

Association for Professionals in Infection Control and Epidemiology (APIC) Infection Preventionist Competency Model

Seven-part series presented by:

Jaime Zapata, CIC, LSSGB Infection Preventionist Specialist



[Watch the recordings](#)



Session 1 – Overview of the APIC Infection Prevention Framework

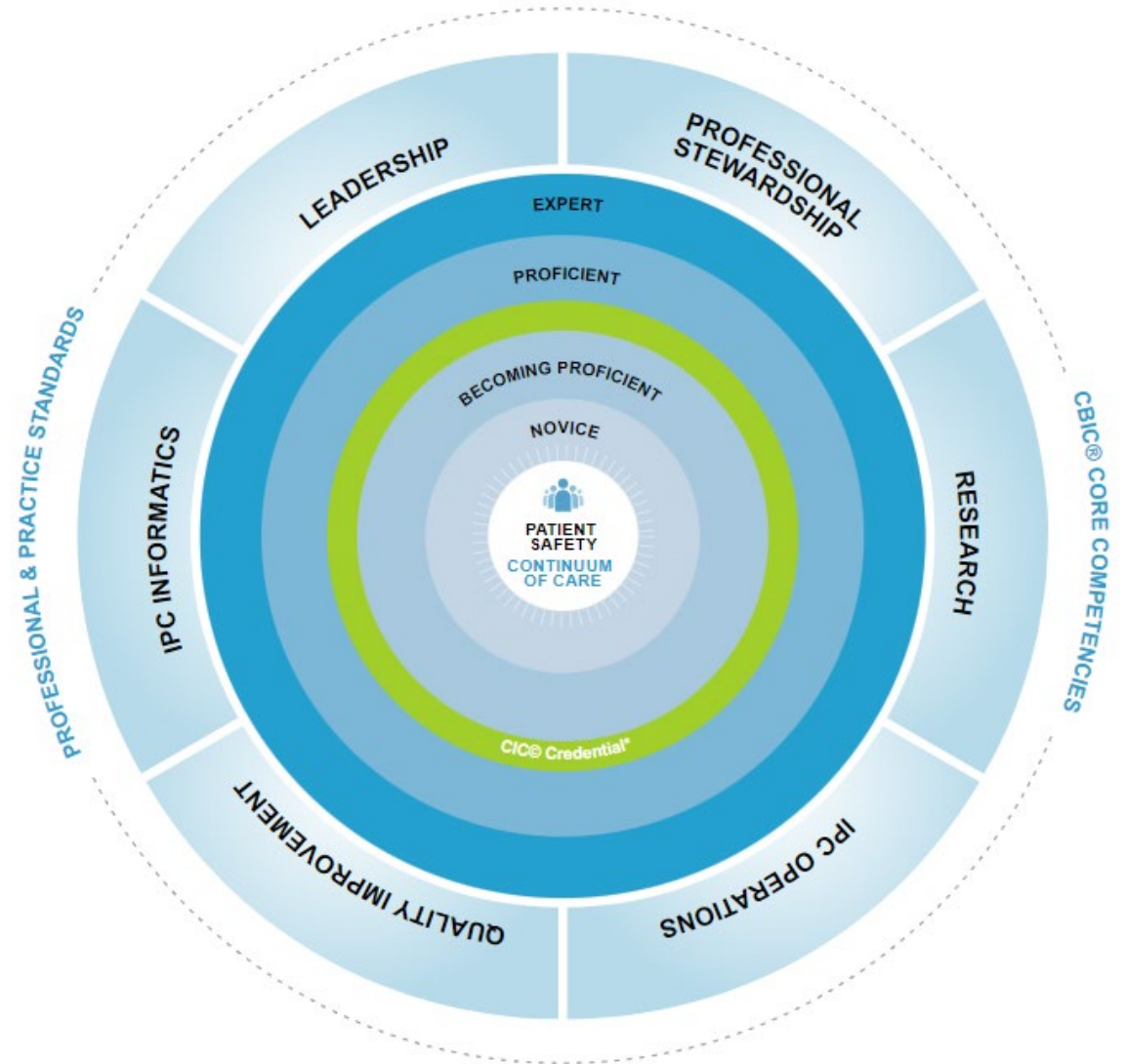
April 6, 2023

Jaime Zapata, CIC, LSSGB Infection Preventionist Specialist

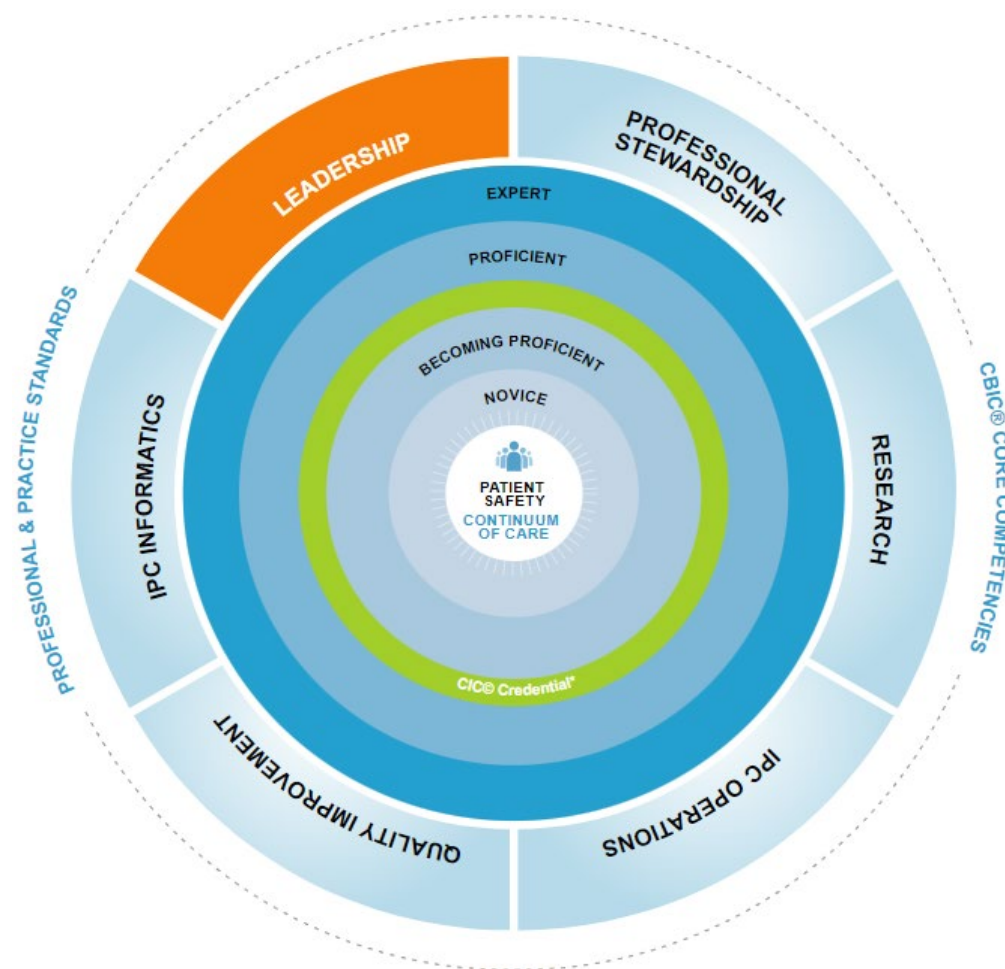


Introduction

- The Infection Prevention Model guides infection prevention and control practices
- Use the model to advance infection prevention practice and professional development
- Connect and apply the model in real life situations

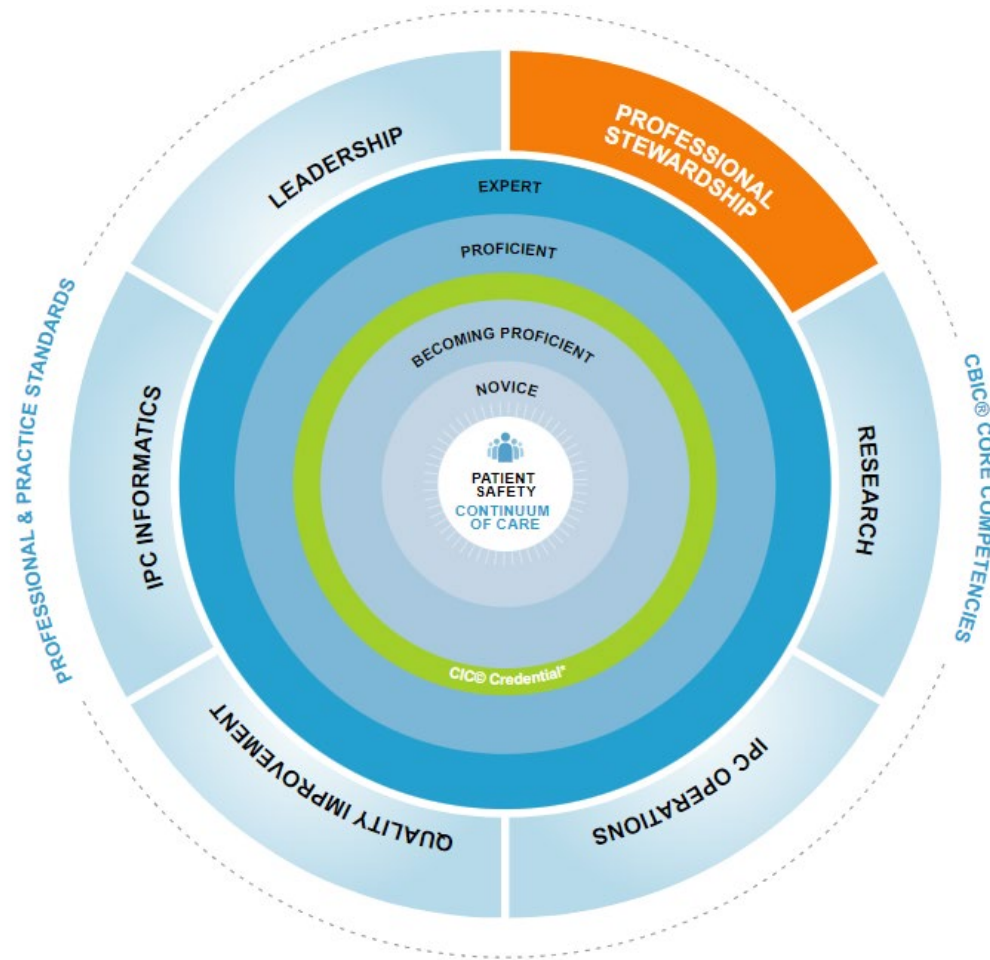


Model Competency Domains: Leadership



- Infection Preventionists (IPs) use leadership skills to establish a clear vision for Infection Prevention and Control (IPC) programs and the continuum of care
- Collaboration with other leaders and colleagues is key to develop and align visions and strategic goals for a successful IPC program
- Skills: communication, critical thinking, collaboration, program management, mentorship

