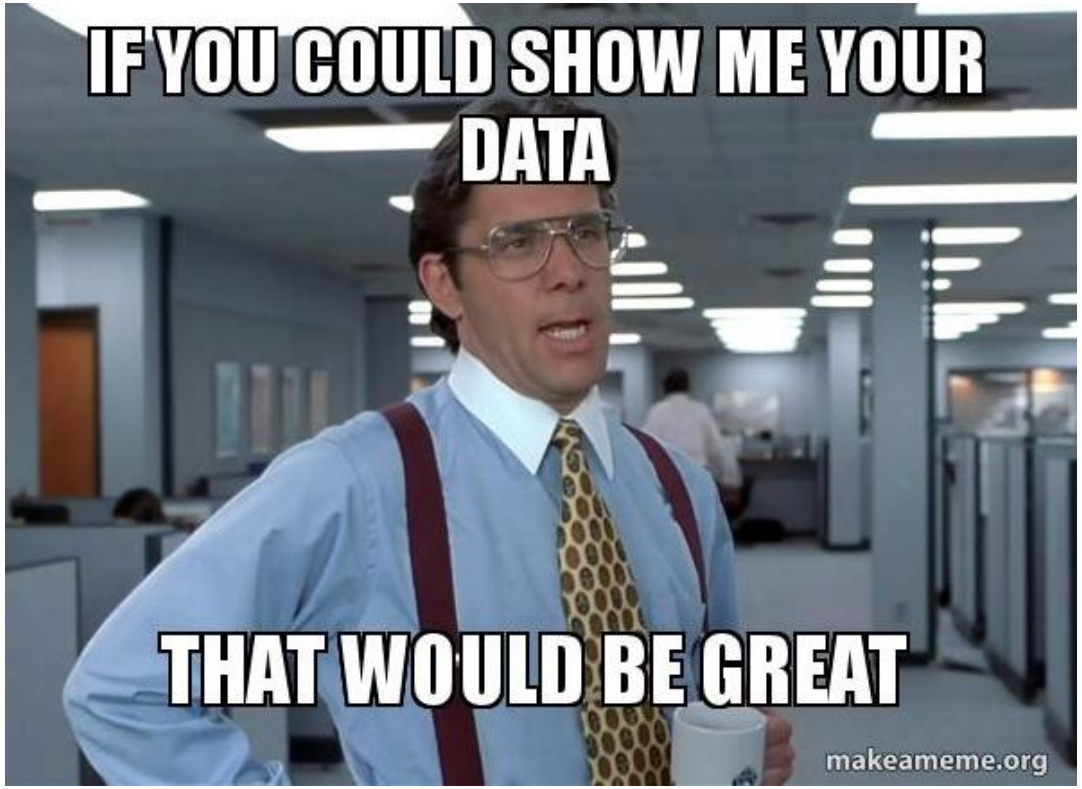
Quality and Performance Improvement



Part 2: Informatics in Data Visualization

Visualization of Data

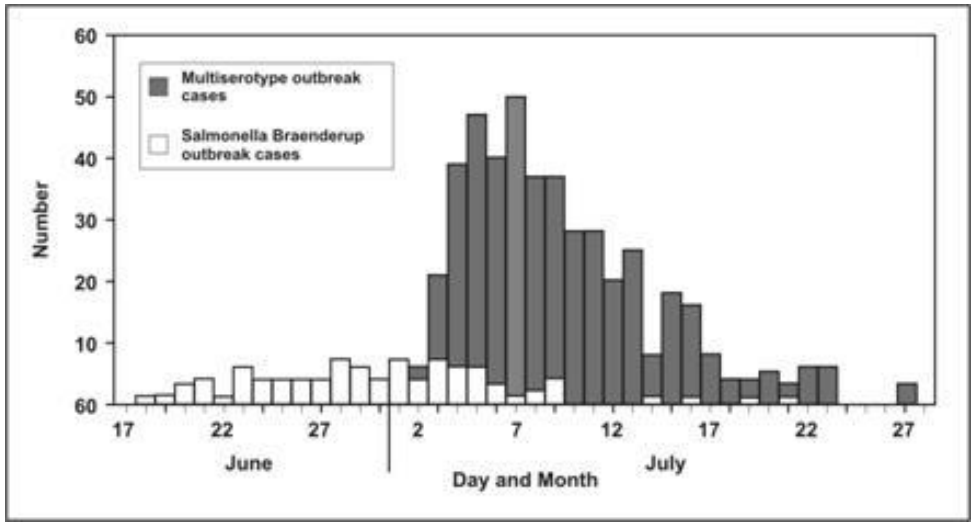
- Histograms
- Control chart
- Pie charts
- Scatterplots
- Pareto charts



