Surveillance Data Collection Analysis

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Objectives

- Surveillance
  - Types of Surveillance
  - Monitoring/Audits
- Regular and Ongoing Post-operative SSI Surveillance
  - NHSN
- Audits and Checklists
  - Developing Audit Tools
  - Using Audit Tools
- Descriptive Statistics for determining trends and clusters
  - Using data to drive your IP program
- Components of a good action plan
  - Who
  - What
  - When
  - How
  - Measurable/Measures of Success

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Background

"An observational survey of infection control practices in ambulatory surgical centers (ASCs) in 68 assessed ASCs found that two thirds of the centers had at least one lapse and nearly 18% had three or more gaps in five reviewed areas, of infection control practices."

Urged for more active infection prevention activities at Ambulatory Surgical Centers…..

So, what's being done to address the issue?

Accessed 2/2019 http://www.cidrap.umn.edu/news-perspective/2010/06/audits-find-infection-control-gaps-ambulatory-surgical-centers

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CMS Move to action

- CMS requires all states to use the infection control audit tool and case tracer method for ASC inspections.
- ASCs cited for deficient practices are required to correct them
- ASCs that fail to correct serious deficiencies risk termination of their participation in Medicare.
- To assist ASCs in their self-evaluation, CMS has made the ASC infection control audit tool (available online)

Link to ASC Infection Control Surveyor Worksheet: https://www.cms.gov/Regulations-and-Guidance/Guidance/Manuals/downloads/som107_exhibit_351.pdf

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Document, Document, Document

- If it's not documented, it didn't happen
- Random and periodic audits, documents level of compliance
- Separates suspicion vs reality
- Maintenance records
  - determine if equipment is periodically examined
  - determine whether the equipment is in good working order
  - determine whether environmental and sanitary requirements have been met.
- Having Policies and Procedures are not good enough
  - Determine if staff adhere to these policies and procedures
    - Safe injection practices
    - Properly sterilized or disinfection equipment

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Audits/Monitoring Activities

- The ASC must conduct monitoring activities throughout the entire facility
  - Establish frequency (e.g. weekly, monthly, quarterly, semi-annually…etc.)
  - Identify infection risks
  - Focus on high risk, high volume, problem-prone areas
- Document its monitoring/tracking activities, including the measures selected for monitoring
- Activities should be conducted in accordance with recognized infection control surveillance practices
  - Those utilized by the CDC's National Healthcare Safety Net (NHSN)
  - Monitoring includes follow-up of patients after discharge, in order to gather evidence of whether they have developed an infection associated with their stay in the ASC

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AUDITS/Monitoring

Audits and Monitoring can be categorized into:

Outcome Measures:

- SSI rates
- Complication rates
- Wrong site Surgery Rates

Process of Care Indicators

- Hand Hygiene Rates
- Environmental Cleaning
- Use of PPE – AORN Surgical Attire
- Cleaning, disinfection and sterilizations
- Flu vaccine compliance
- Housekeeping checklist (AORN)
- Temperature and Humidity Logs
- Pre and post op room turn over procedures (AORN)

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Same-Day Outcome Measures

- Patient Burn
- Patient Fall
- Wrong
  - Site
  - Side
  - Patient
  - Procedure
  - Implant
- All-Cause Hospital Transfer/Admission

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SSI Surveillance – Post-op

- Should be a huge focus of ASCs
- It's an Outcome measure
- Can be Time consuming
- At ASC for one-day, long-term follow up with clinical record review difficult
- Patients do not always return if they have problems
  - ER
  - Hospitals
  - Clinics
  - PCP

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National Healthcare Safety Network (NHSN)

- Gold Standard
  - Standard epidemiological definitions
  - Eliminates "my patient's are sicker"
- Participation in CMS Quality Reporting Programs
- Obtain baseline HAI rates
- Compare rates to national data
- Allows for participating in state or national HAI prevention collaboratives
- Feedback of appropriate data to surgeons effective component of SSI reduction strategies