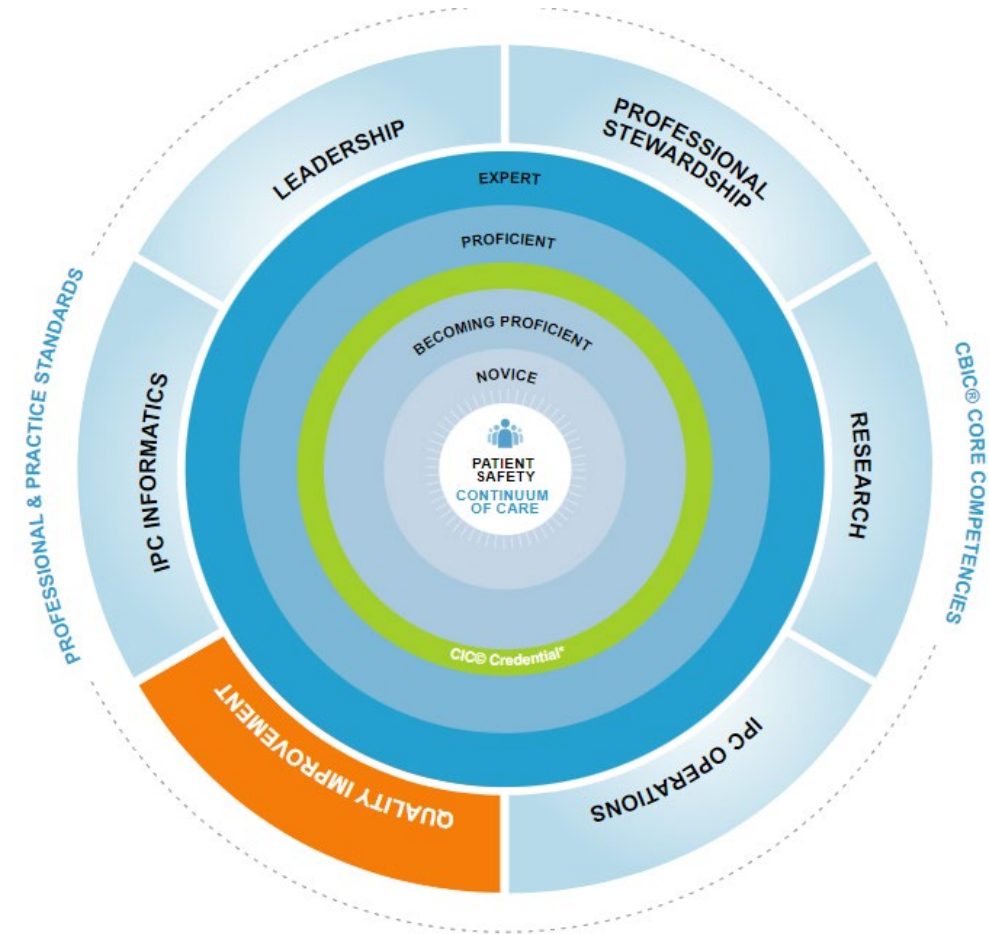
Model Competency Domains: Stewardship



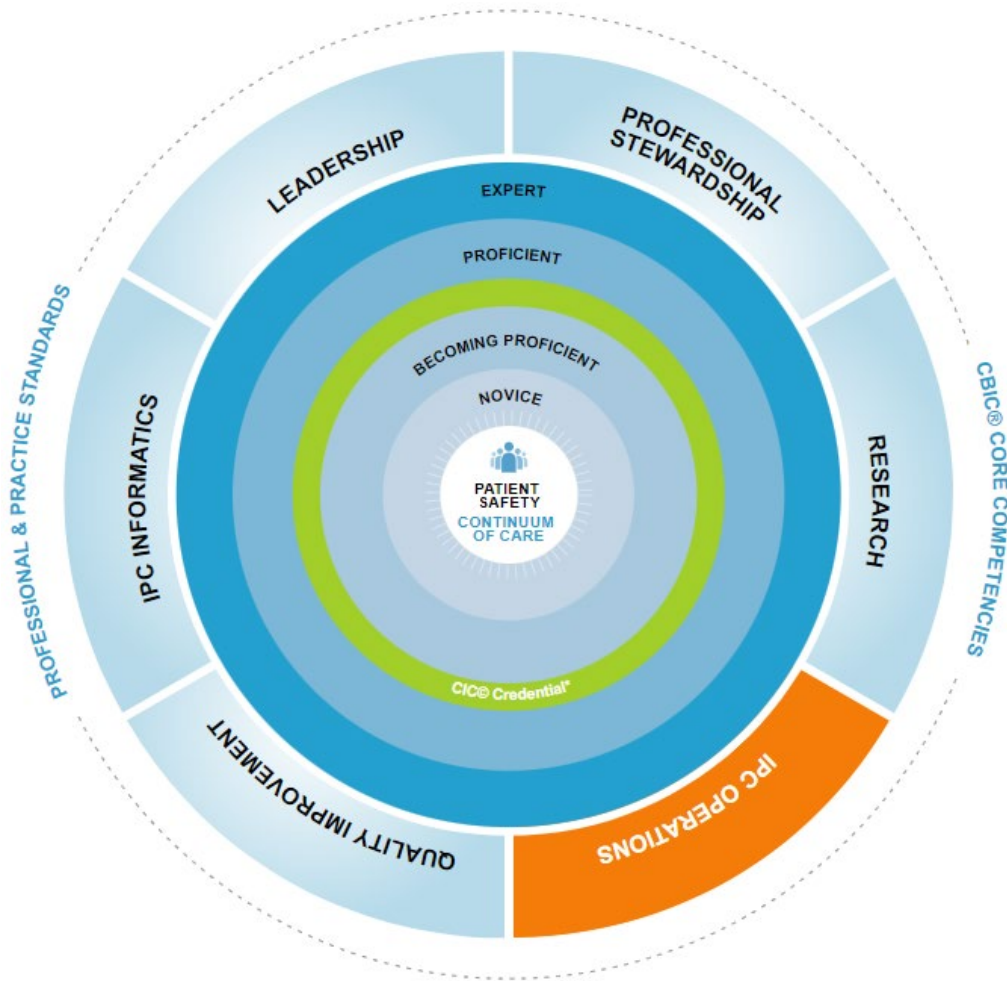
- Dedicated stewards allow infection preventionists to develop, adjust and uphold respectable and reliable reputations
- Infection preventionists must be ready to be held accountable
- Skills: accountability, ethics, continuum of care, advocacy

Model Competency Domains: Quality Improvement

- Quality improvement is a fundamental framework that infection preventionists (IPs) must use to systematically improve care and reduce infections within their health care setting and throughout the continuum of care
- Requires meaningful analysis and use of data, clear understanding of how-to assess risk, apply risk reduction strategies and incorporate performance improvement methodology
- Skills: performance improvement, patient safety, data utilization, risk assessment and risk reduction

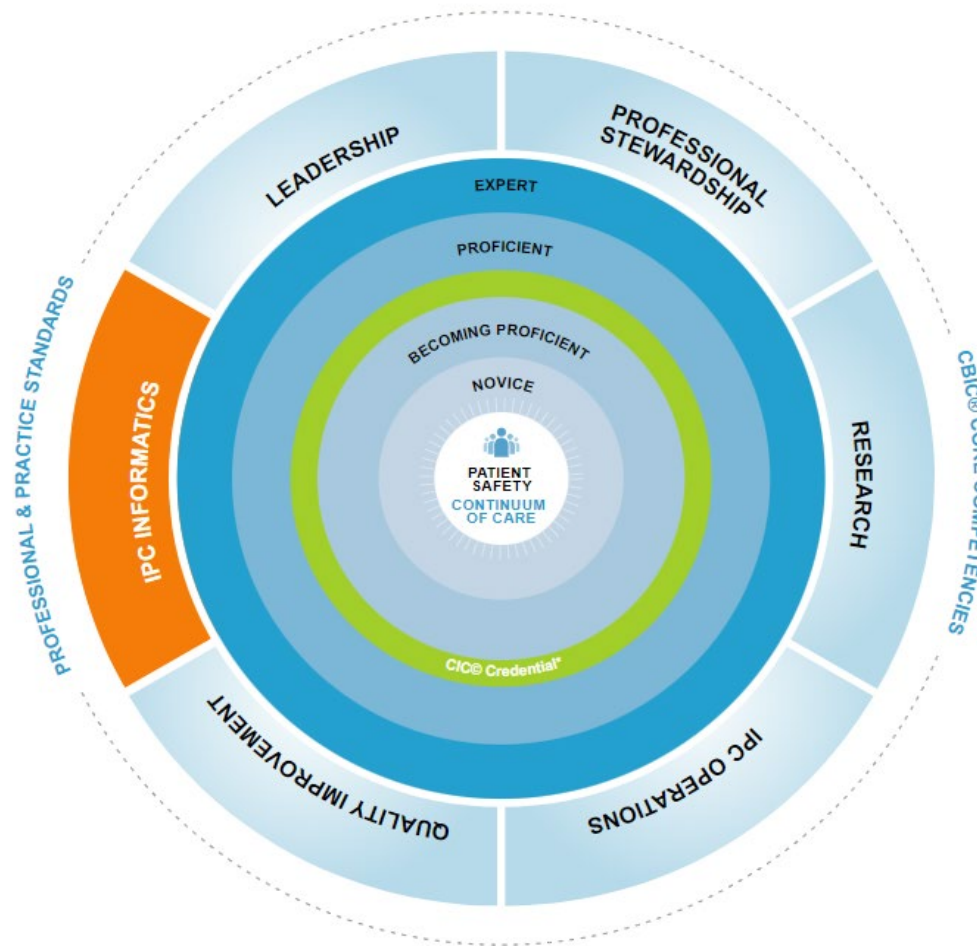


Model Competency Domains: Operations



- This domain highlights specific future-oriented competency content crossing clinical, technical and leadership domains
- Uses proactive and reactive approaches to conduct surveillance, identify infection risks, implement infection interventions and mitigate risks
- Skills: epi surveillance, education, IPC rounding, cleaning, disinfection, outbreak detection, antimicrobial stewardship and diagnostic stewardship