Histogram

- Simply describes the frequency of data points
- Very much like a bar chart
- Helps detect fluctuations over a period of time
- Epidemiologically applied to detect potential infection sources
- Used for quantitative data

Number of Outbreak-Related Salmonellosis Cases by Date, June – July 2022

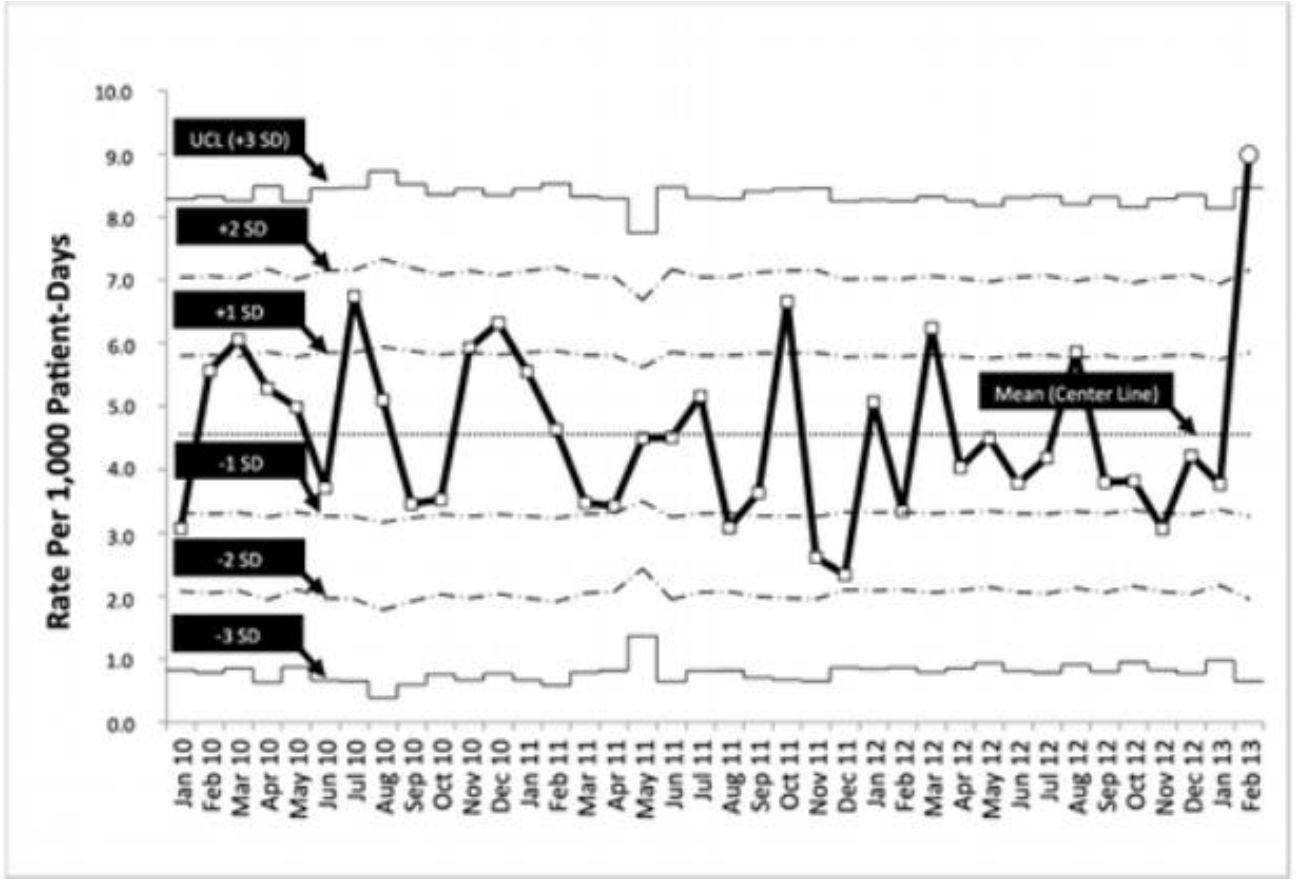


