Healthcare Epidemiology and Statistics

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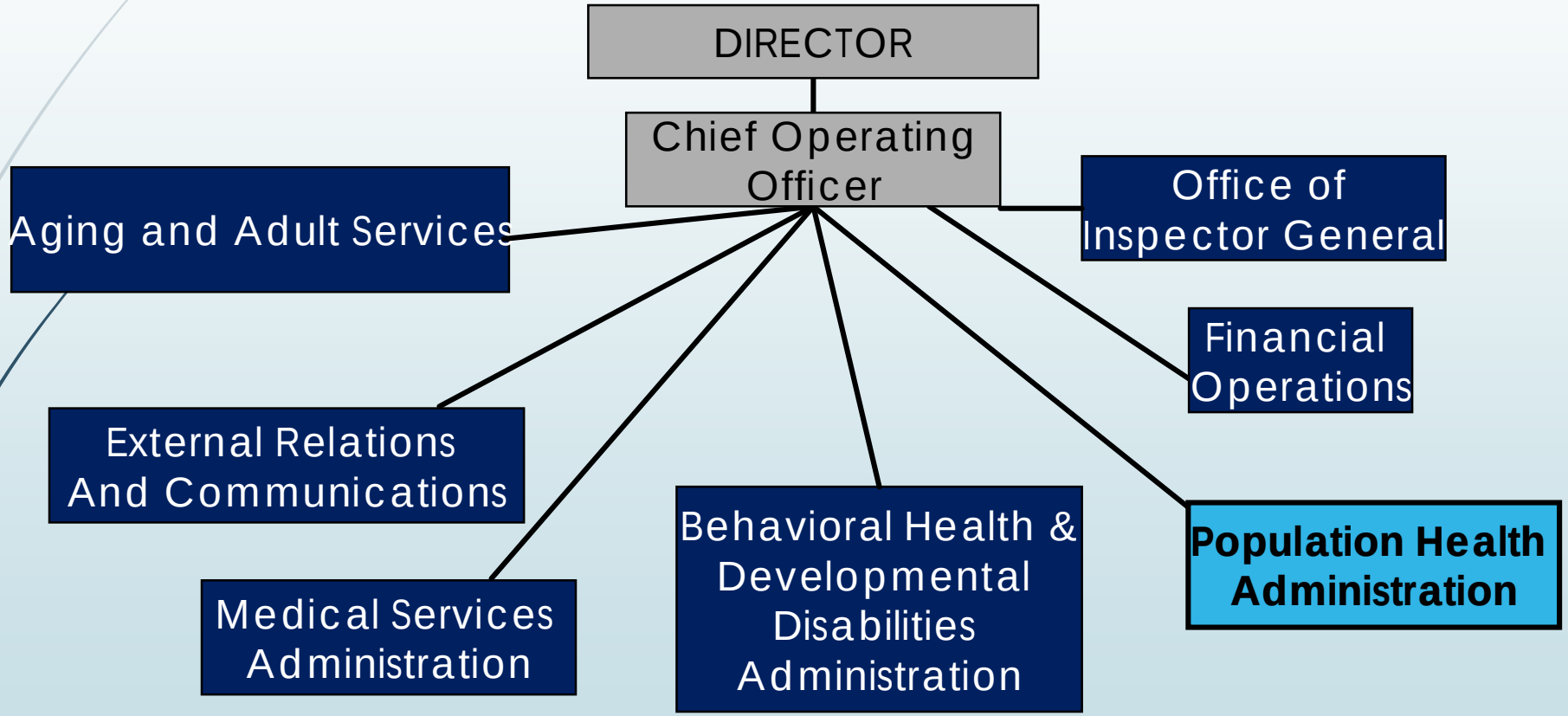
NHSN Epidemiologist

MDHHS SHARP Unit

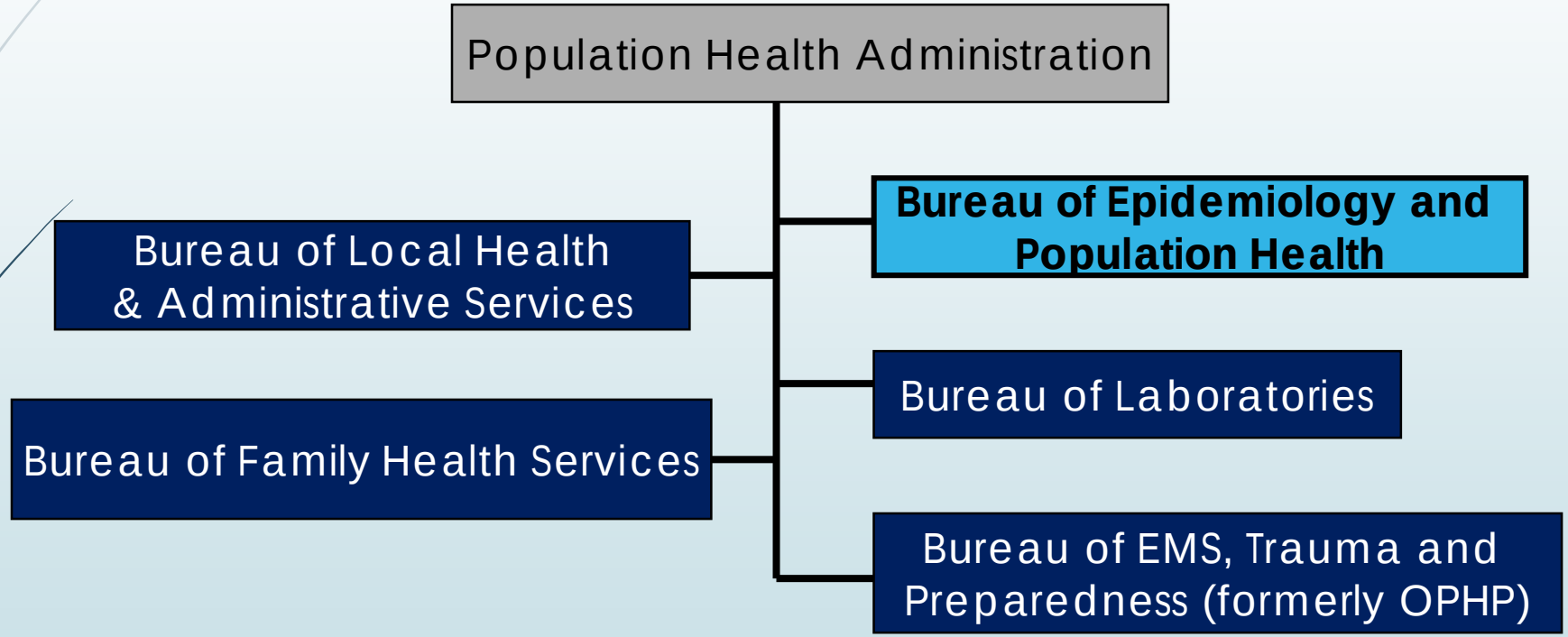
Before we begin...

- Who are we?
- What do we do?
- What can we provide for you?