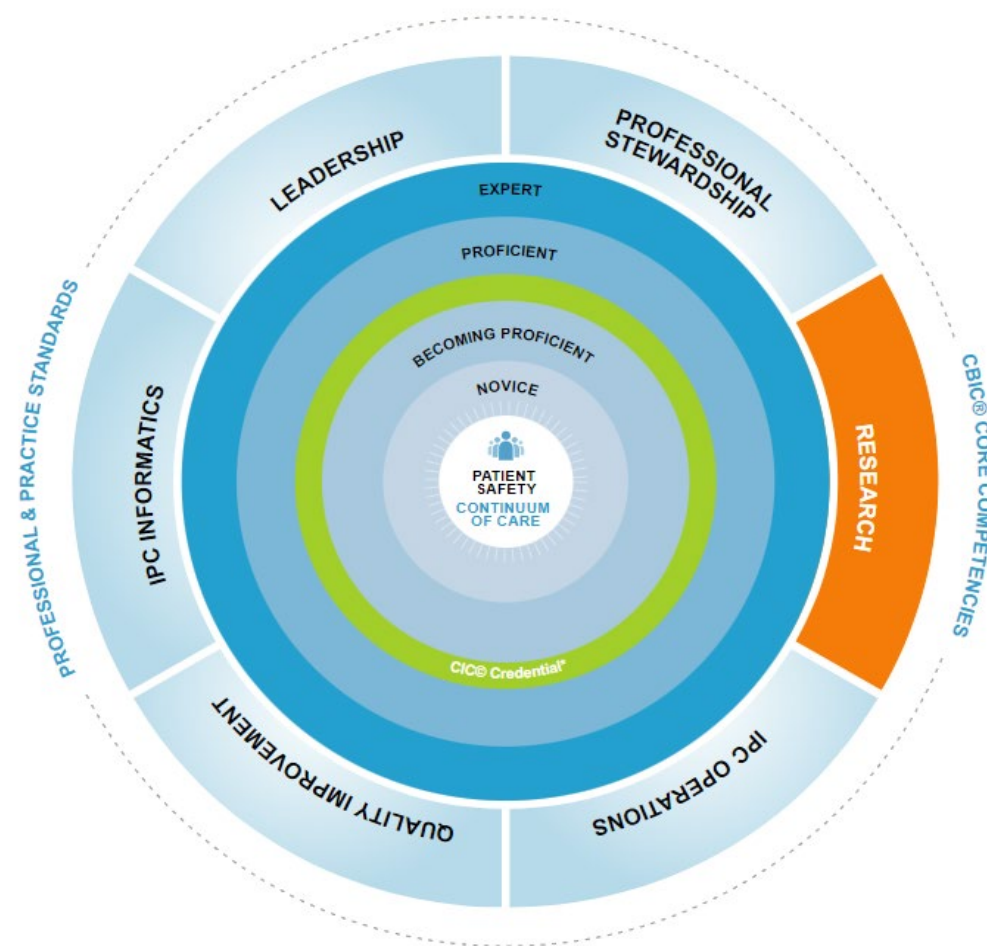
Model Competency Domains: Informatics



- Infection preventionists must keep abreast of and proficient in using and leveraging systems to input, analyze, extract and manage data to support and drive data integrity
- Skills: surveillance technology, electronic medical records, data management, analysis and visualization, application of diagnostic testing data

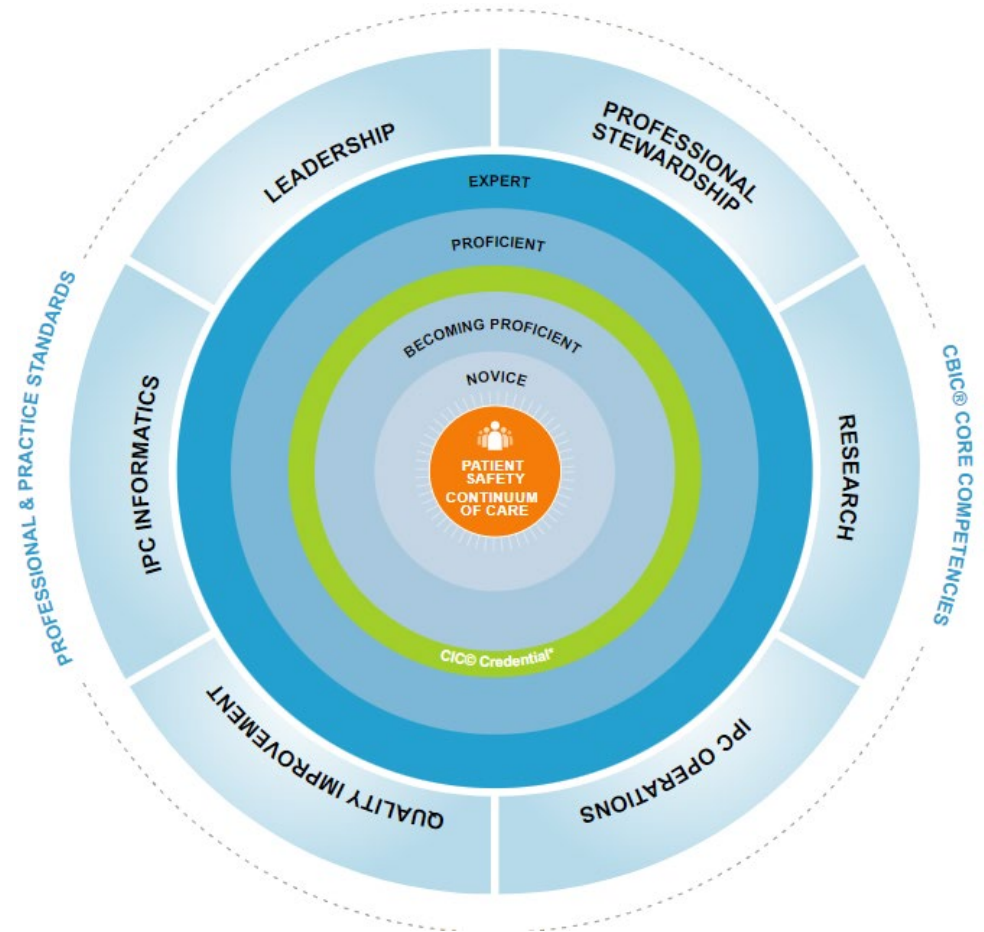
Model Competency Domains: Research

- Essential skill set that supports and advances the IPC field
- This domain highlights the importance of applied research and implementation science
- Synthesize, apply and evaluate information to develop and demonstrate epidemiological expertise
- Skills: evaluation of research, comparative effectiveness, implementation and dissemination, evidence-based practice



Applying APIC's Competency Model

- Clarification of Roles and Responsibilities
- Orientation and Ongoing Competency
- Professional Development