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Pros and Cons to NHSN SSI Surveillance

- Not mandatory……YET! (currently 6 state require ASC reporting)
- 2018 NHSN criteria for SSIs already defined
- Toolkits available - you don't have to reinvent the wheel
- Training available online
- Robust information - aggregated data
- Enroll in NHSN
  - Map and set up reporting plan
- Annual Facility Survey
- Determine surgical procedures to follow
  - Check out state requirements (e.g. CA follows 26 procedures)
- Select post operative procedure codes
  - In plan
  - Off plan
- NHSN heavily microbiology lab report driven
  - No micro/would culture results available
- 2018 SSI Criteria
  - Superficial (30 days)
  - Deep incisional (30-90 days)
  - Organ/space (30-90days)

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Need Help Setting Up NHSN

- Check with State HAI section
  - All states have an HAI section
- Check for local
  - Health Services Advisory Group (HSAG)
  - Hospital Quality Institute (HQI)
  - Hospital Improvement Innovation Network (HIIN)

HSAG & Hospital Quality Institute

HSAG in Partnership With HQI

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Be Creative with post op data collection strategies

- Rely on sending monthly letters to physicians
  - Back office staff
- Post-op clinic visits
- Post-op surveys
  - Phone calls – (30-90 days post-op)
  - Email
- Connection with PCP back office staff
- Build relationships with other infection preventionist
  - APIC chapter meetings
- Home Health Services
  - Wound status
  - Change in antibiotics
- Possibly even PT/OT services
- Onboarding of surgeons – NHSN education on SSI




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Audits/Monitoring

- Meaningful use
  - Don't just measure to measure (counting beans)
    - What are you measuring and why?
    - Aggregate the data (benchmark and trending)
    - Interpret the data
    - Who needs to know this information?
  - Be a part of a (Quality Assurance/Performance Improvement) QAPI program
    - Five Elements of a QAPI Program
      - Design and Scope
      - Governance and Leadership
      - ***Feedback, Data System and Monitoring***
      - ***Use data for Performance Improvement Projects***
      - Systematic Analysis and Systemic Action

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Types of Monitoring Tools

Internet is filled with monitoring tools for almost any infection control processes

- CDC monitoring tools
- State HAI section monitoring tools
- APIC monitoring tools
- ASC monitoring tools
- Assessment Tools

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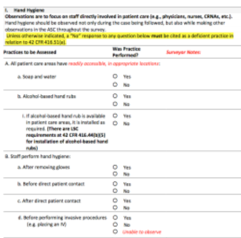

I. Hand Hygiene

Observations are to focus on staff directly involved in patient care (e.g., physicians, nurses, CRNAs, etc.). Hand hygiene should be observed not only during the case being followed, but also while making other observations in the ASC throughout the survey.

Unless otherwise indicated, a "No" response to any question below **must** be cited as a deficient practice in relation to 42 CFR 416.51(a).

Practices to be Assessed	Was Practice Performed?	Surveyor Notes:
A. All patient care areas have *readily accessible, in appropriate locations*:		
a. Soap and water	○ Yes ○ No	
b. Alcohol-based hand rubs	○ Yes ○ No	
i. If alcohol-based hand rub is available in patient care areas, it is installed as required. **(There are LSC requirements at 42 CFR 416.44(b)(5) for installation of alcohol-based hand rubs)**	○ Yes ○ No	
B. Staff perform hand hygiene:		
a. After removing gloves	○ Yes ○ No	
b. Before direct patient contact	○ Yes ○ No	
c. After direct patient contact	○ Yes ○ No	
d. Before performing invasive procedures (e.g. placing an IV)	○ Yes ○ No ○ *Unable to observe*	

What CMS is looking for? Can be used as self assessment audit tool

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Example of Hand Hygiene Observation Tool

Compliance (%) No of actions/Opportunities x 100

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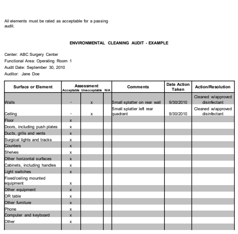

All elements must be rated as acceptable for a passing audit.