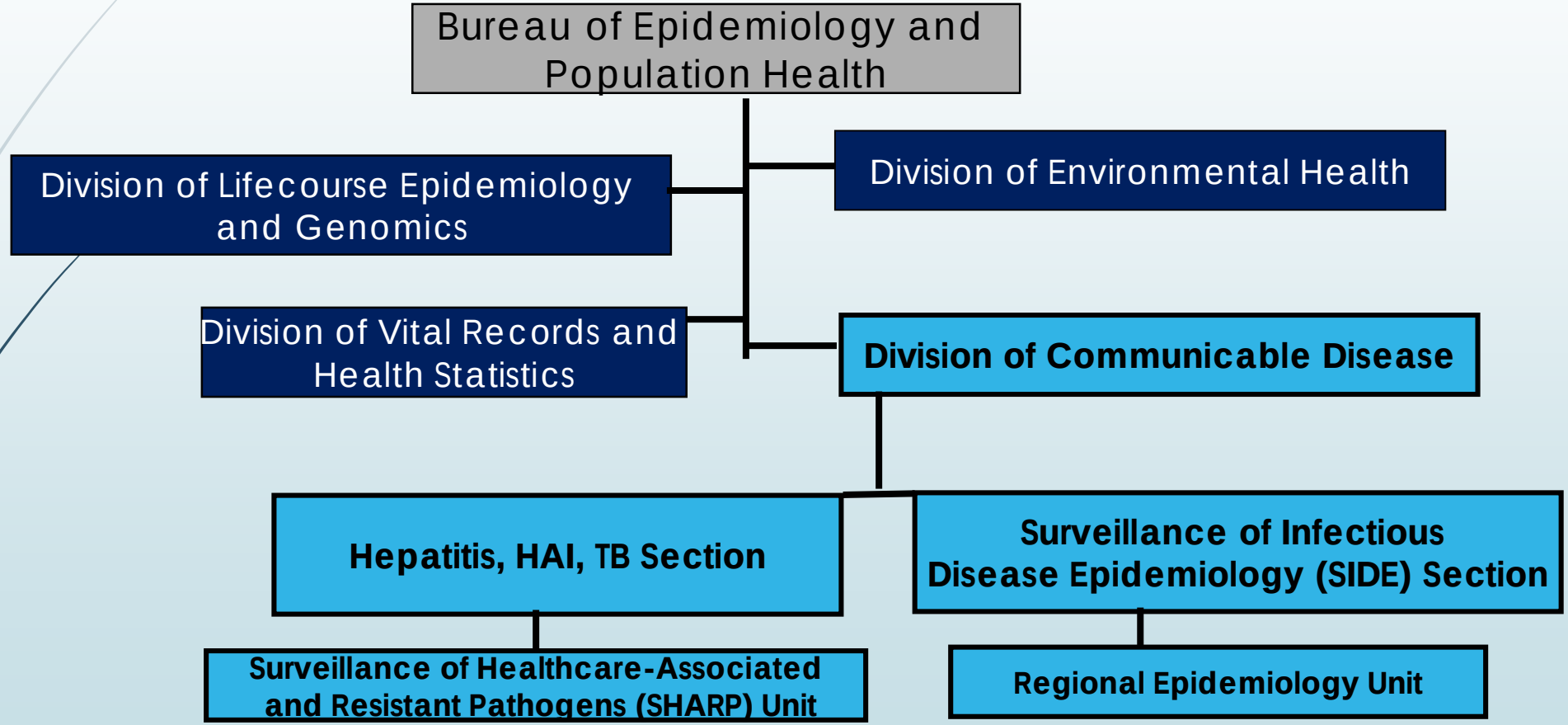
MDHHS Organization



MDHHS Organization



MDHHS Organization



MDHHS SHARP Unit – Objectives

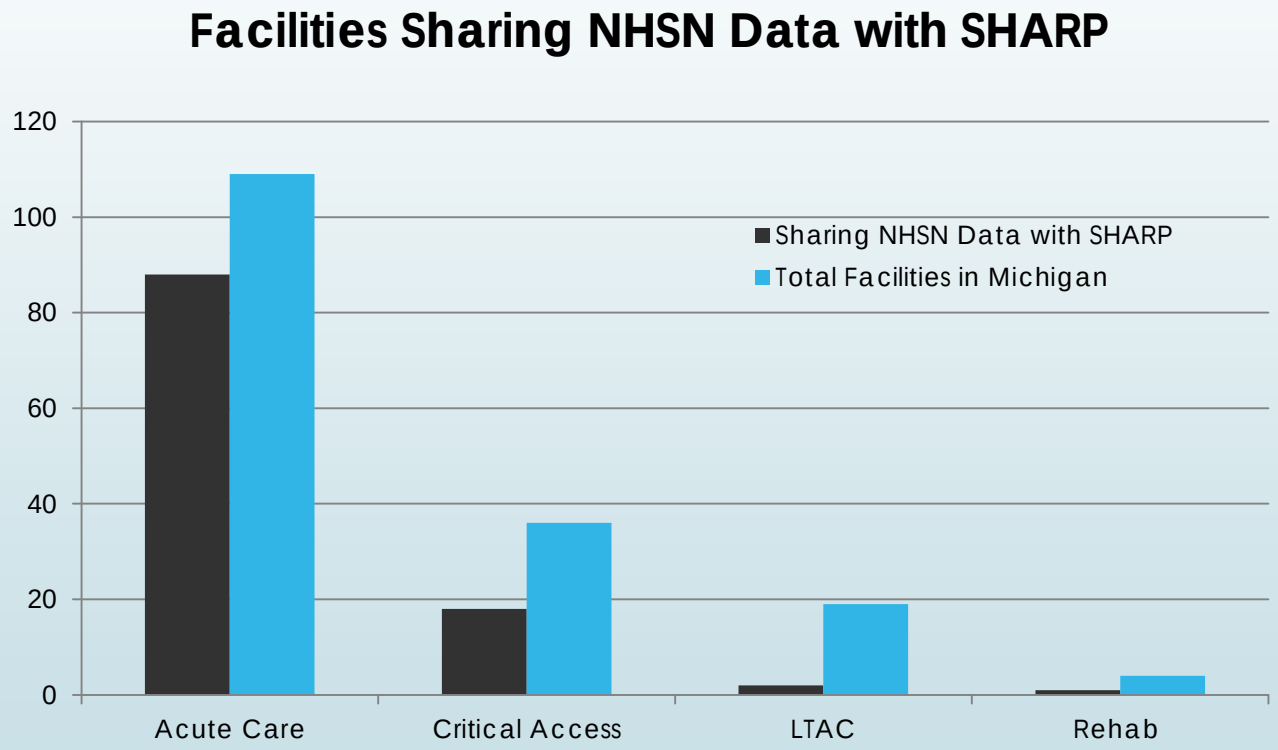
- Coordinate activities related to HAI surveillance and prevention in Michigan
- Improve surveillance and detection of antimicrobial-resistant pathogens and HAIs
- Identify and respond to disease outbreaks
- Use collected data to monitor trends
- Educate healthcare providers, state and local public health partners, and the public on HAIs

SHARP Activities

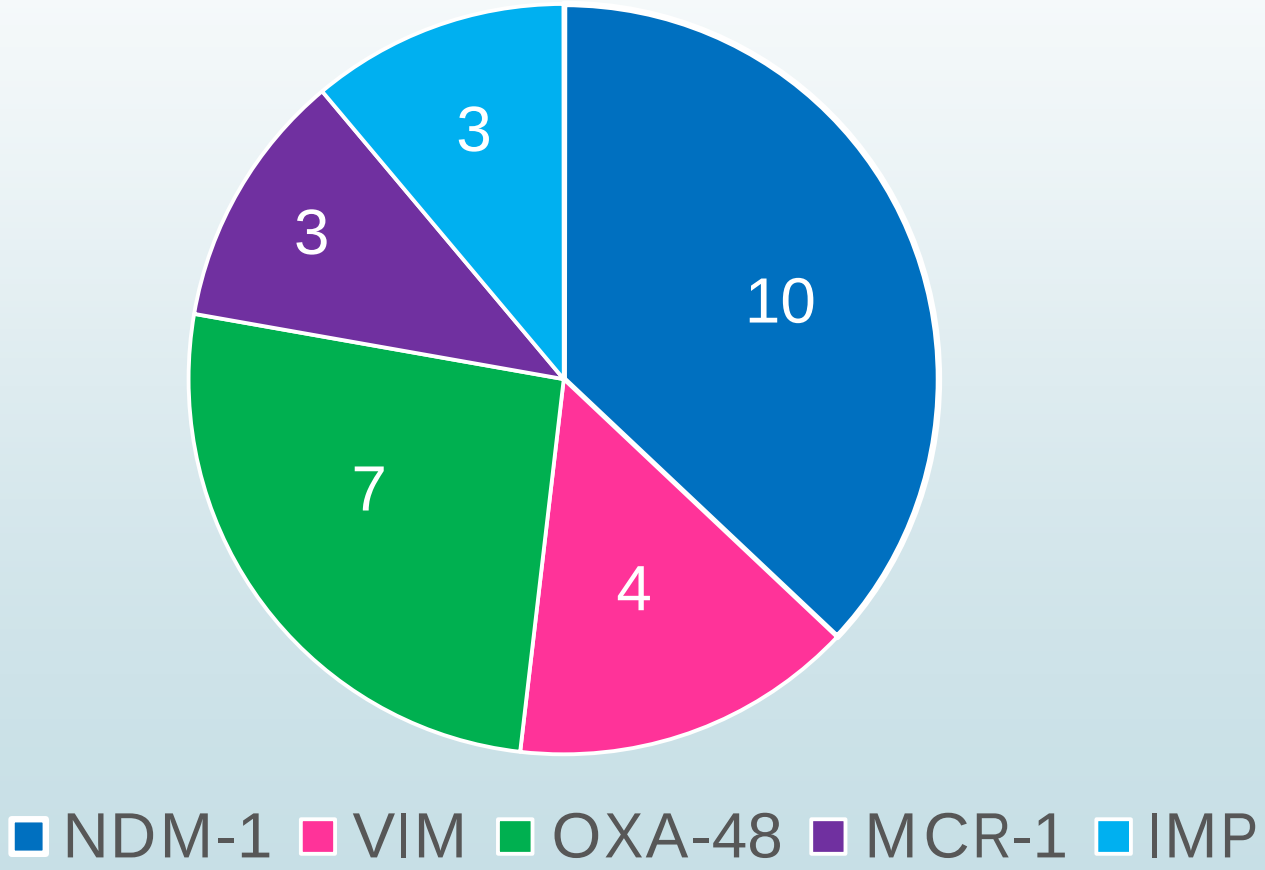
- Outbreak Response
  - Offer services and expertise
  - Help coordinate molecular testing with MDHHS BOL at no cost
- Surveillance and Reporting
  - Assist with NHSN reporting (both voluntary reporting for the SHARP Unit and mandated reporting for CMS)
  - Provide aggregate and individualized feedback report (we'll get to these later in the presentation)
- CRE Surveillance and Prevention Initiative
  - Currently, 28 Acute Care, 10 LTAC, and 2 LTC/SNF facilities participate
- Consulting/Education

SHARP NHSN Surveillance

- 88 of 109 (81%) of Acute Care Hospitals in Michigan are sharing data
- 18 of 36 (50%) of Critical Access Hospitals in Michigan are sharing data
- 2 of 19 (11%) of Long-Term Acute Care Hospitals in Michigan are sharing data
- 1 of 4 (25%) of Rehab Hospitals in Michigan are sharing data
- **Total: 109 of 168 (65%) of hospitals**



Novel Resistance Mechanisms in MI 2014 - Present



Novel Resistance Cases

- **NDM-1: 10 cases**
  - 7 recent international travel, 4 recent hospitalization
- **OXA-48: 7 cases**
  - 4 recent international travel, 3 recent hospitalization
- **VIM: 4 cases**
  - No reported travel, 4 multiple recent hospitalizations
- **IMP: 3 cases**
  - No reported travel, 3 multiple recent hospitalizations
- **MCR-1: 3 cases**
  - 3 recent international travel, 1 recent hospitalization

MDHHS SHARP Staff

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CD Upcoming Reporting Changes

Reporting changes on the horizon

Disease/Condition	Required to be Reported	New Condition in MDSS	New Standardized Case Definition	New form in MDSS
Carbapenemase-Producing Carbapenem-Resistant Enterobacteriaceae (CP-CRE)	**Y**	**Y**	**Y**	**Y**
Perinatal Hepatitis C	Y - no changes to current reporting requirements	Y	Y	Y
Perinatal Hepatitis B	Y - no changes to current reporting requirements	N	N	N
Candida auris	**Y – Unusual Occurrence**	**N**	**Y**	**N**
Extrapulmonary Non-Tuberculous Mycobacterium (NTM)	N - Optional	N	Y	Y
Latent Tuberculosis Infection (LTBI)	N - Optional	Y	Y	Y

Local Health Departments

- CP-CRE will now be a routinely reportable condition coming through the MDSS
- A new condition (CP-CRE) and case detail form are in development
- MDHHS is also developing tools to guide in the investigation of CP-CRE cases reported to the MDSS
  - MDHHS is working to understand how to integrate this current process with upcoming reporting mandates

Clinical Laboratories

- Laboratories will soon be able to electronically report CP-CRE results to our surveillance system via HL7 v2.5.1 messages.
- These HL7 messages can be more complex for CP-CRE than some of the other reportable conditions and we're developing guidance on how to properly format them
- If a laboratory cannot report CP-CRE to MDSS via HL7 message by January 2018, facilities should develop processes to manually report these cases into the MDSS

Intro/Review of Basic Epidemiology

“Real World” definitions of Epidemiology

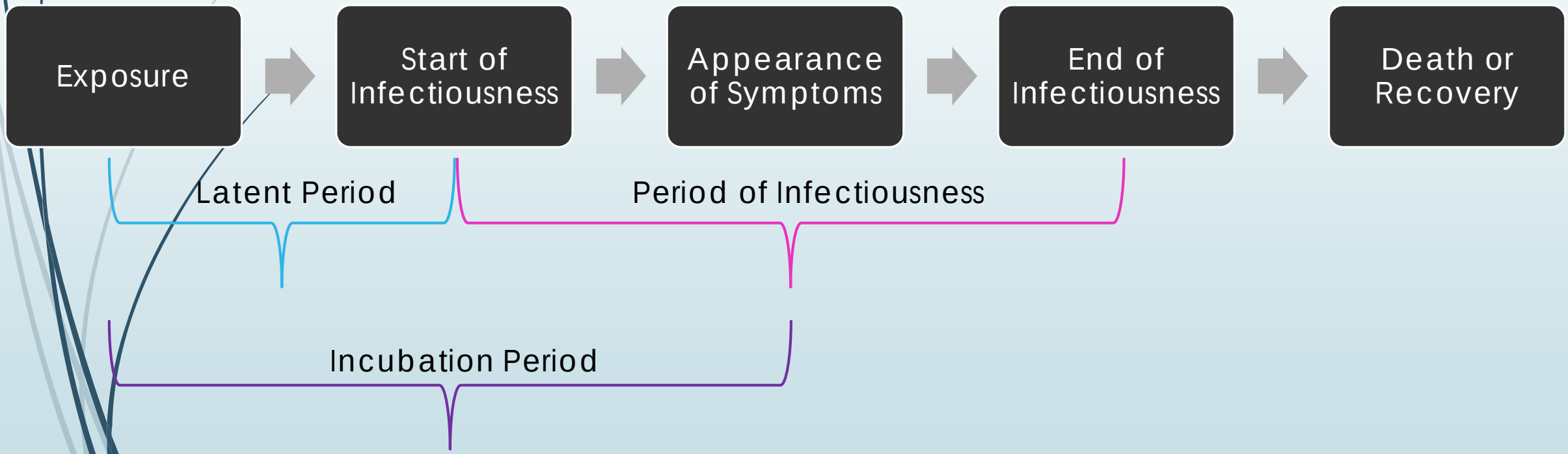
- “the worst taught course in medical school”
  - Medical student, U of M
- "the science of making the obvious obscure”
  - Clinical Faculty, MSU
- “the science of long division”
  - Statistician, Grand Valley State University
- "the study of skin diseases“
  - New CDC Epidemic Intelligence Service Officer, Atlanta