Session 2 – Infection Prevention Model: Leadership

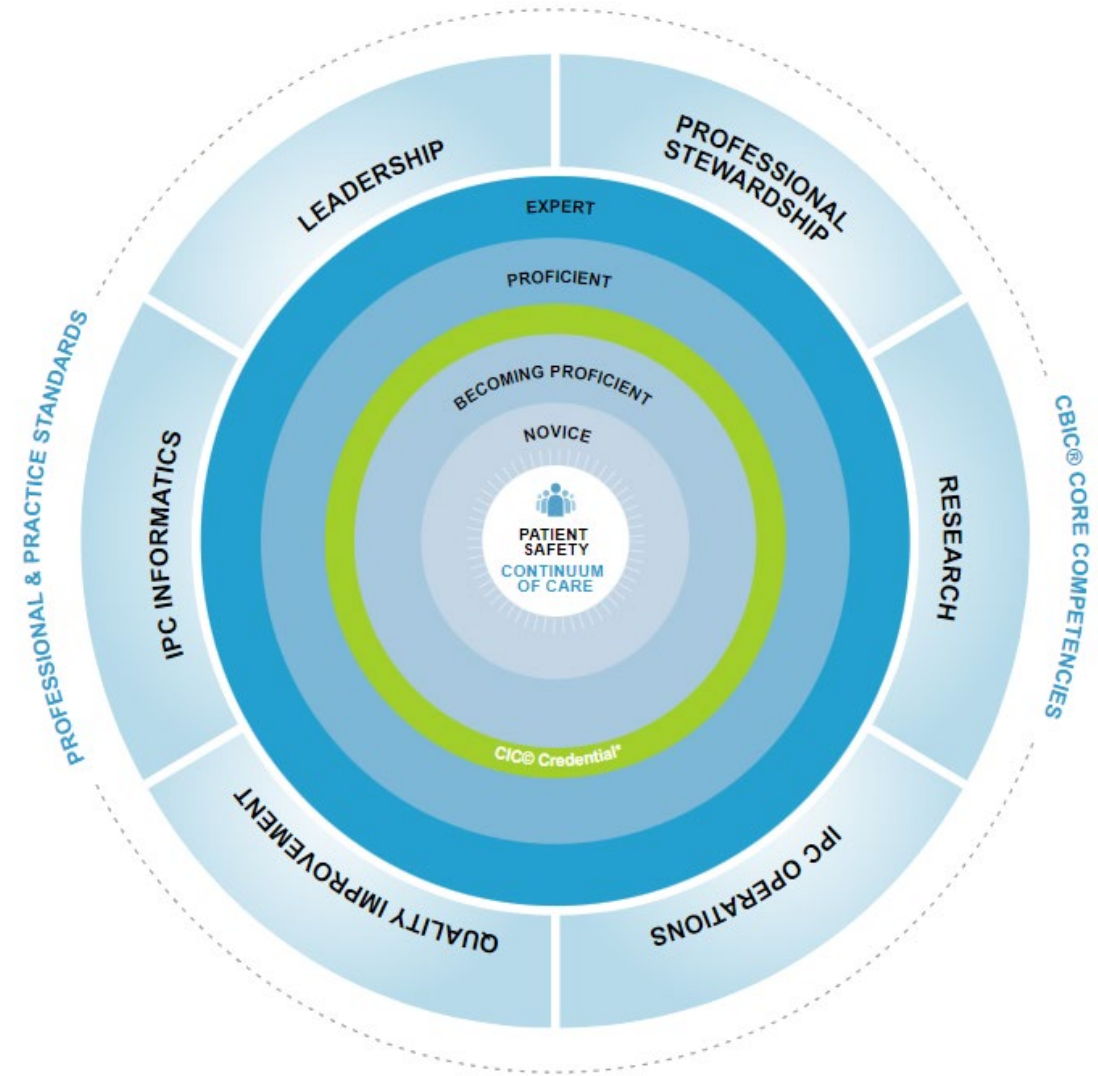
Thursday, April 13, 2023

Jaime Zapata, CIC, LSSGB, Infection Preventionist Specialist

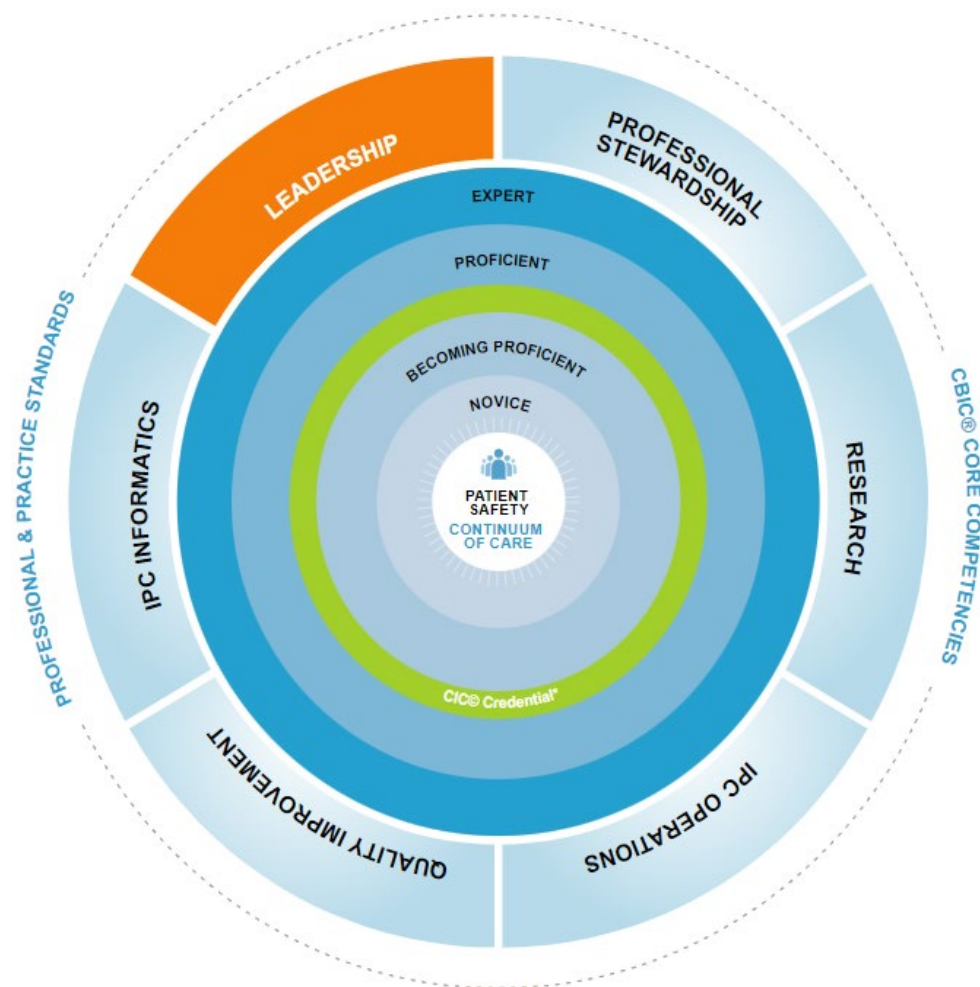


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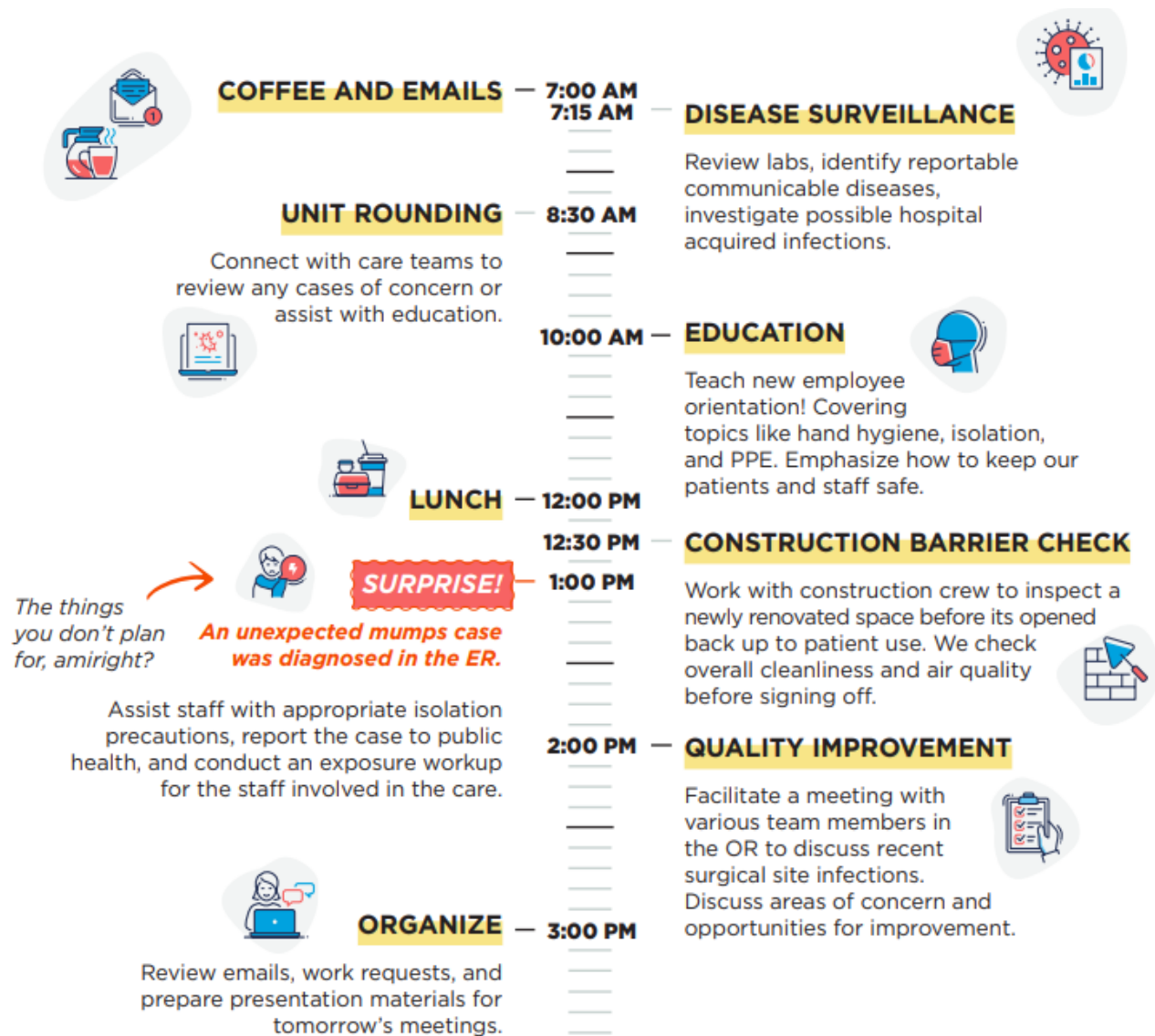