Control Chart

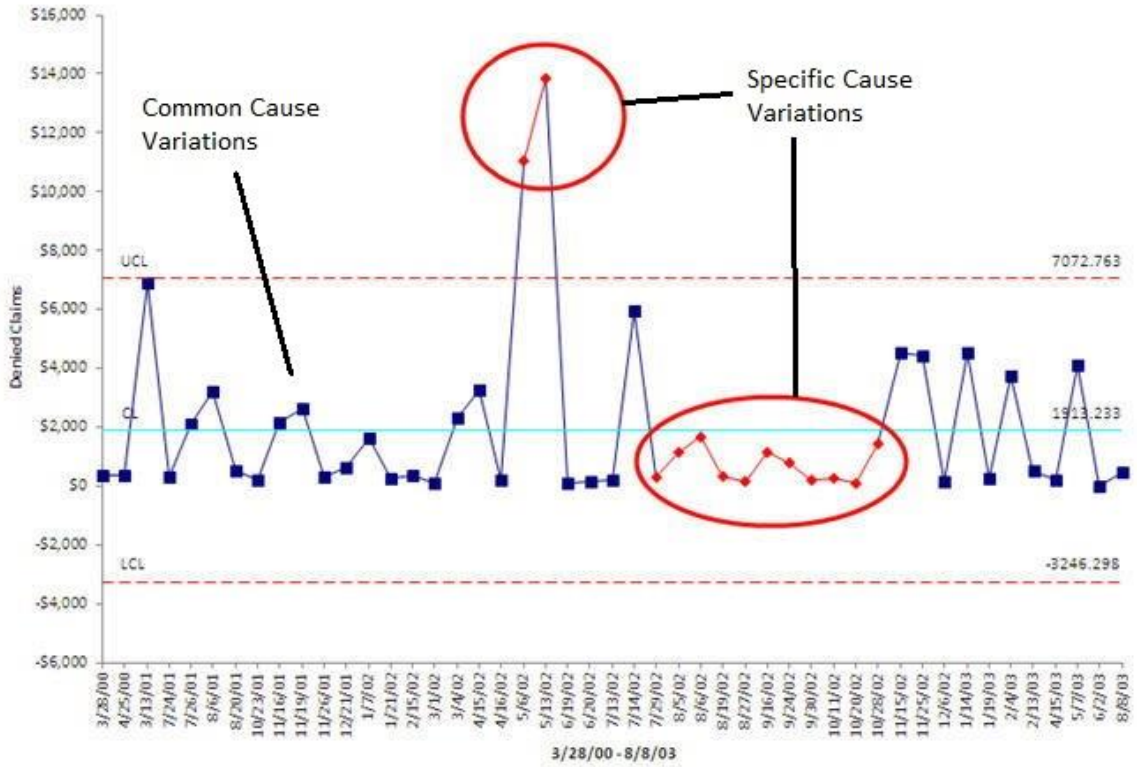
- Used to describe how a process changes over time
- Data plotted in time order
- Center line is average
- Upper and lower control limits
  - 3 standard deviations above and below
  - 6 total standard deviations (Six Sigma)
- Helps analyzing if a process is in control
- Used for quantitative data