Slide courtesy of Russ Olmstead

Epidemiology

- The study of the distribution and determinants of disease and other conditions
- Epidemiology is population-based (unlike clinical medicine)
- Epidemiology studies groups of people rather than the individual
- Primary purpose: aid in the understanding of the cause of a disease by knowing its distribution; determinants in terms of person, place, and time; and natural history

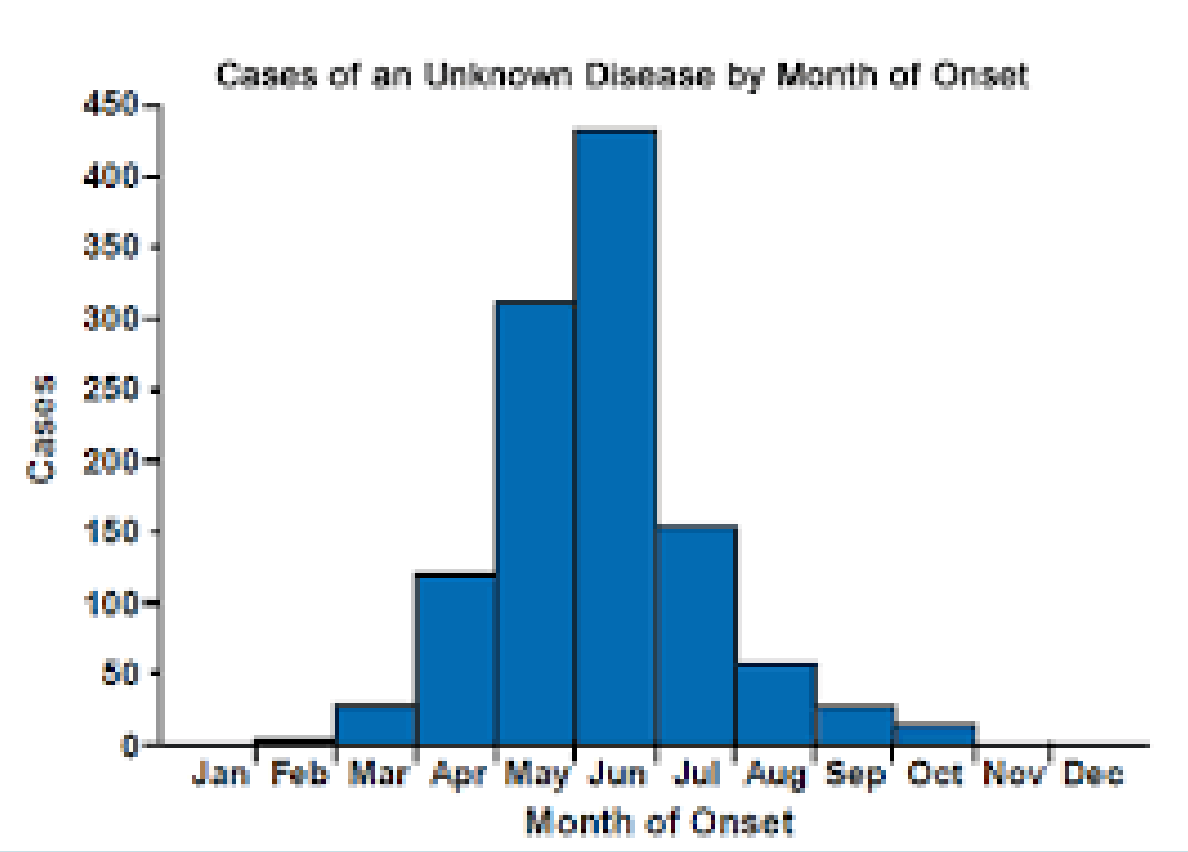
Natural History of Infectious Diseases



Patterns of Infectious Disease Occurrence

- Short-term
  - Endemic = usual occurrence of disease
  - Epidemic = occurrence of disease in excess of expected on a local or regional basis
    - Waning of an epidemic is caused by depletion of susceptible individuals, medical intervention, and quarantine
  - Pandemic = excess disease occurrence on a global scale
    - The distinction between these concepts is not always obvious and is sometimes arbitrary
- Long-term
  - Secular trends – generally chronic, non-infectious disease

Epidemic “Epi” Curve

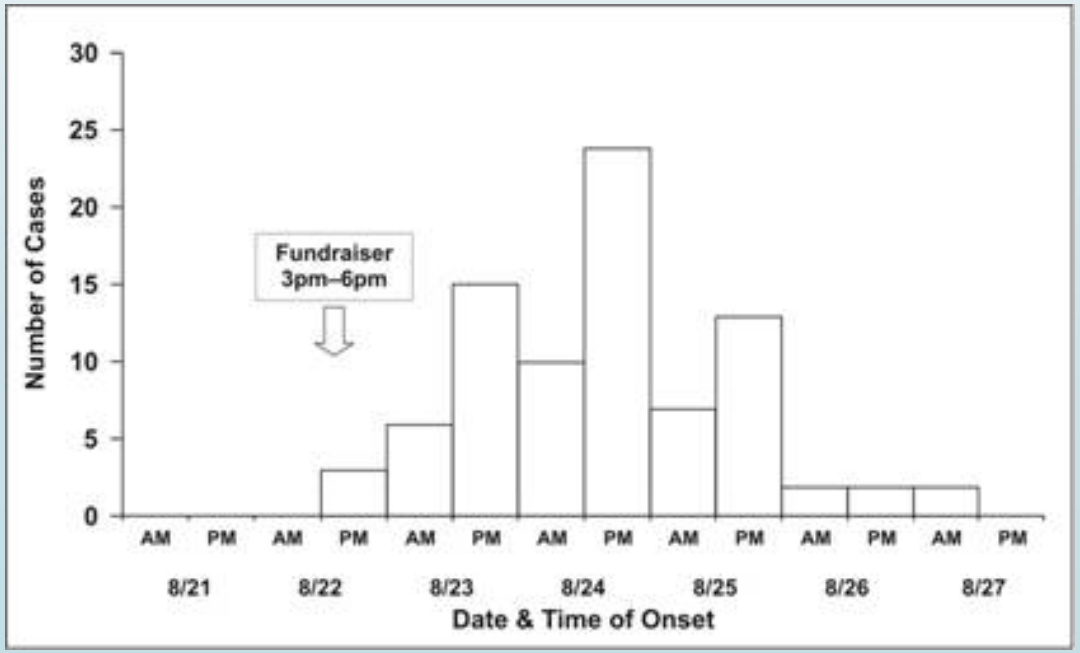


Tells us about:

- Occurrence of an epidemic or outbreak
- Time and source of exposure
- Mode of transmission
- Causative agent

Disease Outbreaks

- Epidemic with a very circumscribed scope, associated with:
  - Usually a common vehicle of either a point source or continuous nature
    - Ex. Food
    - Often occurs very quickly



Case Definition

- Set of rules that tells if someone is a case or not
- Essential for a successful outbreak investigation
- Ensures accuracy of disease frequency estimates

Attack Rate

- Proportion of susceptibles that acquire infection upon exposure over a specific time frame

$$= \frac{\text{\# with risk and disease}}{\text{\# at risk}}$$

Challenges for determining sources

- Correlated consumption
- Cross-contamination
- Recall
- Quantity
- Susceptibility

Association and Causation

- Association: as one variable changes, there is a concomitant or resultant change in the quantity or quality of another variable
- When a statistical association between a factor and a disease has been demonstrated, it may be of three types:
  - Artifactual (spurious)
    - Random error: a certain number of associations occur just by chance
    - Bias (systematic error): caused by errors in study design or analysis
  - Indirect or non-causal
    - May be caused by the mixing of effects between exposure, disease, and a third factor (confounder), that may be associated with exposure and independently affect outcome
  - Causal
    - Evidence indicates that one factor is clearly shown to increase the probability of the occurrence of a disease

Association and Causation

- If an exposure causes an outcome then there is always an association
- If an exposure and an outcome are associated, there may be a causal association

Sources of Epidemiological Data

- Specifically collected data
  - Studies
- Data collected for general purposes
  - Disease surveillance systems (MDSS, NHSN, etc…)
  - Hospital/clinic records
  - Insurance records
  - Employer/school records
  - Surveys
  - Vital records

Measures of Disease Frequency

- Point prevalence: “how much disease exists right now?”
  - Typically expressed as a proportion or percentage “X/N x 100”
  - In a hospital: per 100 admissions

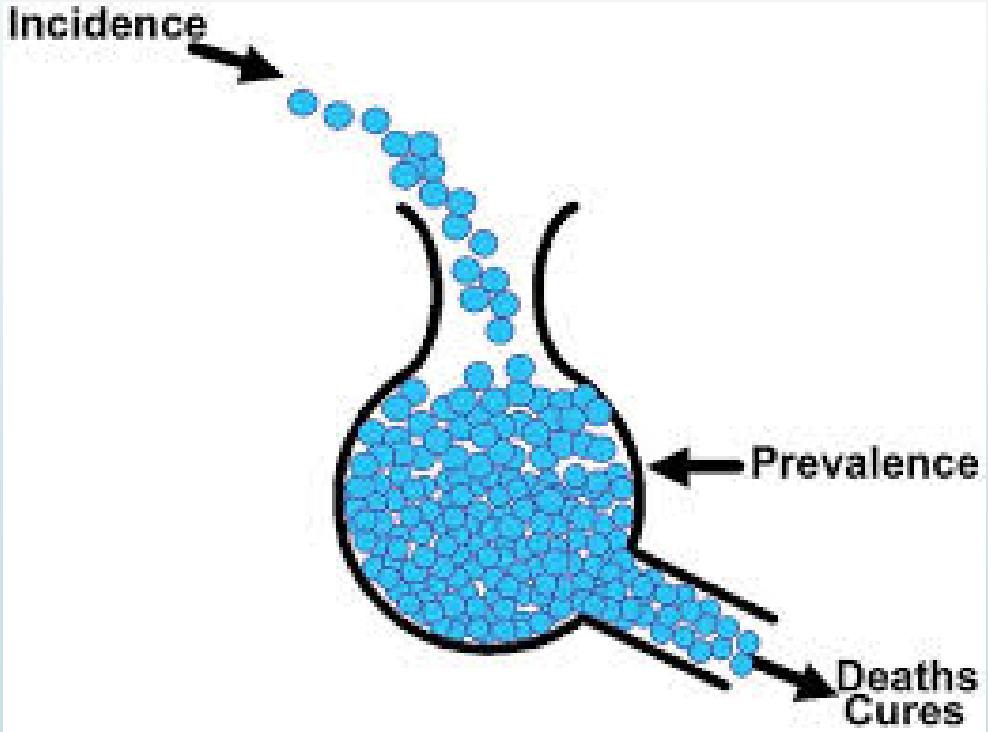
- Example:
  - In a month, a hospital has 329 admissions. Community-onset CDI are considered “prevalent” because the patient came in with it. There were 12 CO CDI LabID Events.
  - 12/329 = 0.036474 X = Prevalence rate of 3.647 per 100 admissions