Model Competency Domains: Leadership



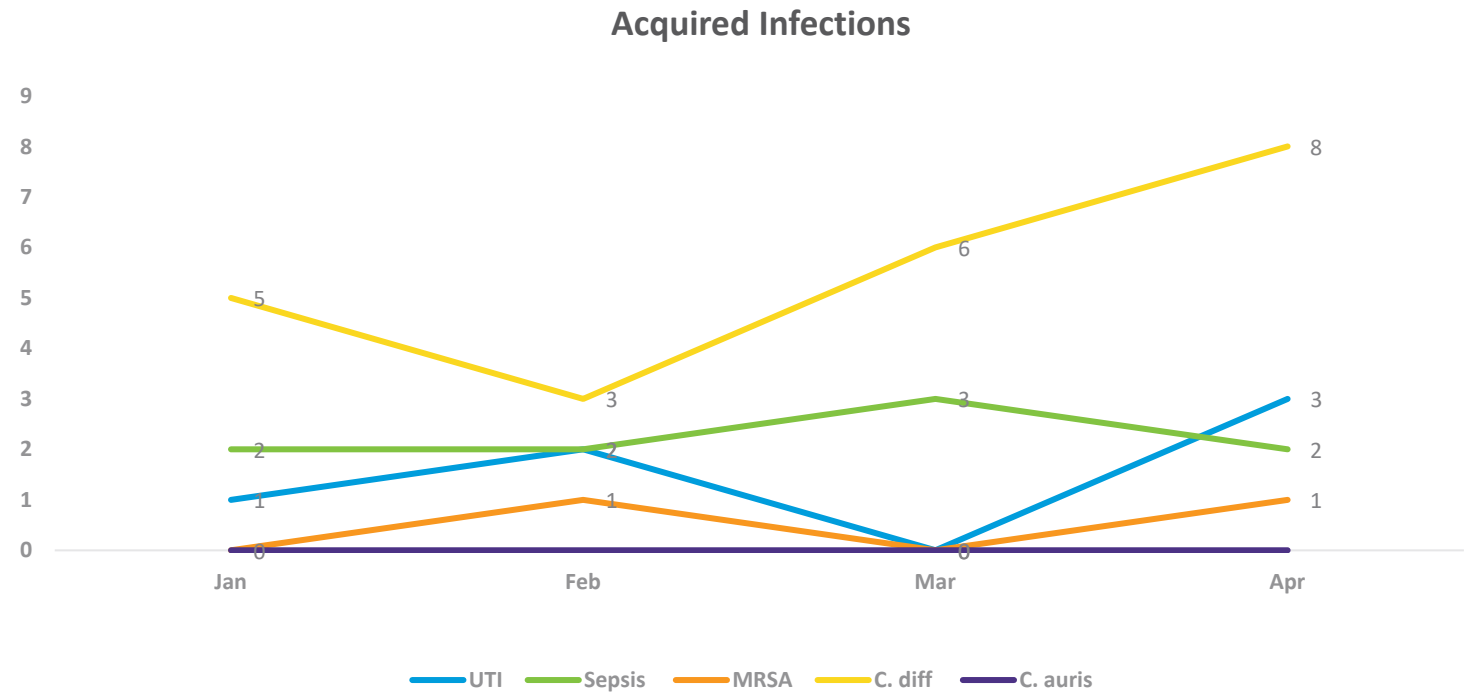
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- Collaboration with other leaders and colleagues is key to develop and align visions and strategic goals for a successful IPC program.
- Skills: communication, critical thinking, collaboration, program management, mentorship.

A Day in the Life of an Infection Preventionist



Model Competency Domain: Leadership

Disease	Q1 2023			Q2 2023			Q3 2023		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
UTI	1	2	0	3					
Sepsis	2	2	3	2					
MRSA	0	1	0	1					
C. diff	5	3	6	8					
C. auris	0	0	0	0					
Total	8	8	9	14					



Model Competency Domains: Leadership (Communication)

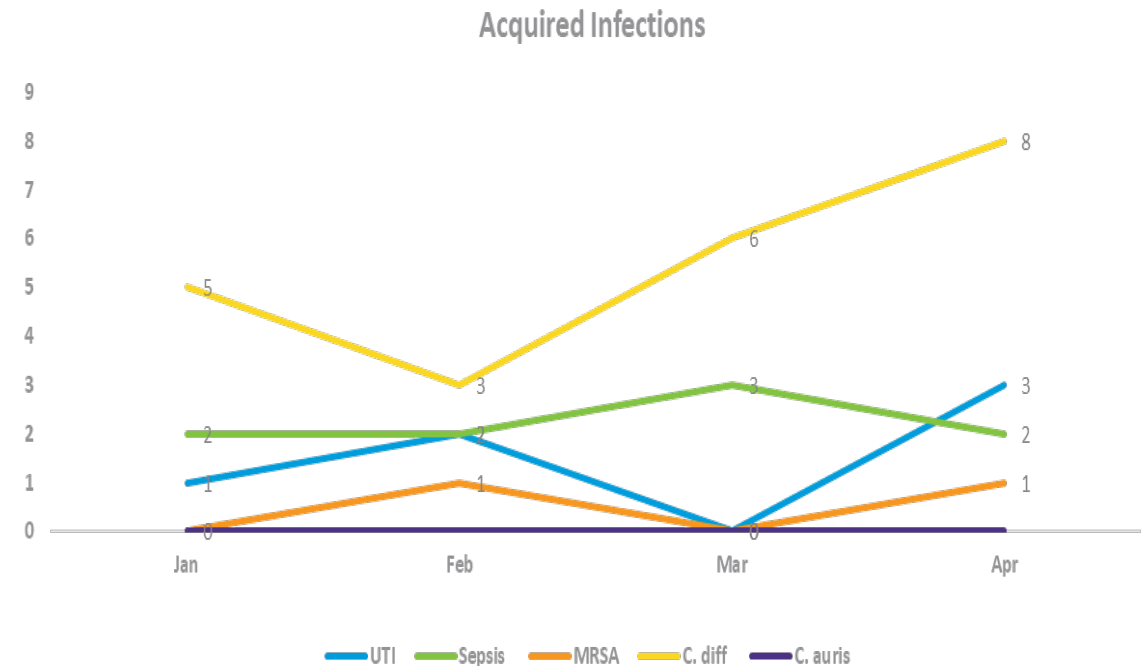
- Effective communication is a critical, increasingly important leadership skill for the infection preventionist (IP).
- Communication involves the *exchange of information* or ideas with individuals and groups, including by using words, *data*, social media tools, listening, body language and behavioral role modeling (performing hand hygiene).
- Effective communication requires *emotional intelligence* and situational awareness:
 - Informational needs
 - Cultural background
 - Knowledge level of the audience, and the real and perceived patient safety risks, using an evidence-based approach to influence others

“IPs should cultivate the art of persuading and influencing others through composed, consistent consensus building based upon accurate data, analysis, and relevant rationale.”

Model Competency Domains: Leadership (Critical Thinking)

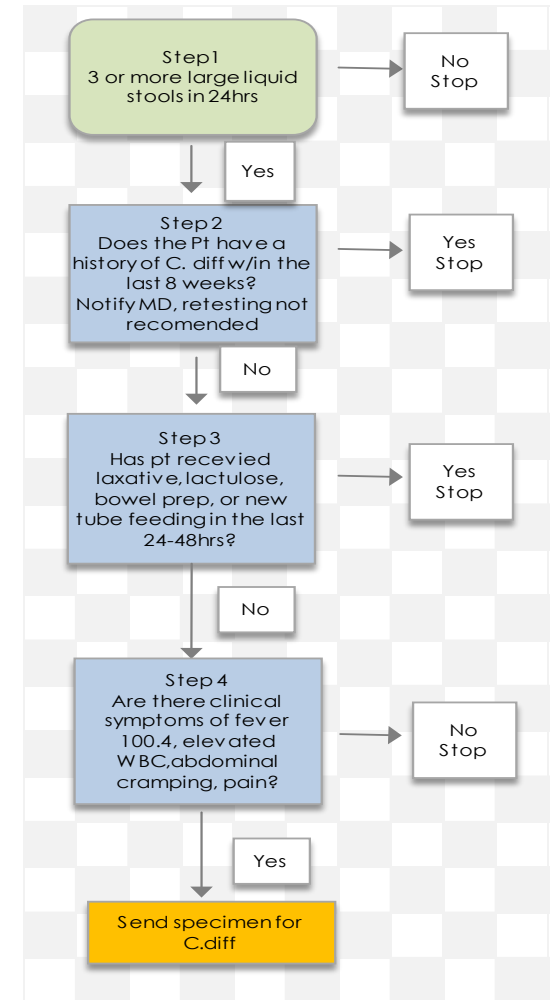
Critical thinking means seeking and using all information at their disposal to examine a problem or situation and finding solutions through creative application of knowledge, experience, data and evidence.

- *Recognizing a problem exists* (a problem can be an outbreak that requires immediate response or a policy that is no longer best practice)
- *Identifying and analyzing options* and potential solutions
- *Making a decision based on the problem*
- *Prioritizing* how to solve multiple problems at once
- *Applying decision to the problem and effectively implementing the solution*
- *Examining* what happened as a result of applying decision to improve results for the next time