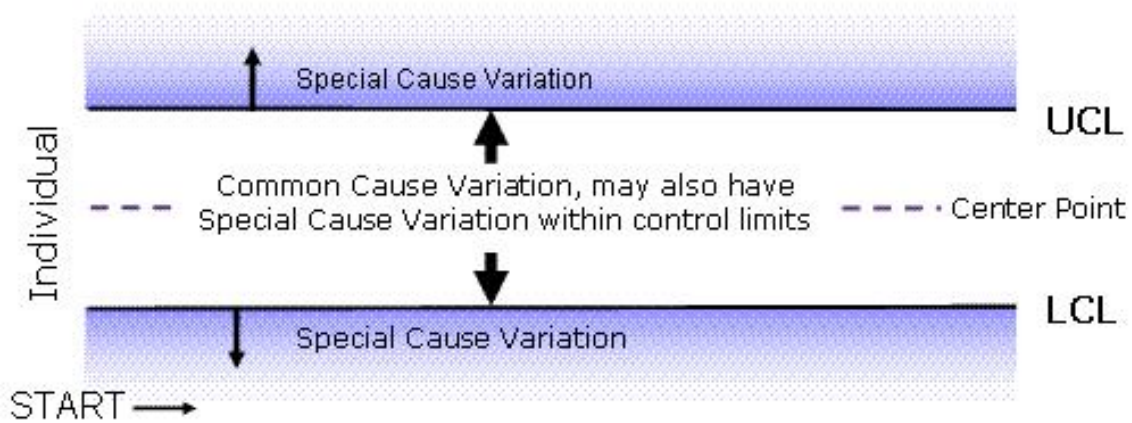
Table 14-2 Rates of CLABSI for January 2011 to January 2013

Month	Number of CLABSIs	Number of Line Days	Rate Per 1,000 Line Days
Jan-11	1	876	1.1
Feb-11	2	978	2.0
Mar-11	4	879	4.6



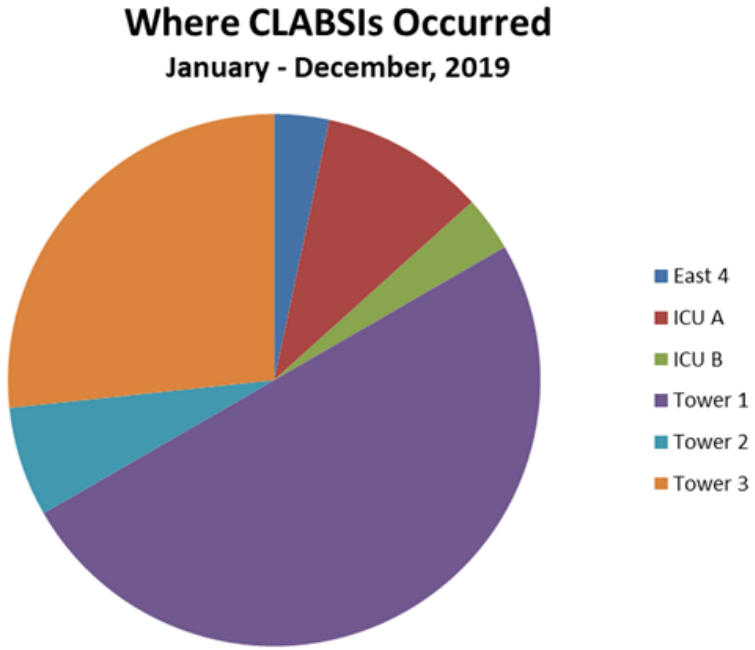
Control Chart Cont.