Measures of Disease Frequency

- Person-time: count only the population and time that can possibly be infected
  - In a hospital: per 1000 or 10,000 patient-days
- Incidence rate/density: “how many new cases arise per a population?”
  - “X/N x pt at risk”
  - Cumulative incidence: complete follow-up of incident cases
  - Attack rate: cumulative incidence for a very short period of time
- Example:
  - In a month, a hospital has 1751 patient days. Patient days are taken by adding up the inpatient daily census, ideally taken at the same time each day. Hospital-onset CDI LabID Events are considered “incident” because they are new cases. There were 15 HO CDI LabID Events.
  - 15/1751 = 0.0085665 X 10,000 = 85.665 per 10,000 patient days
  - Additional example: there were 3 CLABSI events. 3/1751 = 0.001713 X 1,000 = 1.713 per 1,000 patient days

Relationship between incidence and prevalence

- Prevalence increases if:
  - Incidence increases
  - Treatment of a chronic disease improves
- Prevalence decreases if:
  - Incidence decreases
  - Mortality or cure rate increases

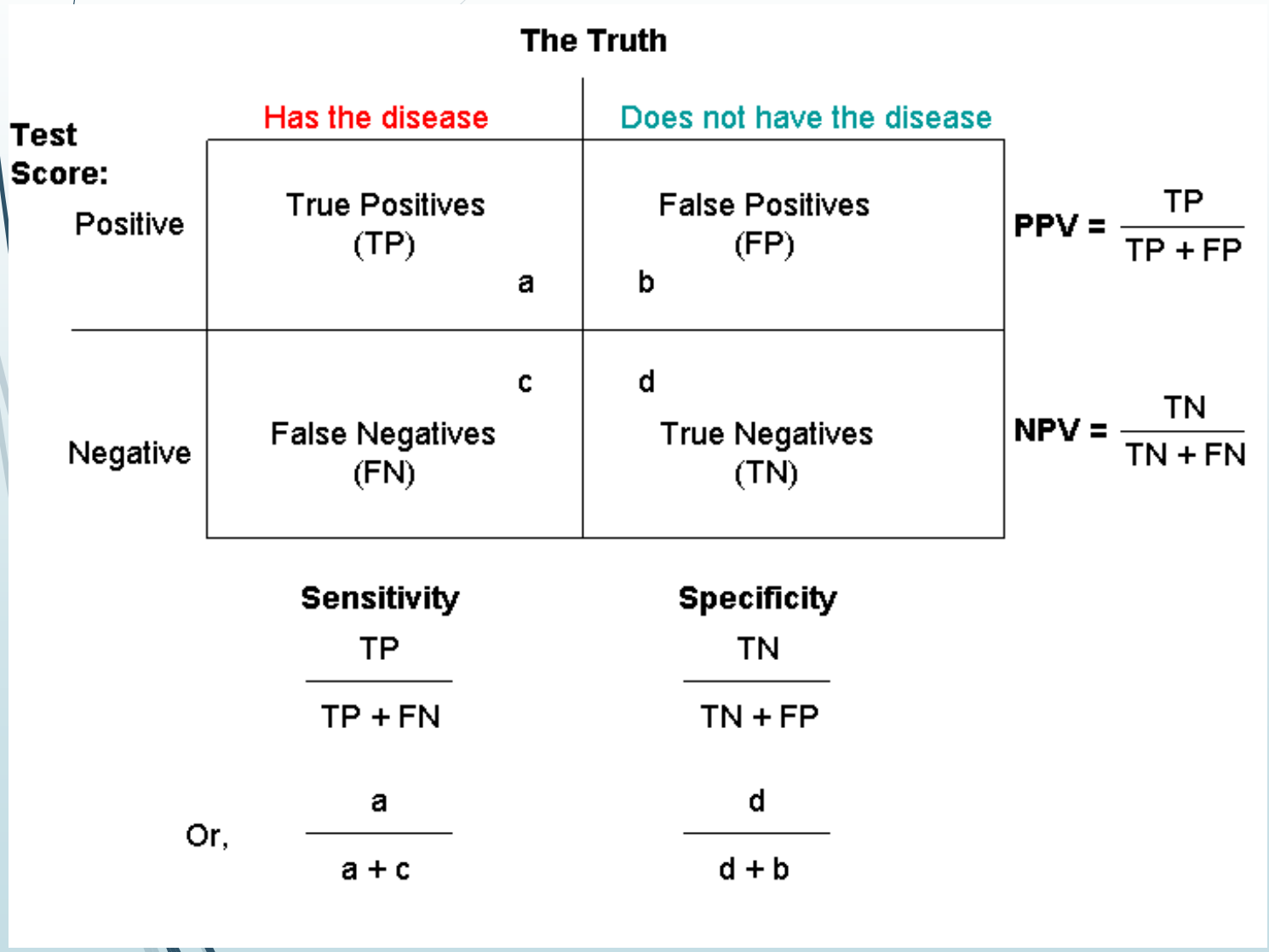


Measures of Association

- Association: statistical relationship between two variables-typically between a determinant (risk factor) and an outcome
- Risk in exposed = A/(A+B)
- Risk in unexposed = C/(C+D)
- Odds Ratio = (A x D)/(B x C)

		Diseased	
		Yes	No
Exposed	Yes	(A)	(B)
	No	(C)	(D)

Validity and Reliability of Tests



- Sensitivity: percentage of all true cases identified
- Specificity: Percentage of all true negatives identified
- Predictive Positive Value: proportion of positive tests that are actually diseased
- Negative Predictive Value: proportion of negative tests that are actually negative

Study Designs – Case Control

- Retrospective, observational
- Statistically examine the relationship between specific determinants or exposures and case status
- Determine status (case or not) based on case definition
- Odds ratio is the measure of association

Case-Control

- Matching
  - Controls can be matched by group characteristics (frequency-matched)
  - Controls can be paired (individually matched)
- Matching tries to account for what we can't see

Case Control Example

	Cancer	No Cancer	**Total**
Drug Use	210	265	**475**
No Drug Use	90	235	**325**
Total	**300**	**500**	800

$$OR = \frac{210 \times 235}{265 \times 90} = 2.07$$ (this tells us there is a positive association)

Study Designs - Cohort

- Gold standard study design
- Prospective – go forward
  - Lifestyle exposures may change and complicate the study
- Retrospective – pick an onset of a disease and trace back to an exposure
- Advantages – rare exposures can be studied, clear temporal relationship
- Disadvantages: not good for diseases of low incidence, time consuming, potential for follow-up bias
- Measure incidence rates

Cohort Example

- 3 year study: 10,000 enrolled; 500 people already have outcome at baseline
- Baseline prevalence = 500/10,000 = 5%; these are excluded from study

- Year 1: 200 leave study, 80 get disease
- Year 2: 180 leave study, 70 get disease
- Year 3: 150 leave study, 65 get disease

- Assign 0.5 year to those who get disease (assume mid-year); loss get “0” years
- Year 1 PT = 9500 – 200 – (80 * .5) = 9260
- Year 2 PT = 9220 (removed the remaining 40) – 180 – (70 * .5) = 9005
- Year 3 PT = 8970 (removed the remaining 35) – 150 – (65 * .5) = 8787.5
- **Total PT = 9260 + 9005 + 8787.5 = 27052.5**
- **Incidence = (80+70+65) / 27052.5 = 0.00796 or 7.95 per 1000 person-years**

Study Designs - Descriptive

- Case report/series – observations from a clinical setting
- Ecologic study – assess outcome/exposure from different sources
- Cross-sectional study – snapshot of what is happening

Study Designs – Clinical Trials

- Intervention studies
  - Treatment or exposure is randomly assigned to study subjects by the investigator
  - Group assignment is unknown to researcher and subject whenever possible (blinding)

Bias

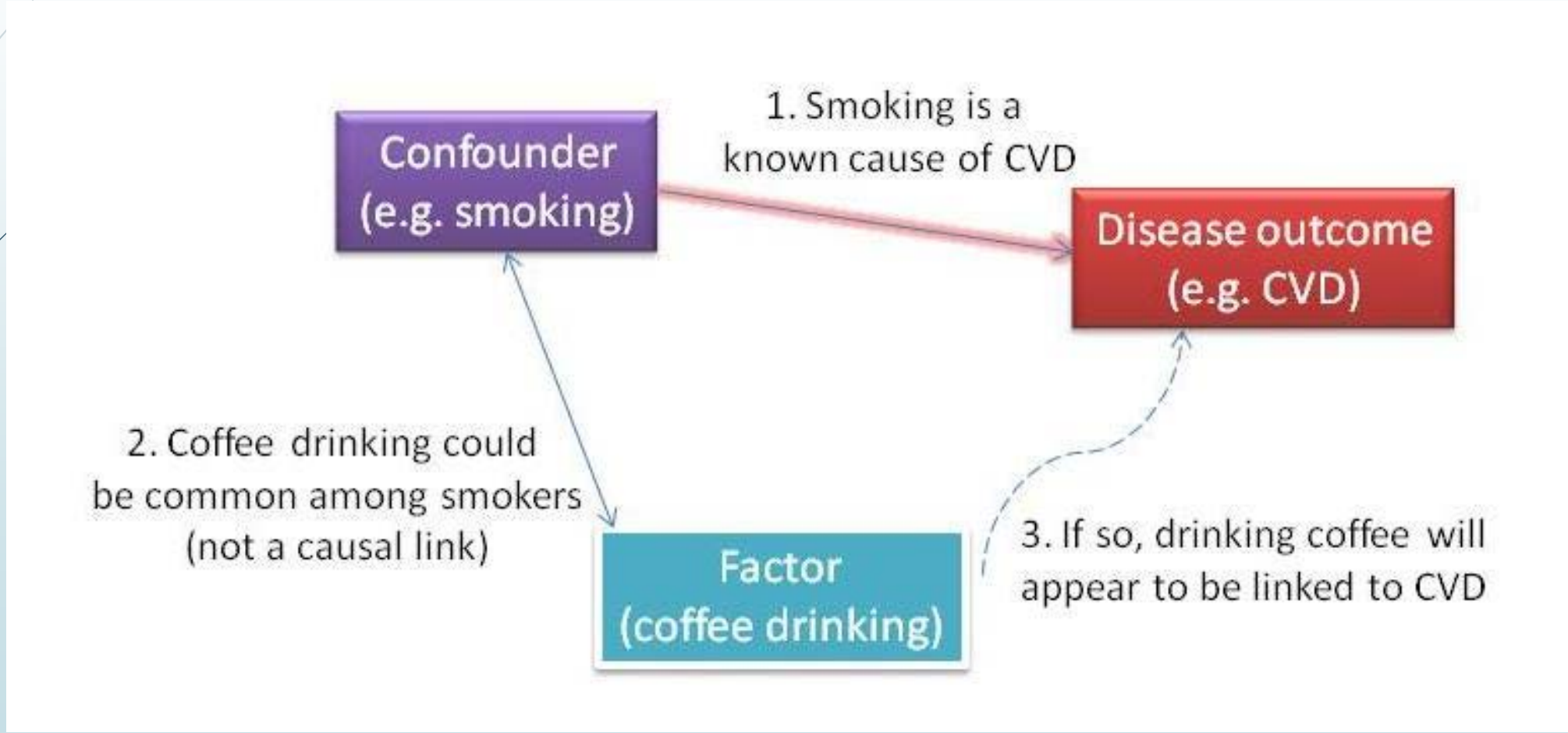
- Systematic error which results in an incorrect estimate of the association between exposure and disease
  - Error likely due to way we conduct the study