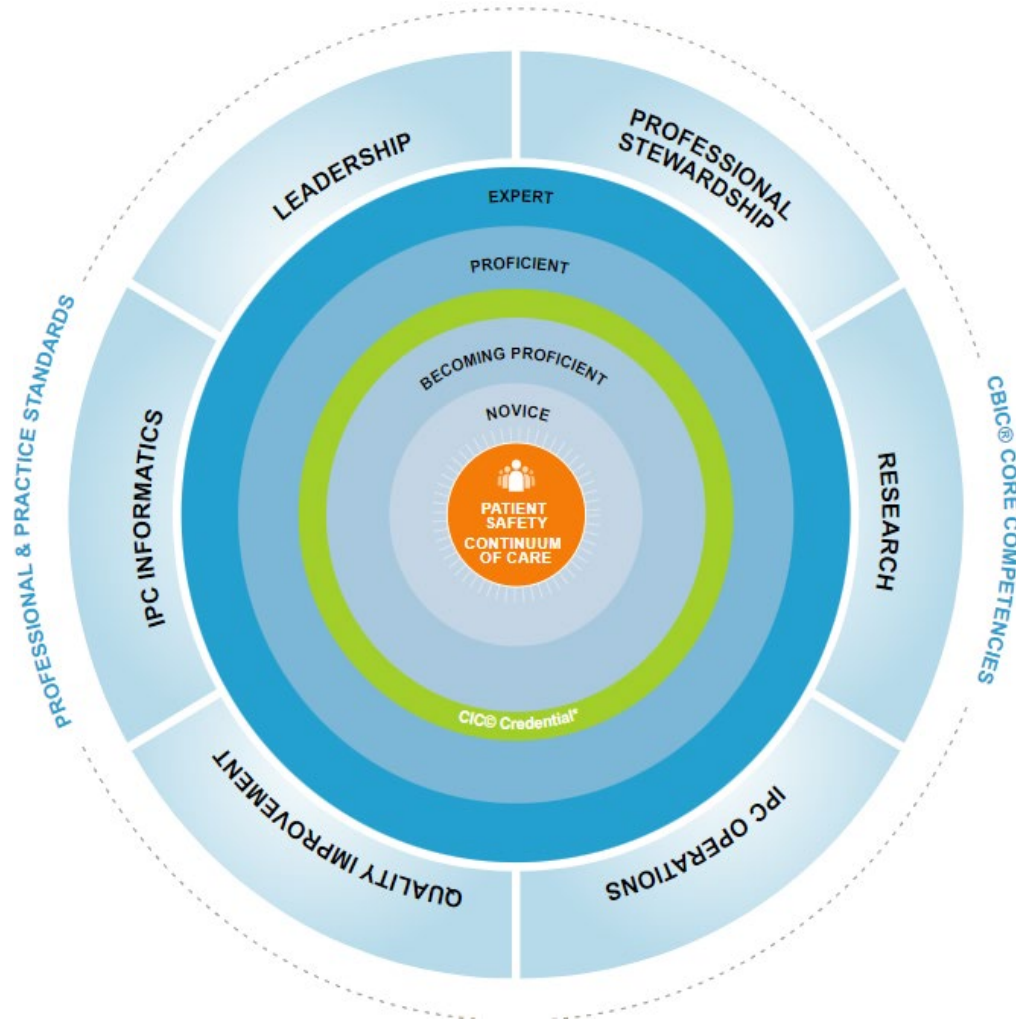


Model Competency Domains: Leadership (Collaboration)

Opportunities for Improvement (OFI)			Accountability					
Area of Focus	Opportunity	Risk	Action to be Completed	Applicable Details	Nursing/ Physician/ Operational Owner	Action Due Date	Status	Progress Measure Validation
Testing	Documentation of loose stooling (frequency)	M	Enhance communication to physicians regarding C. diff ordering/documentation OFIs (Weekly facility acquired infections communication to physicians)	Physicians/ RN	Jaime	3/17/2023	Implementation	C. diff case review, incidence of poor documentation
Testing	CDIFF testing after laxative use	H	Enhance communication to physicians regarding C. diff ordering/documentation OFIs (Weekly facility acquired infections communication to physicians)	Physicians/ RN		3/18/2023	Implementation	C. diff case review, incidence of poor documentation
Testing	Compliance to order set use	H	Consider C. diff order set "cheat sheet" posted on PC or on PC desktop home screen	Physicians/ RN/CNAs	Kate, Turgut	6/1/2023	Planning	Facility Acquired C. diff case review, compliance to order set use
Isolation/ Testing	Compliance to best practices in transmission-based precautions and testing	H	IP audits focusing on isolation/transmission-based precautions/CDIFF testing	Infection Preventionist	Jaime, Wendy	5/1/2032	Implementation	Audits, C. diff drilldown review



Applying APIC's Competency Model



- Clarification of roles and responsibilities
- Orientation and ongoing competency
- Professional development