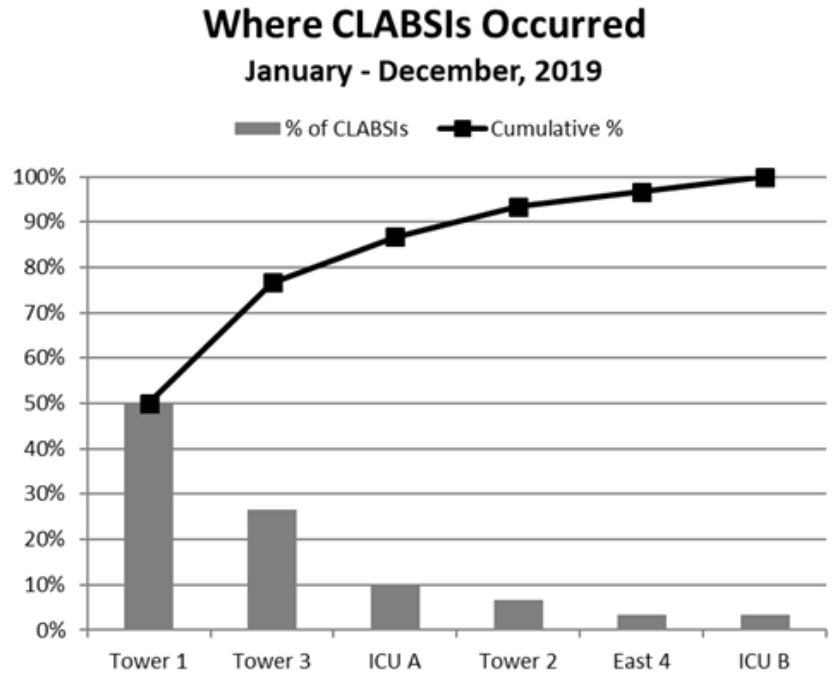




Pie Chart

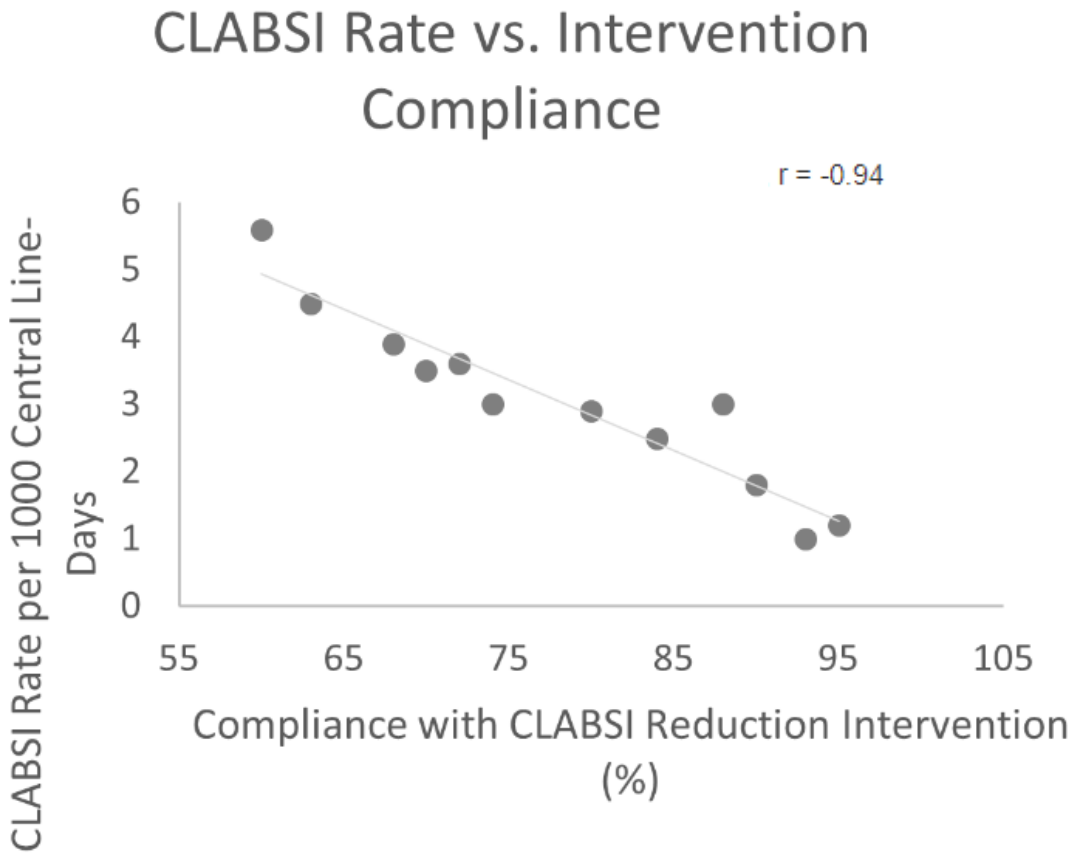
- Used to show data as subparts of a whole
- Compare relationships between different categories
- Should be limited in subcategories for clarity
- Uses proportions (percentages) for subparts to equal 100%