- Two broad types:
  - Selection – selection of subjects (not related to generalizability)
  - Information – measurement of outcome/exposure
    - Recall bias
    - Follow-up bias
    - Interviewer bias

Confounding

- Mixing of the effect of the exposure upon disease with the effect of a second factor that is related to both the exposure and the disease
- Can be controlled in the design phase through:
  - Randomization of subjects in clinical trials
  - Restriction
  - Matching (to help adjust, won't remove it)
- Can be controlled in the analysis phase through:
  - Restriction
  - Stratification, multivariate analysis
  - Matched analysis

Confounding Example



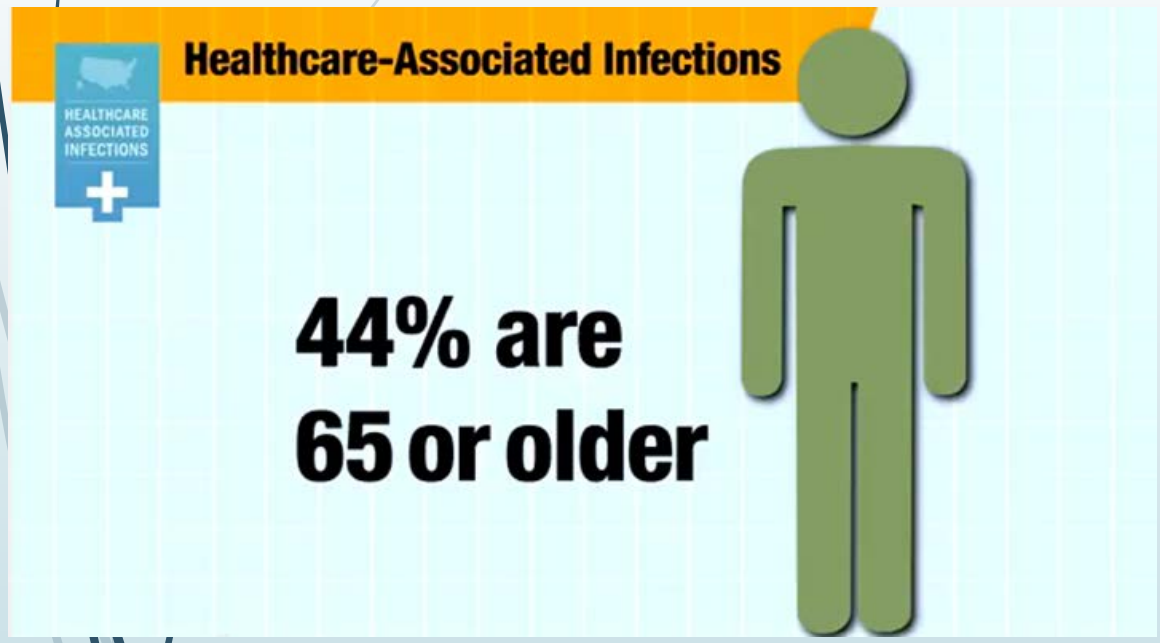
Epidemiology and Infection Prevention

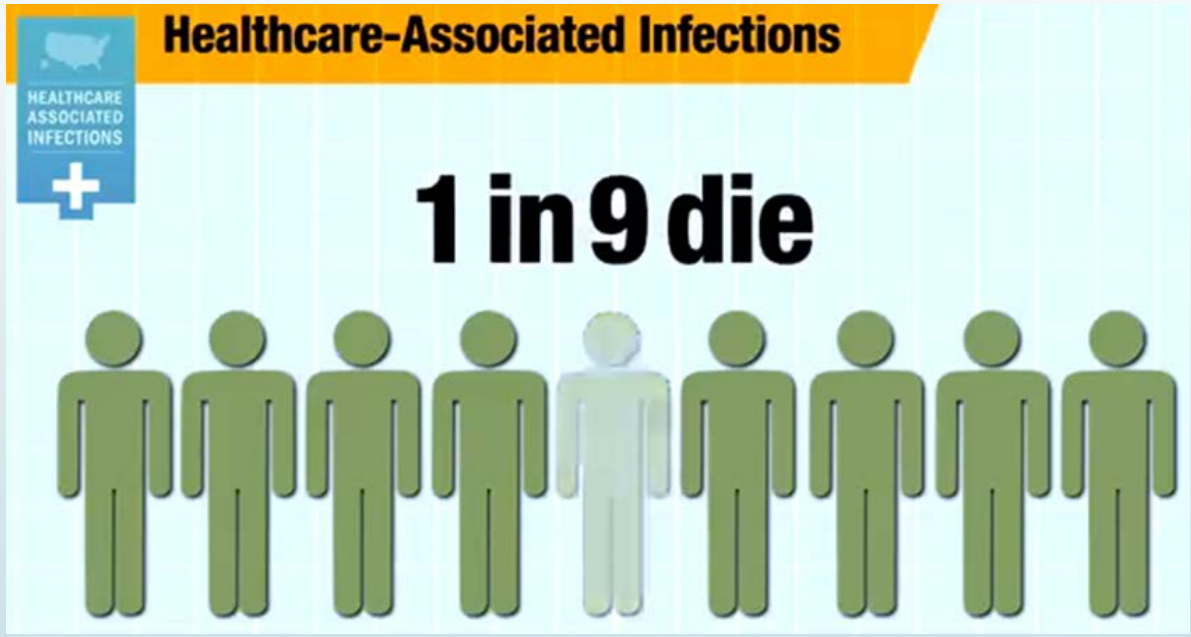
Goals of Infection Prevention/Control & Epidemiology Programs

- Surveillance: systematic collection, analysis, & reporting of data from surveillance systems to prevent disease and improve health

- Principle Goals:
  - Protect the patient
  - Protect the healthcare personnel and visitors
  - Accomplish these in a cost effective manner whenever possible

Who gets HAIs?





HAI Surveillance – NHSN

- Nation's most widely used healthcare-associated infection tracking system
- NHSN provides medical facilities, states, regions, and the nation with data collection and reporting capabilities needed to:
  - Identify infection prevention problems by facility, state, or specific quality improvement project
  - Benchmark progress of infection prevention efforts
  - Comply with state and federal public reporting mandates
  - Ultimately, drive national progress toward elimination of HAIs

NHSN Basic Rules

- Always refer to the protocol!
- For NHSN reporting, surveillance determinations “trump” clinical judgement
  - Clinical diagnoses are important for treatment of individual patients
  - Surveillance definitions are important in identifying trends within a population
- Concerns should be sent to nhsn@cdc.gov instead of not reporting or facility adjudication

NHSN HAI Types

- Healthcare facilities may report the following HAI types into NHSN:
  - Central line-associated bloodstream infections (CLABSIs)
  - Catheter-associated urinary tract infections (CAUTIs)
  - Surgical site infections (SSIs)
  - Hospital-onset *Clostridium difficile* (*C. difficile*)
  - Hospital-onset methicillin-resistant *Staphylococcus aureus* (MRSA) bacteremia (bloodstream infections)

NHSN Analysis

- What about rates?
- Rates can be used for internal hospital tracking/trending
- However, rates are not adequately adjusted for facility types, populations, etc…
- Therefore, an SIR can be calculated and used
- SIRs are used by CMS for hospital reporting requirements

NHSN Analysis

- Standardized Infection Ratio – SIR

$$\frac{\text{Observed Infections}}{\text{Predicted Infections}}$$

SIR = 1 indicates observed=predicted

SIR>1 indicates more infections than predicted

SIR<1 indicates fewer infections than predicted

always refer to “predicted” infections instead of “expected” because we shouldn’t expect infections!

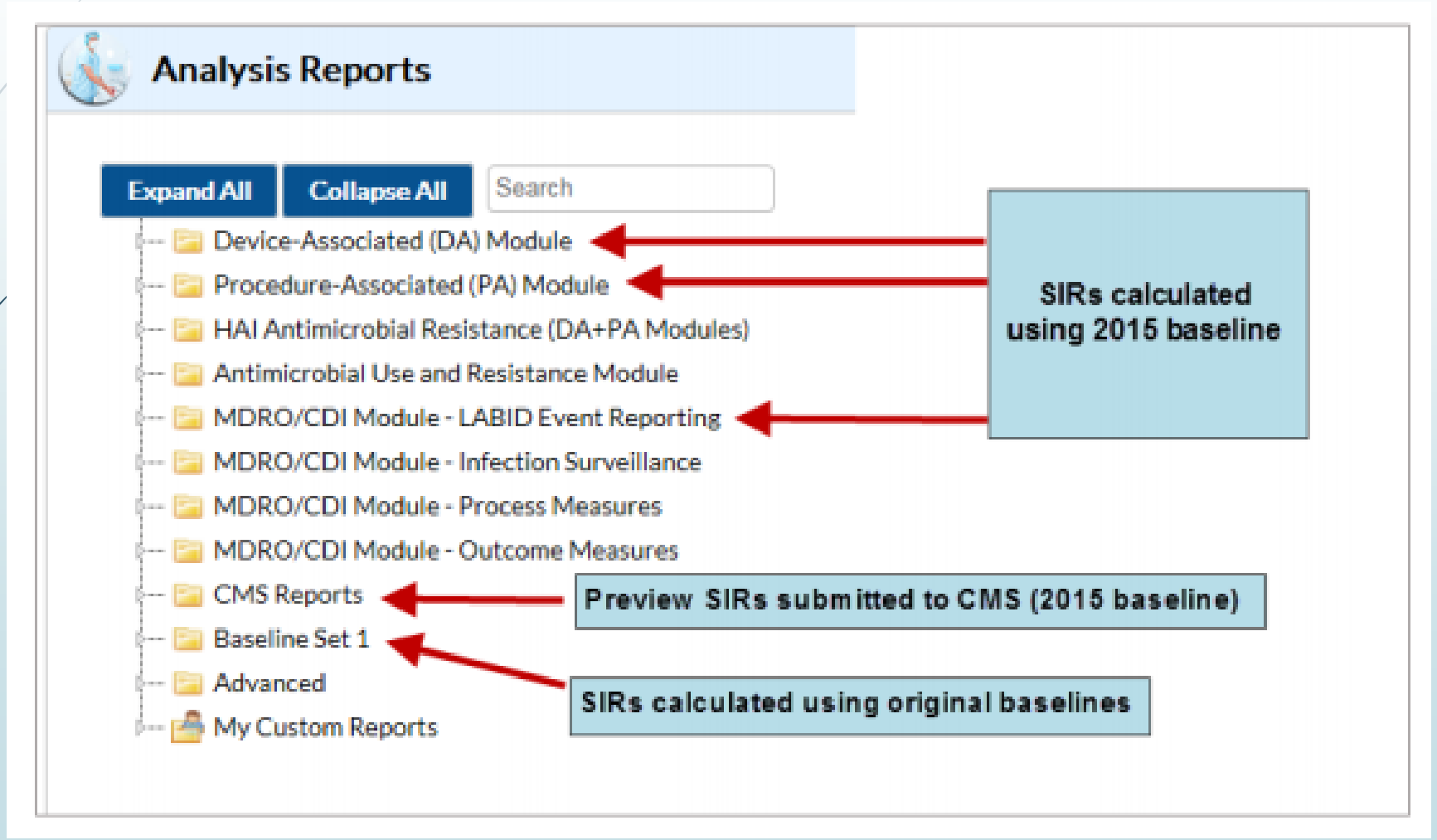
NHSN Analysis – SIRs, continued

- SIRs are not calculated if a "predicted" number is <1
- Number predicted is calculated based on 2015 baseline data