ENVIRONMENTAL CLEANING AUDIT - EXAMPLE

Center: ABC Surgery Center
Functional Area: Operating Room 1
Audit Date: September 30, 2010
Auditor: Jane Doe

Surface or Element	Assessment Acceptable	Unacceptable	N/A	Comments	Date Action Taken	Action/Resolution
Walls	·	x		Small splatter on rear wall	9/30/2010	Cleaned w/approved disinfectant
Ceiling	·	x		Small splatter left rear quadrant	9/30/2010	Cleaned w/approved disinfectant
Floor	x					
Doors, including push plates	x					
Ducts, grills and vents	x					
Surgical lights and tracks	x					
Counters	x					
Shelves	x					
Other horizontal surfaces	x					
Cabinets, including handles	x					
Light switches	x					
Fixed/ceiling mounted equipment	x					
Other equipment	x					
OR table	x					
Other furniture	x					
Phone	x					
Computer and keyboard	x					
Other	x					

Example of Cleaning Audit Tool

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All this data

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How to use data?

- Tracking and trending
- Benchmarking and comparing
- Improving Performance
- Mandatory reporting

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Analyzing

- Incidence - How frequently it occurs
- Prevalence - How widespread in a given point in time
- Rates
  - Numerator
  - Denominator
  - Multiplier (to give you a whole number)

$$\text{prevALence} = \frac{\text{ALL cases}}{\text{Population @ risk}}$$

$$\text{iNcidence} = \frac{\text{New cases}}{\text{Population @ risk}}$$

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Measures of Central Tendency

- **Mean:** mathematical *average* of the values in a data set.
- Calculation:

Patient Length of Stay: 12, 9, 3, 5, 7, 6, 13, 8, 4, 15, 6

Mean (x)= The sum of each patient's length of stay / The number of patients

= 12 + 9 + 3 + 5 + 7 + 6 + 13 + 8 + 4 + 15 + 6 / 11 = 88 / 11 = 8 days

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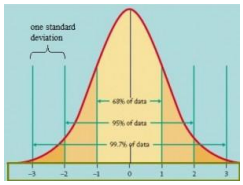
Measure of Central Tendency Normal Bell Curve



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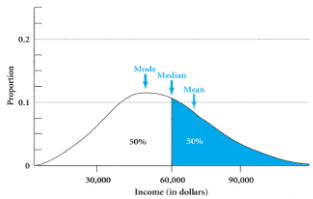
Measures of Central Tendency



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Measures of Central Tendency

- **Median:** the value falling in the *middle* of the data set.
- Calculation:

Patient Length of Stay: 12, 9, 3, 5, 7, 6, 13, 8, 4, 15, 6

Median = 3, 4, 5, 6, 6, 7, 8, 9, 12, 13, 15 = 7 days

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Measures of Central Tendency

- **Mode:** the *most* frequently occurring value in a data set.
- Calculation:

Patient Length of Stay: 12, 9, 3, 5, 7, 6, 13, 8, 4, 15, 6

Mode = 3, 4, 5, 6, 6, 7, 8, 9, 12, 13, 15 = 6 days

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Measures of Dispersion

- **Standard Deviation:** measure of dispersion that reflects the variability in values around the mean.
  - **Deviation:** the difference between an individual data point and the mean value for the data set.
  - SD = $\sqrt{(X-X)^2 / n-1}$
    - "Take all the deviations from the mean, square them, then divide their sum by the total number of observations minus one and take the square root of the resulting number"
- **Variance:** a measure of variability that is equal to the square of the standard deviation.