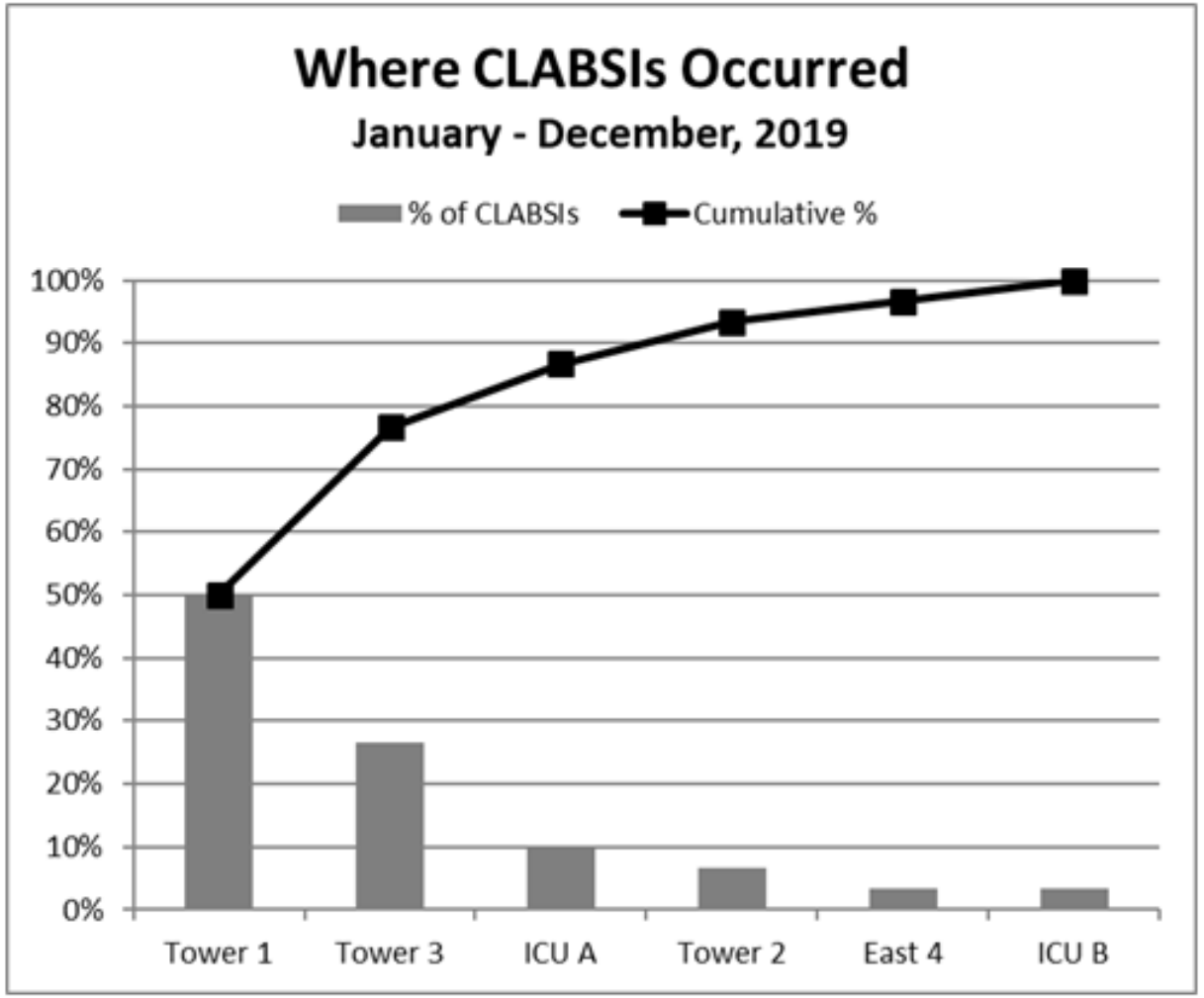
Scatterplots

- Used with paired numerical data
  - E.g.: CLABSI rate with Compliance with CLABSI Reduction Intervention
- Helps identify potential root causes
- Helps determine if two variables have a relationship
- Can have negative, positive, or no relationship