Session 3 – Infection Prevention Model: Professional Stewardship

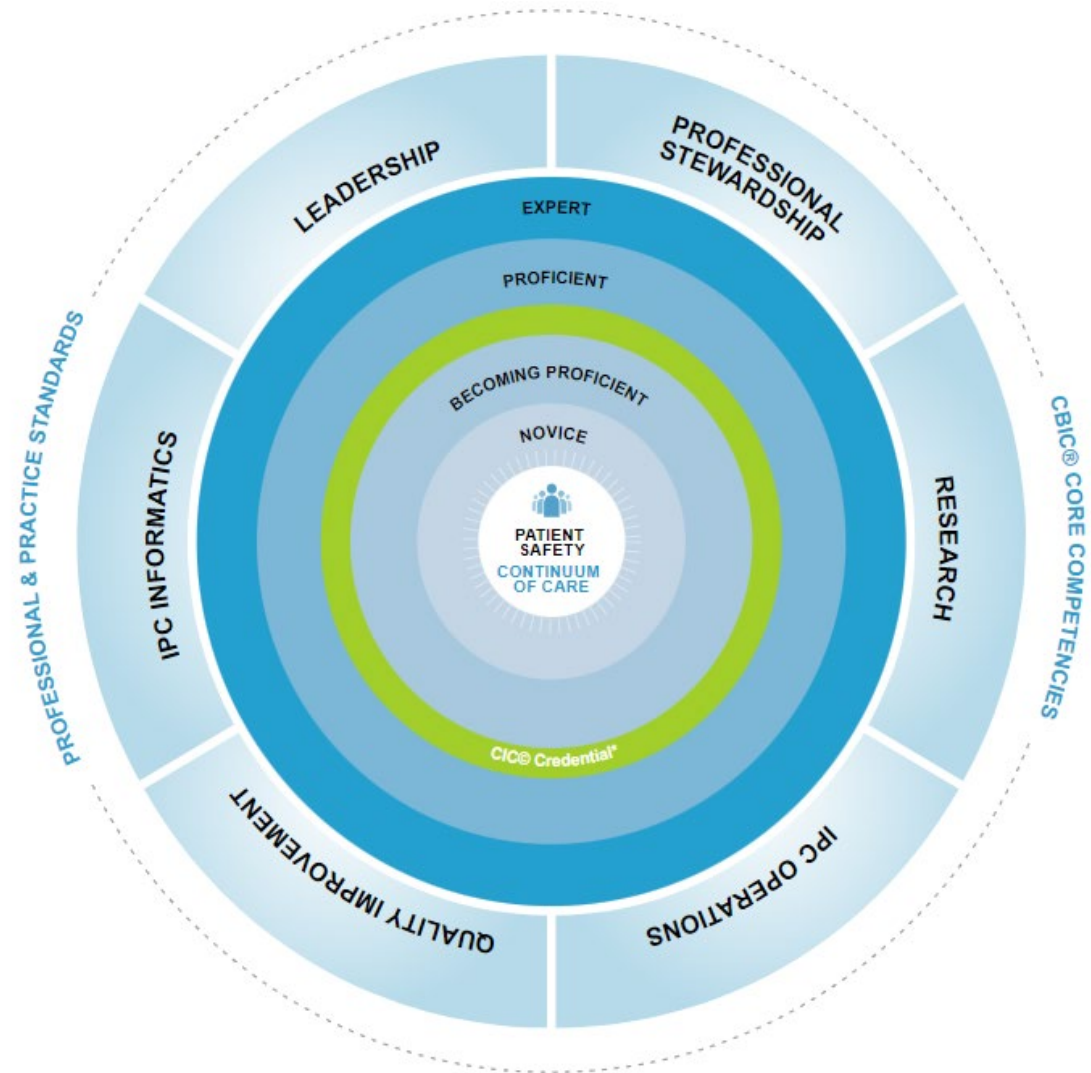
Thursday, April 20, 2023

Jaime Zapata, CIC, LSSGB, Infection Preventionist Specialist

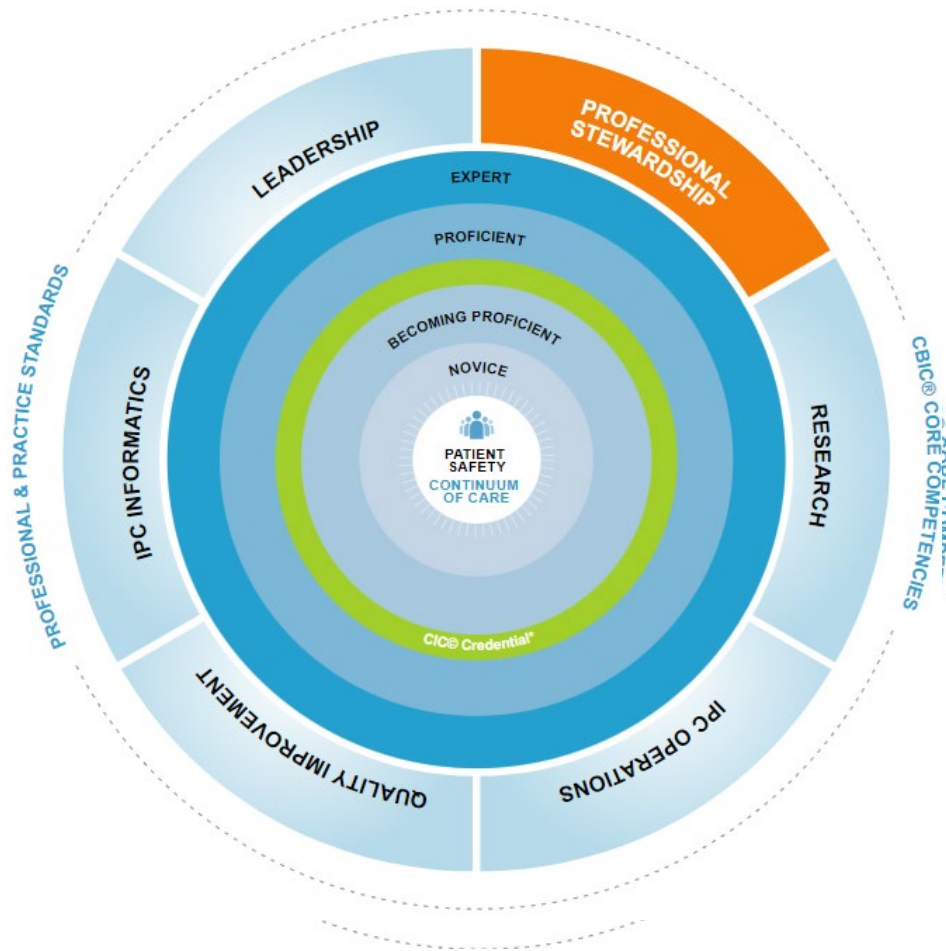


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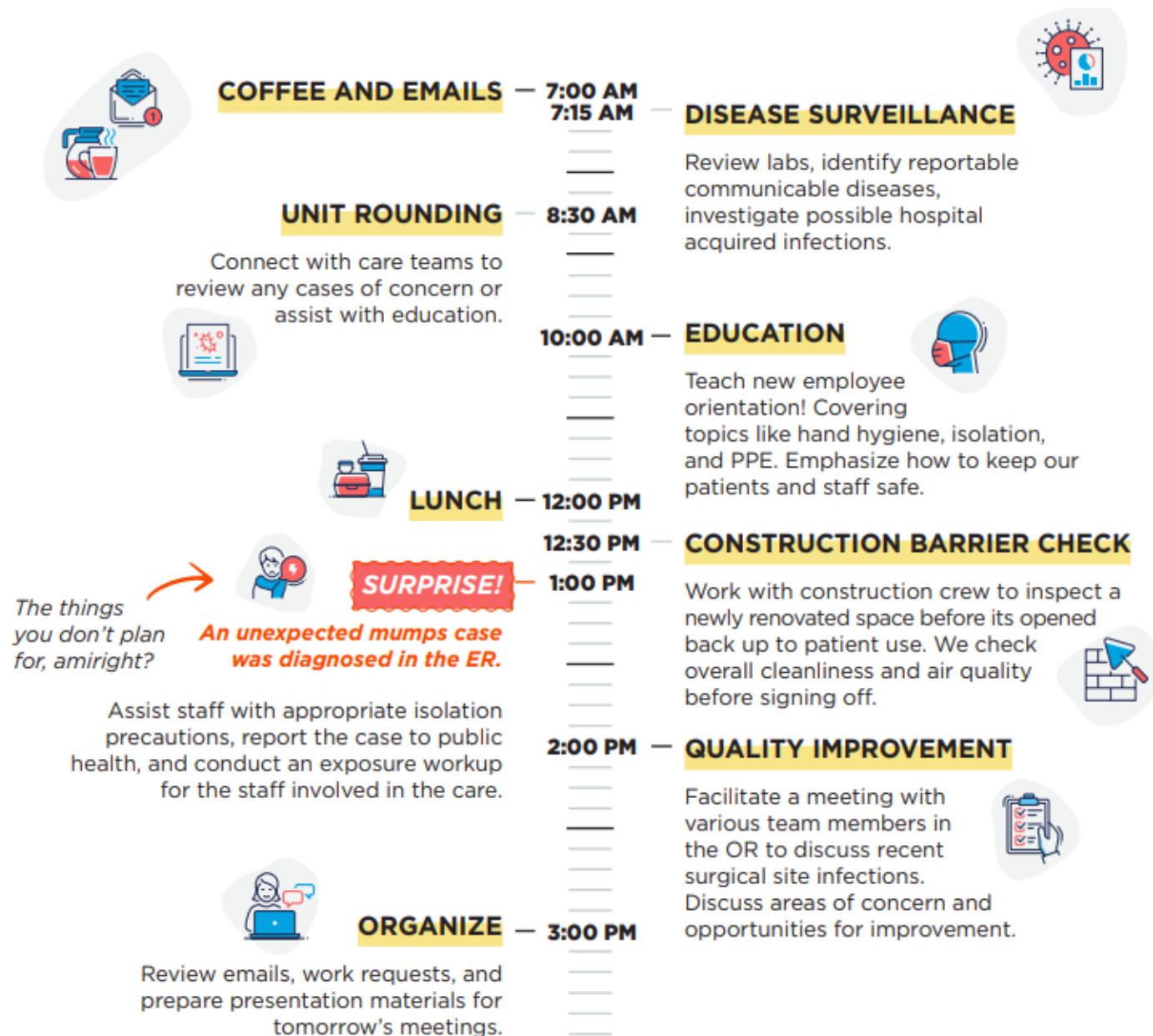


Model Competency Domains: Professional Stewardship



- Professional stewardship allows Infection Preventionists to develop, adjust and uphold a respectable and reliable reputation.
- Infection Preventionists must be willing and ready to be held accountable.
- Skills:
 - Accountability and Ethics
 - Continuum of Care and Advocacy

A Day in the Life of an Infection Preventionist

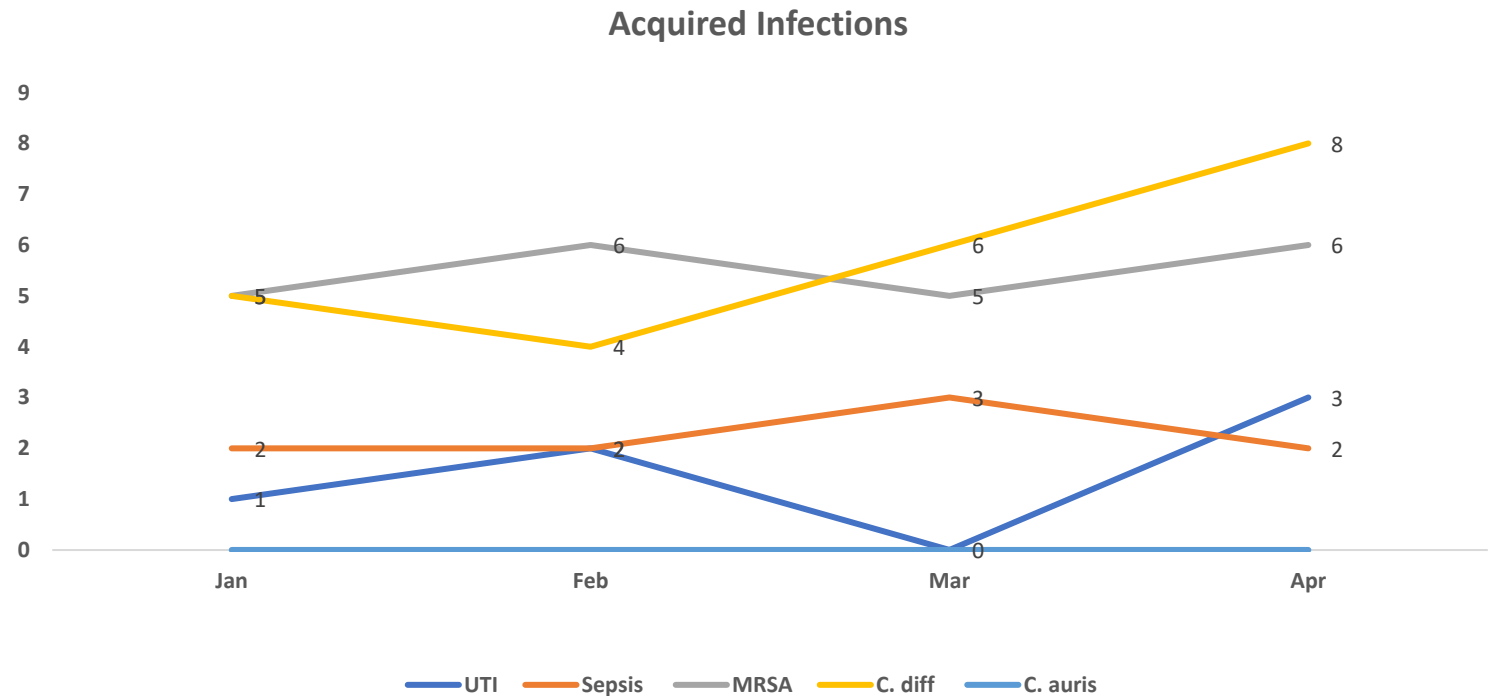


Model Competency Domains: Stewardship (Accountability and Ethics)

- Infection Preventionists (IPs) must be able to work effectively to ensure that *accountability measures* are in place for the performance of evidence-based practices impacting quality metrics that prevent harm.
- IPs must have skills in *communication, education, relationship-building, behavior change and facilitation* to ensure compliance is established and that all healthcare workers are educated in preventing and controlling infections.
- Maintaining confidentiality of sensitive information
- Investigating claims of employee violations
- Encouraging staff to take responsibility for those actions
- Implementing and sustaining new guidelines and procedures
- Providing information to educate staff
- Emphasizing performance expectations
- Revising and communicating expectations and methods for achieving IPC goals and results

Model Competency Domain: Stewardship (Accountability and Ethics)

Disease	Q12023			Q22023			Q32023		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
UTI	1	2	0	3					
Sepsis	2	2	3	2					
MRSA	5	6	5	6					
C. diff	5	4	6	8					
C. auris	0	0	0	0					
Total	13	14	14	19					



Case Scenario: Stewardship (Accountability and Ethics)

- The Infection Preventionist is seeing that the numbers of certain acquired infections have been creeping upward in the nursing home.
- In getting to the root cause of a recent increase in MRSA and *C. diff* infection events, you have discovered that the clinician who was changing a wound dressing at the bedside (resident with MRSA in the wound and diarrhea) touched the bed rail, linens, pillows and night table with gloves on.
- Upon exiting, the clinician took the gloves off and was not observed performing hand hygiene; put a new set of gloves and went to do the next dressing change on another resident.