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The Math

- Determine what you're going to measure
- Define what you're going to measure
- Determine how are you going to measure it?
  - Must have numerator (defined)
  - Must have denominator (population)
  - Must have multiplier to get rates
  - Rates - in healthcare, rates are often used to measure an event over time used as performance improvement measures

$$\text{Infection rate} = \frac{\left\{\begin{array}{l}\text{Total number of nosocomial}\\ \text{infections for newborns}\end{array}\right\}}{\left\{\begin{array}{l}\text{Total number of discharges (including deaths)}\\ \text{for newborns}\end{array}\right\}} \times 100$$

$$= \frac{3 \times 100}{123}$$

$$= \frac{300}{123}$$

$$= 2.44\%$$

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Useful to know

Inferential statistics

- Parametric vs non- parametric
- Hypothesis testing
  - Null vs Alternate Hypothesis
  - Types of Errors (Type I-II)

NHSN

- Inferential statistics
- Statistic Model is Regression Analysis
- Weighted Risk Factors
- SIR calculated as a ratio Observed/Predicted

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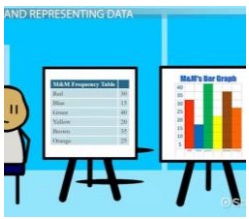

How to present the data

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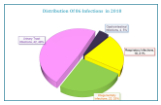

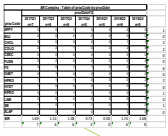

Tables, Graphs, Pie Charts

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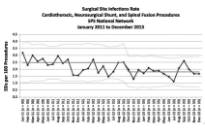
Run charts vs control charts

- Run chart – patterns over time
  - Easily spot trending (upwards or downwards)
- Control chart single line of data over time, but includes upper and lower limits
  - Can be used to set benchmarks in absence of national standard



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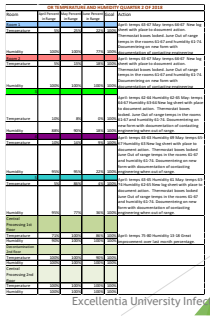
What story do you want to tell?

- OR Room Temps and Humidity
- Great Log, but what does it tell me?



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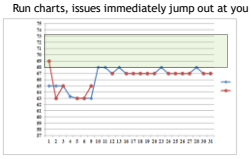
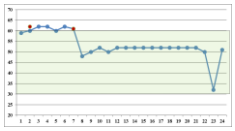
Run charts, issues immediately jump out at you





Control Chart of OR Temp/Humidity for one month 2018

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8 rules to detect variation in SPC

1. Any point above the UCL or below the LCL.
2. One of two points above +2 SD or below –2 SD.
3. Four of five points above +1 SD or below –1 SD.
4. Eight consecutive points above or below the CL.
5. Six consecutive points increasing or decreasing.
6. Fifteen consecutive points between +1 SD and –1 SD.
7. Fourteen consecutive points alternating up and down.
8. Eight consecutive points above +1 SD and/or below –1 SD

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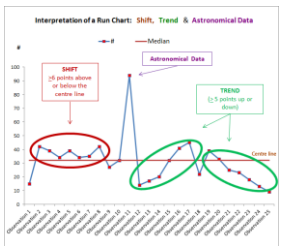

Example of Run Chart Interpretation

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Type	Uses
Table	Summarize data; basis for constructing graphs and charts
Line Graph	Display & Monitor trends in rates or numbers over time
Bar Chart	Compare size or frequency of different groups
Pie Chart	Show pieces of a whole

Which Graphic Display Shall I Use?