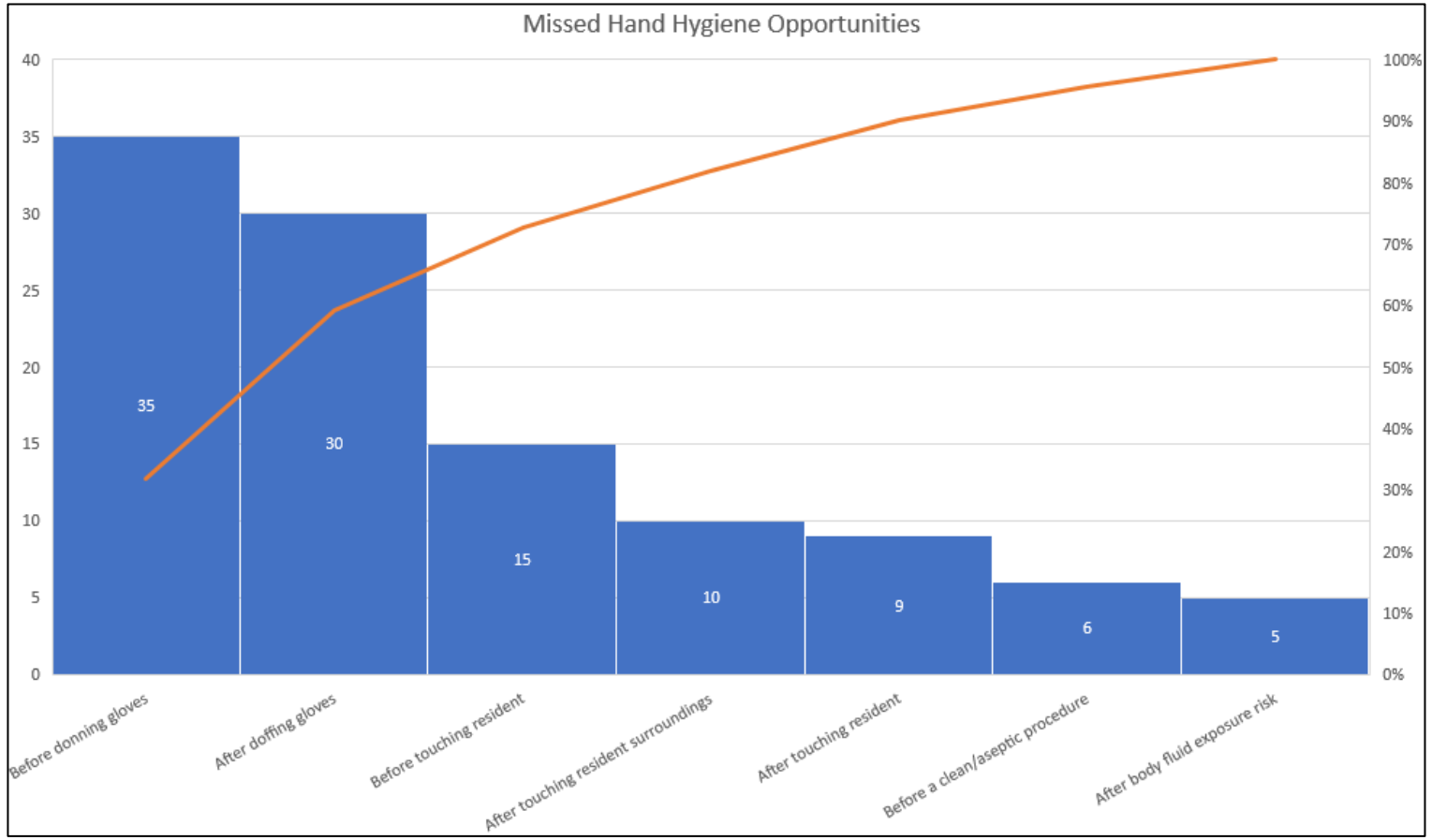
Targeting Priorities: Pareto Principle

- 80/20 rule: 80% of effects come from 20% of causes
- Can be used to:
  - Prioritize risks
  - Apply resources
  - Enhance efficiency
- Brings clarity to problems with multiple causes



Pareto Principle in Practice

Missed Opportunity/Moment	Frequency of Missed Opportunity
Before touching resident	15
After touching resident	9
After touching resident surroundings	10
Before a clean/aseptic procedure	6
After body fluid exposure risk	5
Before donning gloves	35
After doffing gloves	25
	Total Missed Opportunities: 110



Data Visualization Tips

- Choose the right visualization for the data
- Keep designs simple and straight-forward
- Avoid design variation unless necessary
- Use color to provide clarity and cues
  - Red for concerning/high-risk items
- Keep audience in mind with presentation
- Title and label your visualization thoroughly

Reporting and Feedback

Frontline staff

Safety committee

External agencies (LHD, NHSN, CMS)

Quality committee

Infection prevention committee

Poll Question

Which internal platforms does your facility report infection prevention program data to? (Select all that apply)

A. Infection prevention committee
B. Staff meetings
C. Safety committee
D. Quality committee
E. All of the above
F. Other (fill-in)

Validation of Surveillance Systems

- Are all elements of surveillance definitions adhered to?
- Are surveillance data managed by competent staff?
  - Analysis
  - Reporting
- Are methods for surveillance are routinely assessed?
- Are appropriate statistical methods/calculations used?
- Are current information technology resources used to their capacity?

Integrated Systems

- Incorporated in current EMR or facility-made
- Lab, diagnostic, and pharmacy data
  - Culture and sensitivity reports
  - Chest x-rays
  - Antibiotic utilization
- Infection prevention care bundles
  - Central line associated bloodstream infection
  - Catheter-associated urinary tract infection
- Electronic auditing forms

Evolution of Informatics in LTC

- Translation of raw data to sound analysis and inferences
- Advocating for integration and automation
- IPs must understand gaps in full meaningful use of data
  - Collaboration with EMR software representative
  - Collaboration with pharmacy, lab, diagnostics
  - Minimize manual data abstraction and analysis
- Use of visualization methods that identify trends
- Tailoring data visualization methods for stakeholders

Conclusion

- IPs must be competent in informatics
- Surveillance systems are essential for:
  - Program operationalization including oversight
  - Quality and performance improvement
- Two types of measures: process and outcome
- Present data clearly and within applicable platforms
- Integrate information systems to enhance program infrastructure

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