Sample NHSN Risk Models

Table 3. Risk Factors Used in the Acute Care Hospital CDI LabID Event Model		
Factor	Parameter Estimate	P-value
Intercept	-8.9463	<0.0001
Community-onset (CO) Admission Prevalence Rate	0.7339	<0.0001
CDI test type= EIA	-0.1579	<0.0001
CDI test type= NAAT	0.1307	<0.0001
# ICU beds: ≥ 43	0.7465	<0.0001
# ICU beds: 20-42	0.7145	<0.0001
# ICU beds: 10-19	0.6261	<0.0001
# ICU beds: 5-9	0.4394	<0.0001
Oncology hospital (facility type = HOSP-ONC)	1.2420	<0.0001
General acute care hospital (facility type = HOSP-GEN)	0.3740	<0.0001
Total facility bed size	0.0003	<0.0001
CDI LabID surveillance in ED or 24-hour observation location(s)	0.1119	<0.0001
Teaching facility (major, graduate, or undergraduate)	0.0331	0.0028

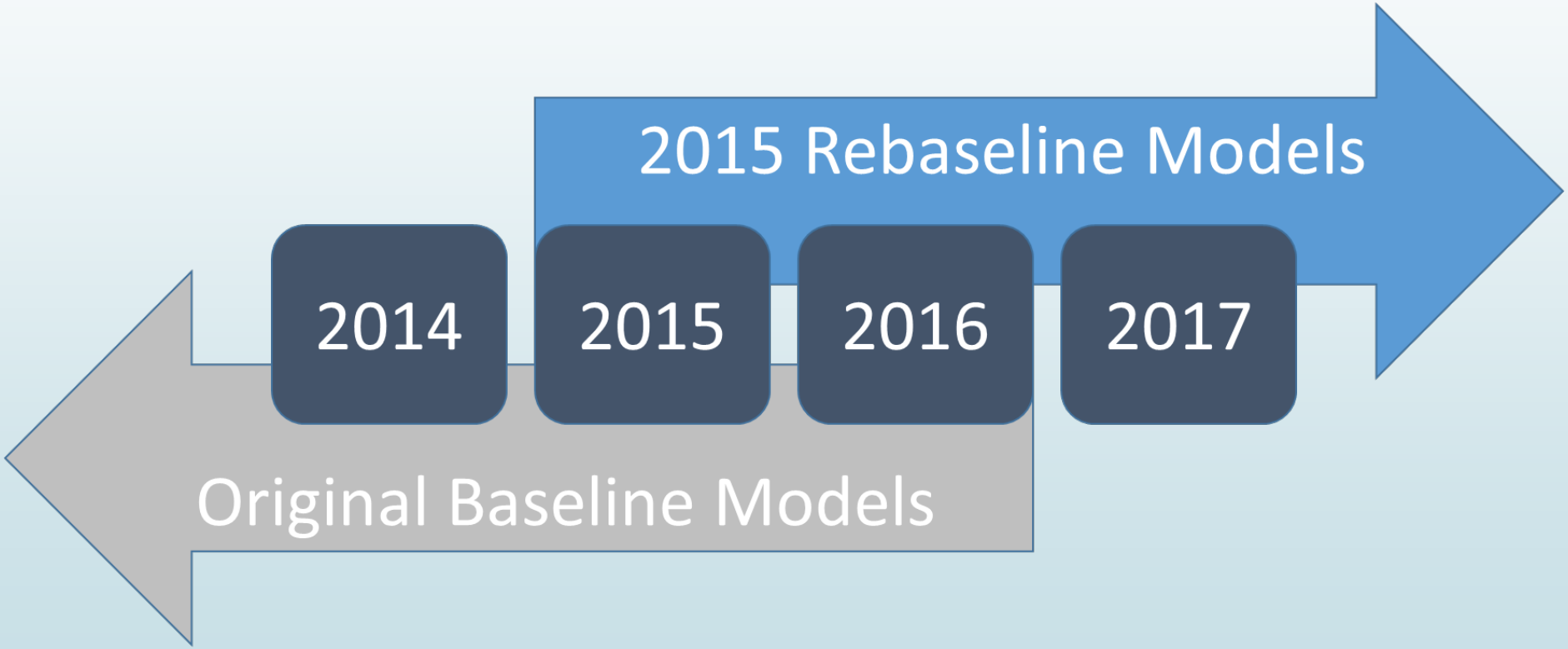
Analysis Reports in NHSN



Standardized Utilization Ratio (SUR)

- Calculated similarly to an SIR, but the ratio is observed to predicted device utilization numbers
- Good method of calculations for smaller hospitals and/or hospitals focusing on device utilization reduction

2015 Rebaseline Timelines



P-values and 95% CI

- P-value in the context of SIR: tells us if the number of observed infections is statistically significantly different than the number of predicted
  - NHSN calculates p-values using a mid-P exact test
  - Typical cut-off of 0.05 to conclude that the number of observed infections is statistically significantly different than the number predicted
- 95% Confidence Interval
  - Statistical range of values for which we have a high degree of confidence that the true SIR lies within that range
  - If the CI does not include 1, then the SIR is significantly different than 1

Example of NHSN output

orgID	summaryYQ	infCount	numPred	numcldays	SIR	SIR_pval	sir95ci
10018	2015Q1	5	2.365	1850	2.114	0.1251	0.775, 4.686

TAP Strategy

Target → Assess → Implement

- Target facilities using TAP Report function available in NHSN
- Assess gaps in infection prevention in targeted facilities/units using Facility Assessment Tools
- Implement interventions to address the gaps in infection prevention using Implementation Guidance

TAP Reports

- SIRs are not always available or representative
  - Hospitals with <1 infections expected won't receive an SIR
  - Hospitals with very few expected infections will receive an inflated SIR if they have an infection
- TAP gives hospitals a way to target problem areas and see where they rank within a group

Cumulative Attributable Difference

- TAP reports use the cumulative attributable difference (CAD) to rank hospitals
  - CAD is generally calculated based on a target or goal SIR

Calculate CAD

$$CAD = Observed - (Predicted * SIR_{target})$$

- Interpretation:
  - CAD>0 = “more infections than predicted” OR “number of infections needed to be prevented to reach the target SIR”
  - CAD<0 = “fewer infections than predicted” OR “number of infections prevented beyond the target SIR”

Access Reports in NHSN

- To access TAP reports in NHSN:
  - Analysis
    - Output Options
      - TAP Reports
        - Choose Hospital Type
        - CDC Defined Output
        - Select CLAB, CAU or CDI
- Facilities can run the report to rank locations within the hospital
- Groups can run the report to rank hospitals and locations within their participating hospitals

TAP Dashboard

- **1** – TAP Strategy Dashboard tab located on the NHSN home screen
- **2** – Date of dataset used to generate dashboard. Update the dataset using the "update" button
- **3** – The TAP Report Dashboard displays the Facility level CAD for each HAI type
- **4** – Modify the HAI(s) displayed on the bar graph
- **5** – Modify to view from 1 to 5 last quarters of data
- **6** – Print the graph to include in facility reports
- **7** – The legend states that the CAD values are calculated using the HHS 2020 Targets

Interpret TAP Report

Click variable name to be directed to more information in this guide.

The unit-specific TAP Report output displays facility units ranked by their CADs.

CDI data are reported to NHSN on a facility-wide basis. Thus, TAP Reports for CDI will only display facility-wide CADs and will not provide unit-level rankings or unit-level CADs.

The surgical intensive care unit (SICU) at DHQP Memorial reported 5 CAUTI events and 5 pathogens during this reporting period. Shown here, 3 pathogens were yeast. This information can help facilities understand the events reported and implement the most appropriate prevention strategies.

No. of pathogens outside the parentheses represents total no. of pathogens reported. Only most common pathogen types are presented in parentheses, and some events may have > one type of pathogen.

Individual Facility, Unit-Specific Report - CAUTI example

Date Range: CAU_TAP summary Yr 2013 to 2013

Facility				Location								
Facility Org ID	Facility Name	Facility CAD	Location Rank	Location	CDC Location	Events	Urinary Catherter Days	DUR %	CAD	SIR	Sir Test	No. Pathogens (EC, YS, PA, KS, PM, ES
1000	DHQP Memorial	5.73	1	SICU	IN:ACUTE:CC:S	5	502	81	3.38	2.31	SIG	5 (0, 3, 1, 1, 0, 0)
			2	NEURO	IN:ACUTE:CC:N	3	257	77	1.58	1.58		3 (0, 0, 1, 0, 2, 0)
			3	BURN	IN:ACUTE:CC:B	2	162	61	1.10	1.67		2 (1, 0, 0, 0, 0, 0)
			4	REHAB	IN:ACUTE:WARD:REHAB	1	76	11	0.18	0.91		1 (0, 0, 0, 0, 1, 0)
			5	2N	IN:ACUTE:WARD:M	1	239	20	-0.20	0.63		1 (0, 0, 0, 0, 0, 0)
			6	6S	IN:ACUTE:WARD:M	1	261	20	-0.31	0.57		1 (0, 0, 0, 0, 0, 0)

If location-level CADs are the same in a given facility, their ranks are tie
(EC, YS, PA, KS, PM, ES) = No. of E. coli, yeast (both candida and non-candida species), *P. aeruginosa*, *K. pneumoniae/K. oxytoca*, *Proteus Mirabilis*, *Enterococcus* species
SIR is set to '.' when expected number of events is < 1.0
LOCATION CAD = (OBSERVED_LOCATION - EXPECTED_LOCATION*0.75)

Rounding the CAD up to a whole number when explaining the data to leadership ensures that they understand how many infections they would have needed to prevent to reach the SIRgoal.