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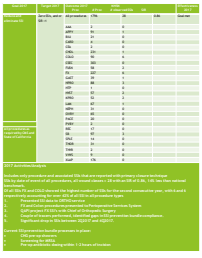
Action Plans/Infection Control Plans



Goal 2018	Program Priority	Planned Actions for 2018:
Reduce and eliminate SSI Zero SSI infections, and/or SIR ≤ national benchmark; zero infections or reduce rate from 2017	High for FX and COLO Medium for all other procedure types	• Continue surveillance of the same procedures from previous year • Continue utilizing CDC, IHI, SHEA and APIC Guidelines for Prevention of SSIs • Work with ORTHO on pre-op order sets to include MRSA screening and decolonization, weight based dosing of abx. • Continue education to physicians and staff as needed • Discuss with relevant committees further SSI prevention initiatives to include: ○ OR Traffic Control ○ Enforce AORN Surgical Attire ○ CHG wound irrigation ○ Enhance AAHI guidelines for point-of-use pre-clearing • Continue use of UV light as part of terminal/end -of-day cleaning and disinfection of the OR

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Summary

- Analyze collected data
- Use data to identify trends
- Use trends to develop an action plan (Infection Prevention Plan)
- Present data summary to healthcare workers and leadership
- Present action plan to healthcare workers and leadership
- Periodically review action plan to determine its effectiveness

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Example Question

- In a Control Chart, the central line represents the:
  - Average of data points.
  - Time period
  - Count/rate
  - Lower limit of data

Answer: In a control chart the central line represents the average of the data points. The x-axis represents the time period used (days, months, years…) while the y-axis represents the rate or count and the data points represent the actual values. Additionally, there may be an upper control limit, a line representing +2 SD, and a lower control limit a line representing -2 SD from the mean.

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Sample Question

- **Using the data presented below regarding surgical site infections (SSIs):**

Quarter	SSIs	Volume
1st	2	350 cases
2nd	1	320 cases
3rd	1	300 cases
4th	2	400 cases

Which quarter would have the highest SSI rate?

A. 1st
B. 2nd
C. 3rd
D. 4th

Answer: A. 1st Numerator (SSI Event)/Denominator (volume of cases) x 100

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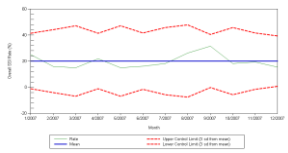
Sample Question

Monthly Surgical Site Infection Rate following Knee Replacement, 01/01/2007 - 31/12/2007



Study the SPC to the left, is this ASC experiencing an issue with SSIs?

Answer: No
1. Any point above the UCL or below the LCL.
2. One of two points above +2 SD or below –2 SD.
3. Four of five points above +1 SD or below –1 SD.
4. Eight consecutive points above or below the CL.
5. Six consecutive points increasing or decreasing.
6. Fifteen consecutive points between +1 SD and –1 SD.
7. Fourteen consecutive points alternating up and down.
8. Eight consecutive points above +1 SD and/or below –1 SD

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Sample Question

- Identify the median in the following list of numbers:
6,2,9,7,1,4

A. 9
B. 7
C. 5
D. 4

Answer: C The median of a data set is the number that is 50 percent of values fall below and 50 percent of values fall above. The data here are not presented in numerical order, so first they must be ordered from lowest to highest. Then is an even number of values in tis set, so to find the median one must identify the two central numbers and then average them. So 4+6 = 10÷2 = 5

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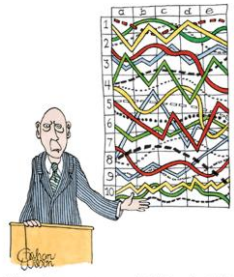

"I'll pause for a moment so you can let this information sink in."

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Questions

- Deborah Ellis, PhD, CIC

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Resources

- APIC Text of Infection Control and Epidemiology, 4th ed
  - Chapter 11. Surveillance
  - Chapter 13. Use of Statistics in Infection Prevention
  - Chapter 14. Process Control Charts
- APIC EpiGraphics: Statistics and Surveillance Tools for IPs
- CMS Surveyor Work Sheet for ASCs
- State Operations Manual Appendix L – Guidance for Surveyors: Ambulatory Surgical Centers
- Certified Ambulatory Infection Preventionist (CAIP) Candidate Handbook – Surveillance, Data Collection & Analysis