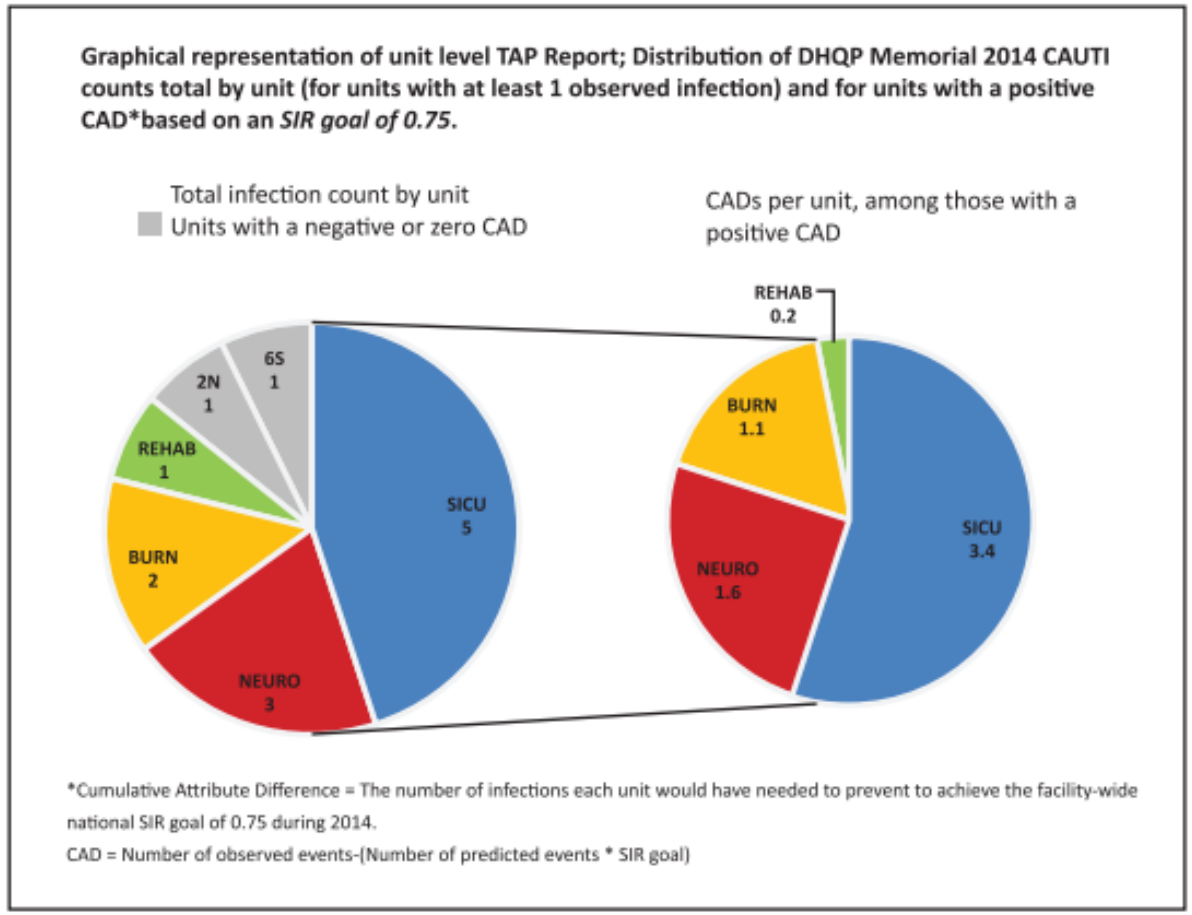
The SIR will display as missing when the predicted number of events is less than 1.0.

If nothing is listed under SIRtest, the SIR is not significantly higher than the SIRgoal. 'SIG' will be displayed if the SIR is significantly higher than the SIRgoal.

DHQP Memorial overall needed to prevent 6 infections (round up 5.7) to have met their SIR goal (0.75 for CAUTI) during this time period selected (Yr 2013). The SICU is the major contributor to the facility CAD, followed by the Neuro and Burn critical care units. DHQP Memorial should focus their CAUTI Prevention efforts on these units.

Communicate TAP Report Data

1. Example figure displaying distribution of total facility infection count and CADs by unit among units with a positive CAD (adapted from a figure developed by Jamie Moran, MSN, RN, CMSRN, CIC, Qualis Health).

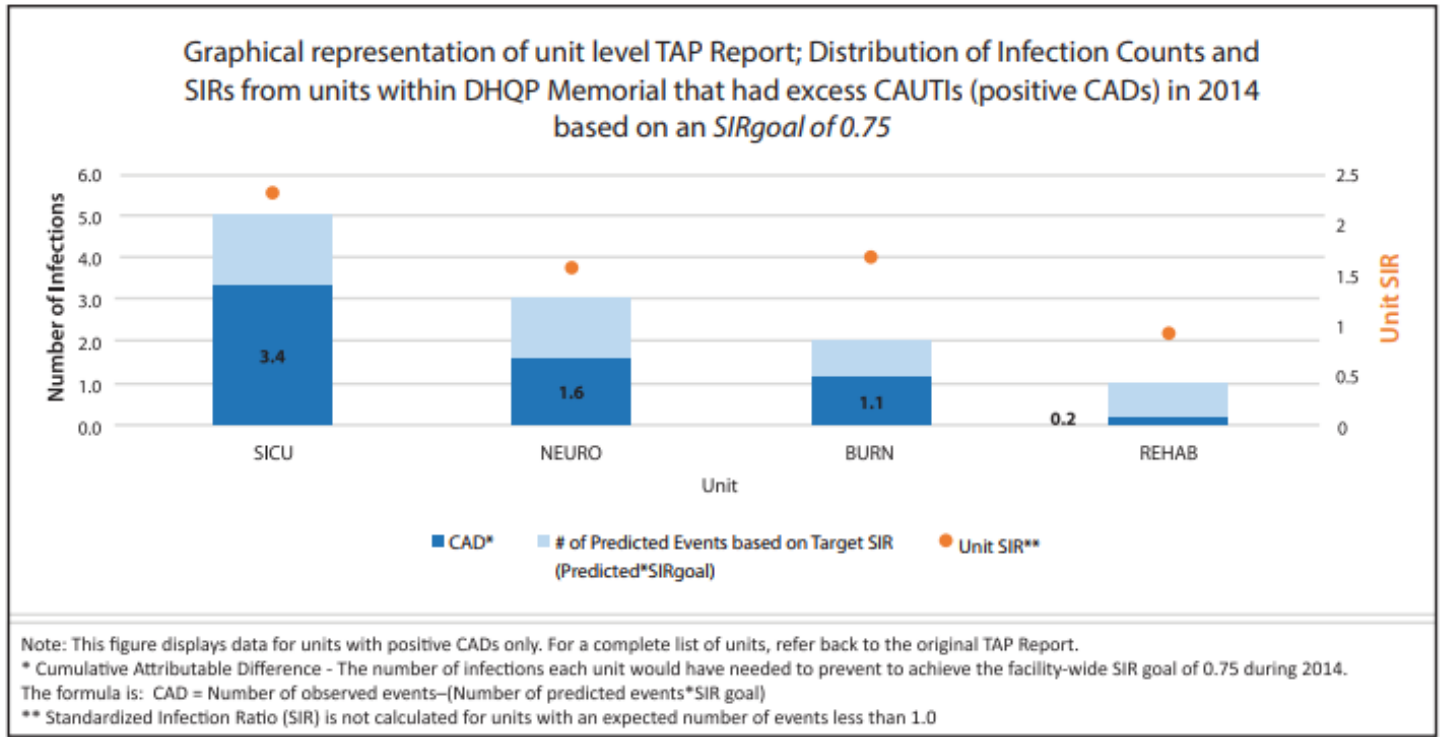


To Facility Leadership:

"This pie chart displays the total number of CAUTIs per unit within DHQP Memorial for 2014. The colored sections indicate units with a positive CAD, or units that had more infections than predicted based on a goal SIR of 0.75. The CADs for each of these units are displayed in the pie chart on the right. Our facility should target CAUTI prevention efforts to these units for the greatest impact on the CAUTI SIR. Specifically, the SICU is the largest driver of the facility CAD and should be an area of focus for CAUTI prevention."

Communicate TAP Report Data

2. Example bar chart (adapted from an example created by Rick Welsh, RN, CPHQ, Health Services Advisory Group) displaying distribution of total infection count by unit for units with a positive CAD.



Note: This figure displays data for units with positive CADs only. For a complete list of units, refer back to the original TAP Report.
* Cumulative Attributable Difference - The number of infections each unit would have needed to prevent to achieve the facility-wide SIR goal of 0.75 during 2014. The formula is: CAD = Number of observed events–(Number of predicted events*SIR goal)
** Standardized Infection Ratio (SIR) is not calculated for units with an expected number of events less than 1.0

To Facility Leadership:

"This bar chart displays the total infection counts among units with a positive CAD, or units that had more infections than predicted based on a goal SIR of 0.75. The CADs for each of these units are displayed in dark blue. The chart also indicates the SIR for each unit in relation to the CAD. DHQP Memorial should target CAUTI prevention efforts to these units for the greatest impact on CAUTI rates. Specifically, the SICU is the largest driver of the facility CAD and should be an area of focus for CAUTI prevention. In this case, the SICU also has the highest SIR compared to other units."

During the conversation with DHQP Memorial, a staff member stated, "The Neuro unit has a higher CAD, so must be performing worse than the Burn unit."

An appropriate response would be, "While the Neuro unit does have a higher CAD, we must note the limitation that the CAD should not be used as a comparative metric. If we instead look at the SIR (which can be used to compare locations), we see that the Burn unit actually has a slightly higher SIR than the Neuro unit. The CAD is higher in the Neuro unit because it is influenced by risk exposure size, in this case catheter days. The Neuro unit has a greater number of catheter days and accounts for a higher burden of infections than the Burn unit, with fewer catheter days."

Assess: Facility Assessment Tools

What method should be used to assess opportunities for improvement in the targeted units?

Using the TAP reports, DHQP Memorial has identified that they should target the SICU, Neuro, and Burn units to assess for potential gaps in infection control related to the HAIs of interest. The Facility Assessment Tools can facilitate this process. Assessments can be administered in person in the units, which can create invaluable opportunities to provide real-time teaching moments and increased HAI prevention awareness within the unit. Assessments can also be conducted electronically as the Assessment Tools have been formatted as Adobe fillable forms that allow for easy data collection.

Who should complete the Facility Assessment Tool?

The assessments aim to capture awareness and perceptions among staff related to HAI prevention policies and practices and does not require special expertise to complete. It is strongly encouraged that the tool be completed on an individual basis by a variety of staff members within an identified unit. From leadership to frontline, having multiple levels of staff (e.g., infection preventionist, unit manager, physicians, nurses, other frontline staff) complete the tool will allow for the simultaneous assessment of differences in awareness, knowledge, and perceived practices across the facility. This will allow you to identify areas of similarities and differences in responses and focus in on gaps and areas of improvement.

How do you learn from the assessments?

Once the assessments have been completed, the responses can be summarized and reviewed for gaps within different infection prevention areas, or domains. Visit the TAP Website for postings of tools as they are completed. For further assistance, contact your local QIN-QIO or State Health Department to facilitate data collection and summarization.

Prevent: Access Resources and Address Gaps

V. *Implementing Infection Prevention Strategies*

The Facility Assessment Tool Excel Database can be used to summarize results from the Facility Assessment Tool administered to staff members within the identified units. Once all assessments have been imported into this database, it will automatically calculate summary statistics for the individual questions and overall summary scores. These features will aid in identifying domains and areas of improvement to address. Implementation strategies can then be customized to the particular gaps identified in the targeted locations. The CAUTI Toolkit Implementation Guide: Links to Resources can be found here.

1

5. Does your facility have a *nurse* champion for CAUTI prevention activities?	6. Does your facility have a *physician* champion for CAUTI prevention activities?
# of Responses per Questions	
41	41
Yes:	**Yes:**
49%	15%
No:	**No:**
30%	36%
Unknown:	**Unknown:**
21%	49%

Clicking the link will direct you to the Catheter Out website, specifically to their Physician Engagement resources.

2

I. *General Infrastructure, Capacity, and Processes*

Example Resources
ENGAGEMENT OF LEADERSHIP, CHAMPIONS, AND STAFF
Engage the Senior Executive Module - Comprehensive Unit-based Safety Program (CUSP) Toolkit Curriculum focused on the role and responsibilities of senior executives, from the Agency for Healthcare Research and Quality (AHRQ)
Strategies and Tips for Nurse Engagement Strategies to engage nurses as champions in CAUTI preventions, from catheterout.org
Strategies and Tips for Physicians Engagement Strategies to engage physicians as champions in CAUTI preventions, from catheterout.org
Presentation to Nurse Manager & Case Manager (or Unit Champion) Agenda for presentation to unit champion, for the On the CUSP: Stop CAUTI Implementation Guide

3

The CAUTI Facility Assessment Tool was administered to DHQP Memorial staff, with a particular focus on the SICU, Neuro, and Burn units. The point-of-contact received 41 responses for Section I Question 6, and found that only 15% indicated that the hospital does have a Physician Champion for CAUTI prevention activities. Using the CAUTI Implementation Guide: Links to Resources, DHQP Memorial accessed resources outlining strategies for Physician engagement from CatheterOut.org. A physician champion for CAUTI prevention was later identified and was successful in building physician support for their nurse-directed urinary catheter removal protocol in the targeted units.

MDHHS SHARP TAP Reports

- Hospitals receive password-protected quarterly report
  - CAUTI and CLABSI CADs calculated using NHSN TAP export
  - CDI LabID, MRSA bacteremia LabID, SSI COLO, SSI HYST calculated in excel using CMS SIRs
- Hospitals receive a letter in the top left corner
  - This letter changes every report
  - Can use it to find your hospital in the State and Regional TAP Reports
    - Aggregate report provides statewide data as well as data stratified by Michigan Emergency Preparedness Region.

Hospital Name

2016 Q4 Report

Letter ? on 2016 Q4 Aggregate TAP Report
Michigan Department of Health and Human Services
Surveillance for Healthcare-Associated and Resistant Pathogens (SHARP) Unit

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The Michigan Department of Health and Human Services (MDHHS) Surveillance for Healthcare-Associated and Resistant Pathogens (SHARP) Unit began including the new targeted assessment for prevention (TAP) reports in the 2014 annual statewide aggregate report. Beginning with the 2015 Quarter 1 report, individual TAP reports are provided quarterly.

This report shows modules and locations where your facility either needs to focus additional prevention efforts, or where your facility is excelling in infection prevention. The table presents a cumulative attributable difference (CAD) determined using the HHS target standardized infection ratios (SIRs) for each module. Numbers in red show how many infections your facility needs to prevent quarterly in order to reach the HHS target SIR. Numbers in green show the number of infections prevented beyond what was expected for your facility according to the HHS target SIR. Your facility's corresponding SIR for each module and location are provided as well.

Bar graphs containing CAD values from all letter-coded SHARP-participating hospitals by module and location will be available in the 2016 Q4 Aggregate TAP Report. This graph will allow each facility to view their rank within each module and location compared to all other SHARP-participating facilities. New letters are assigned each quarter.

2016 Q4 Targeted Assessment for Prevention Report

NHSN Module	Location	SIR[1]	Significant (Y/N)[2]	CAD[3]	Prevented or Need to Prevent
CAUTI	All	0.9	N	0.71	Need to Prevent
	ICU	0.6	----	-1.1	Prevented
	Ward	1.3	----	1.9	Need to Prevent
CLABSI	All	0.1	Y	-3.82	Prevented
	ICU	0.2	----	-1.6	Prevented
	NICU	0.1	----	-1.2	Prevented
	Ward	0.2	----	-1	Prevented
CDI	Facility-wide	0.38	Y	-9.13	Prevented
MRSA Bac	Facility-wide	2.2	N	3.84	Need to Prevent
SSI COLO	----	0.5	N	-1.32	Prevented
SSI HYST	----			-0.25	Prevented

[1]SIR: Standardized Infection Ratio: Ratio of observed events compared to the number of predicted events, accounting for unit type or other variables. An SIR of 1 can be interpreted as having the same number of events as predicted. An SIR that is between 0 and 1 represents fewer events than predicted, while an SIR of greater than 1 represents more events than predicted.
[2]Significant (Y/N). A Y indicates that, based on the p-value and 95% Confidence Interval (CI), the SIR is statistically significantly different than 1. An N indicates that, based on the p-value and 95% CI, the SIR is not statistically significantly different than 1 (expected). Significance testing was only performed on overall SIRs, not location-specific.
[3]CAD=Cumulative Attributable Difference. The number of infections that your hospital either needs to prevent to meet the HHS target or has prevented beyond the HHS target.
HHS CAUTI Target SIR = 0.75, HHS CLABSI Target SIR = 0.5, HHS CDI Target SIR = 0.7, HHS MRSA bacteremia Target SIR = 0.75, HHS SSI Target SIR = 0.75

Please contact Allie Murad at murada@michigan.gov with questions, comments, or suggestions. Aggregate reports are posted at www.michigan.gov/hai.

Overall 2015 CAUTI CAD in Michigan Hospitals

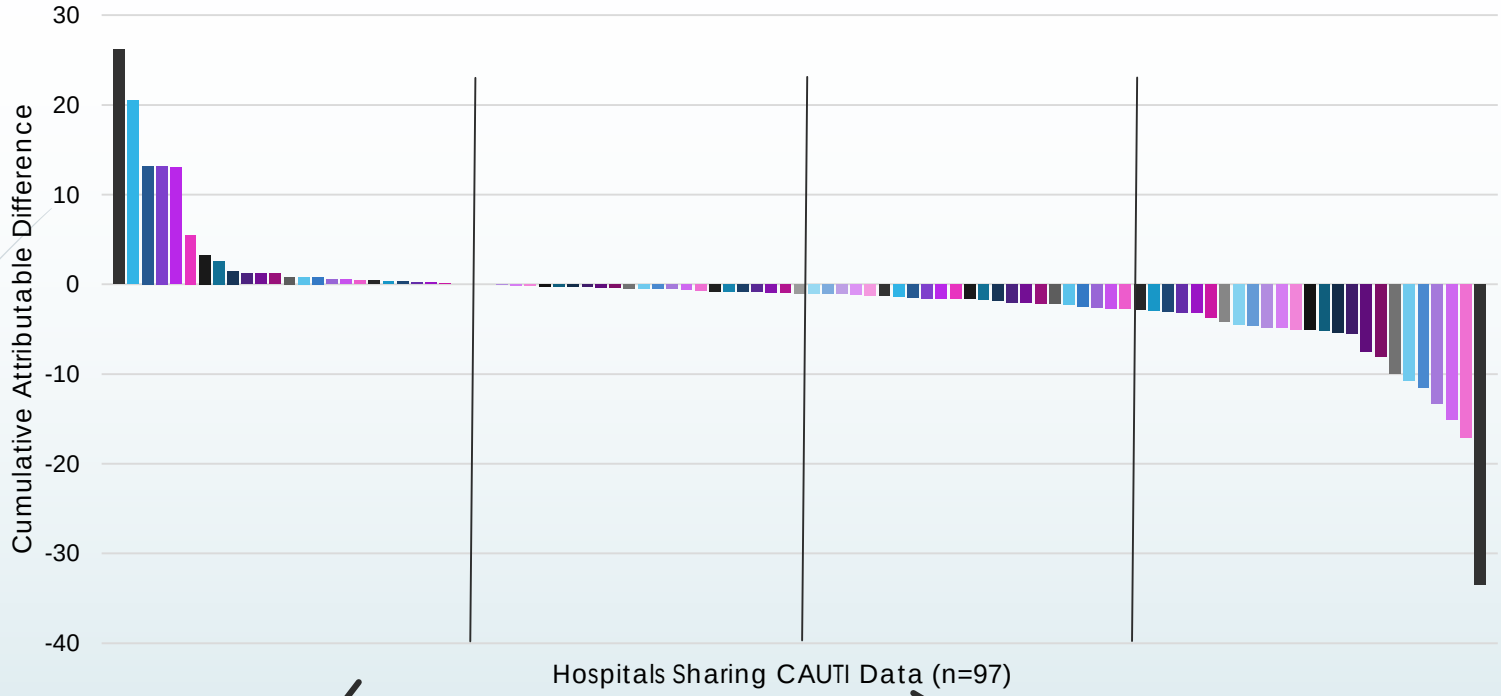


Figure A2. CAUTI CAD Group 1: Facilities with the most infections needed to prevent

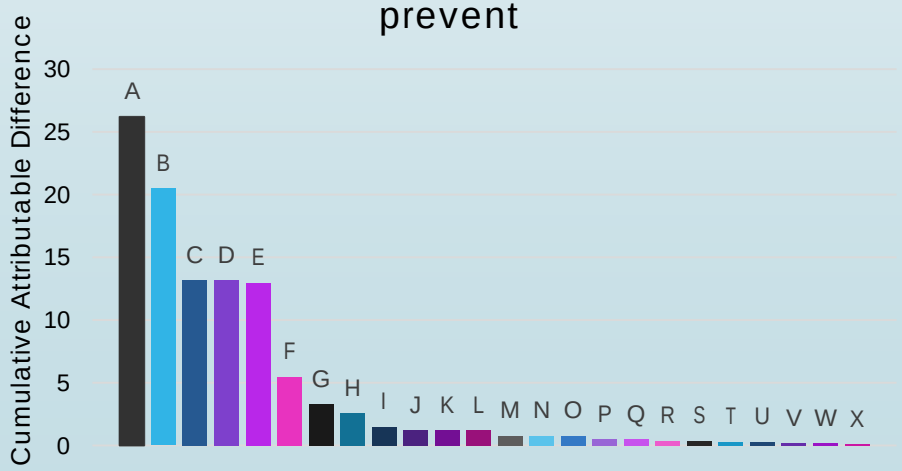
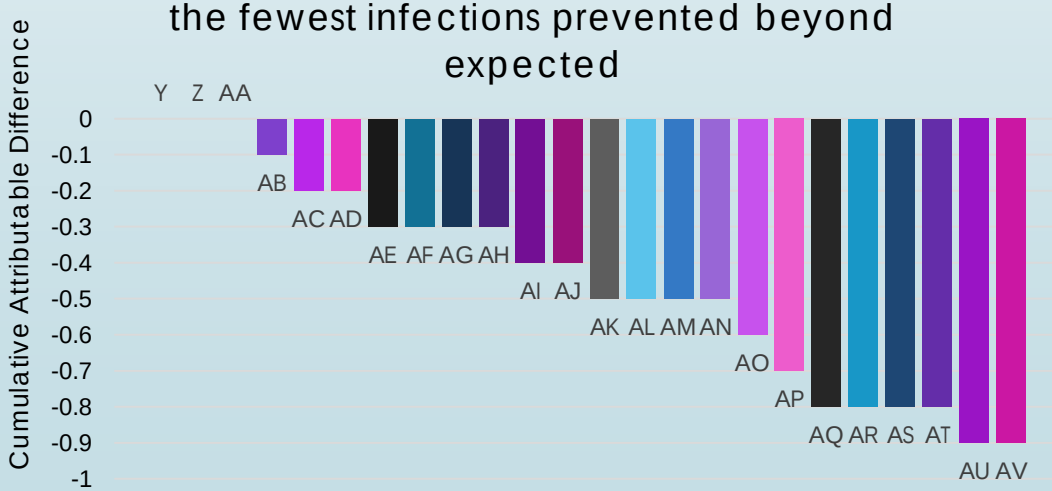


Figure A3. CAUTI CAD Group 2: Facilities with the fewest infections prevented beyond expected



Other NHSN Analysis Options

- Statistics Calculator
  - Allows you to compare SIRs against 1 or other SIRs for significance
  - Allows you to compare rates against each other for significance

- NHSN Analysis
  - Play around – you won't harm any data that have been entered!
  - Data are current as of the time you last regenerated your datasets
    - So, your data may look different than someone else at your hospital

Thank you!

Allison Murad, MPH

Michigan Department of Health and Human Services (MDHHS)

Surveillance for Healthcare-Associated and Resistant Pathogens (SHARP) Unit

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www.michigan.gov/hai