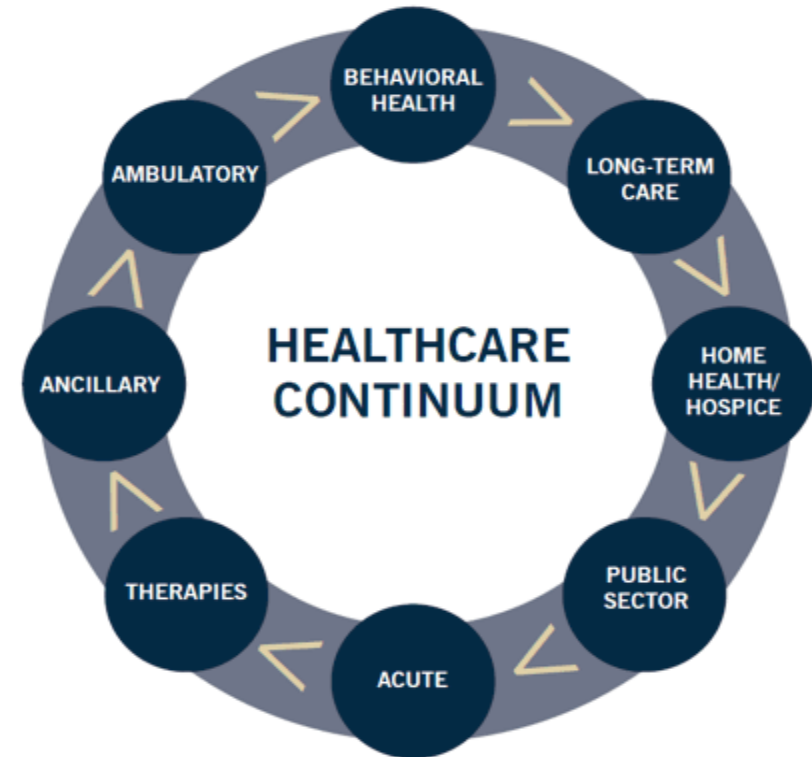
Model Competency Domain: Stewardship (Accountability and Ethics)

“Constant vigilance, ongoing awareness and learning to provide a framework when deciding the best course of action.”

- Daily review of MRSA and *C. diff* cases with managers
- Rounding with CNAs to review best practices and isolation signs
- EVS partnership to ensure appropriate cleaning
- Review of antibiotic use by pharmacy to ensure the appropriate drug is given at the right time and dose
- Use of MRSA and *C. diff* algorithm
- Point of care education

Model Competency Domain: Stewardship (Continuum of Care and Advocacy)

- It is critical that IPs develop collaborative relationships with IPs in other settings.
- IPs must consider IPC processes and products used in each practice setting and remain cognizant of the impact these may have on the patient, family and healthcare staff as the patient moves from one setting to another.
- IPs must work to facilitate communication between facilities and may be called upon to develop plans for safe transfer and provision of care within other practice settings.

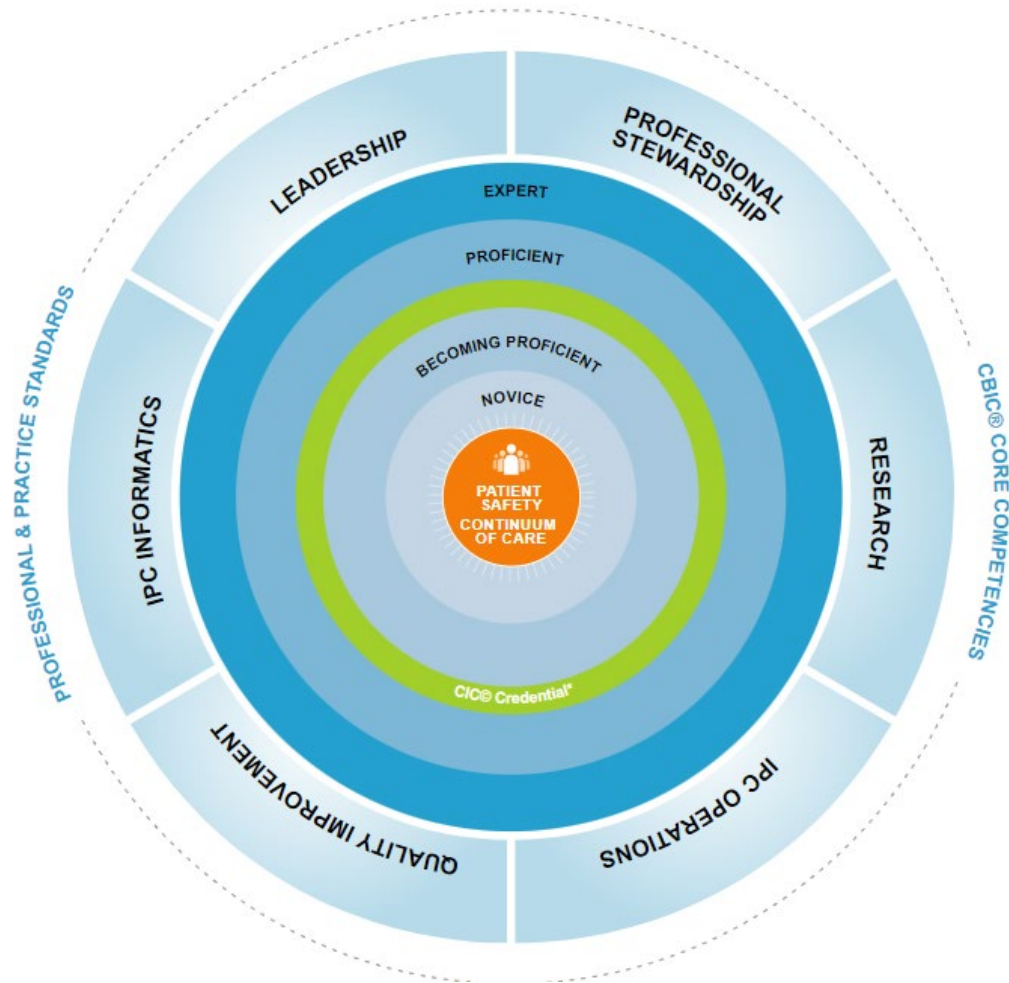


Model Competency Domain: Stewardship (Continuum of Care and Advocacy)

- IPs need to keep abreast of the political and regulatory healthcare landscape and understand its impact.
- Advocate for the role that IPs play across the continuum of care, especially as it impacts practice at the regional, state and local levels.
- Inform and educate policymakers and regulatory agencies on evidence-based IPC practices that protect patients, staff and specific populations from infection.
- IPs need to use their position and influence to advocate for the desired future as well as realistic, incremental changes that meet the needs of patients, visitors, staff and the IPC program itself.



Applying APIC's Competency Model



- Clarification of roles and responsibilities
- Orientation and ongoing competency
- Professional development

Session 4 – Infection Prevention Model: Quality Improvement

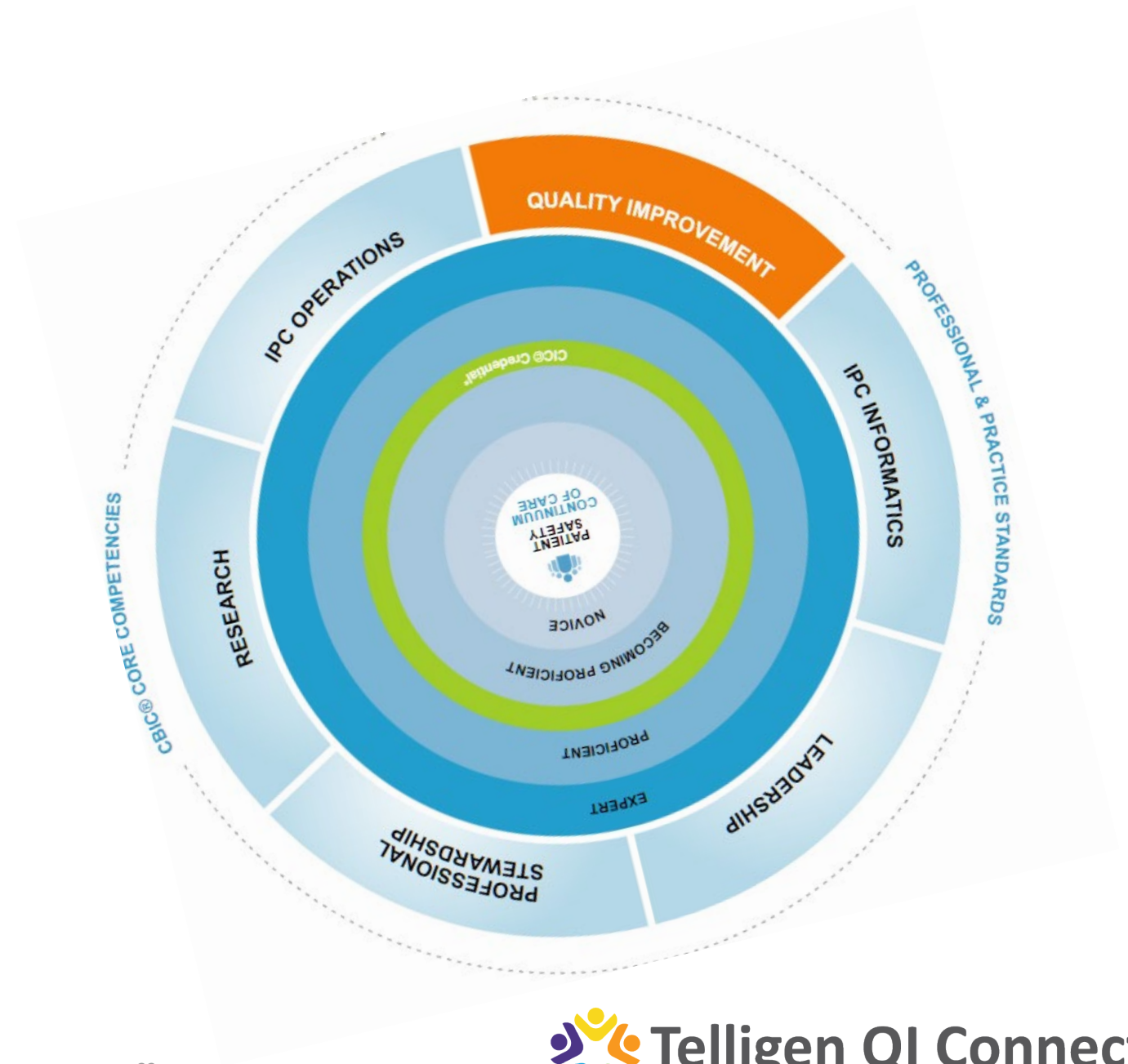
Thursday, April 27, 2023

Jaime Zapata, CIC, LSSGB, Infection Preventionist Specialist

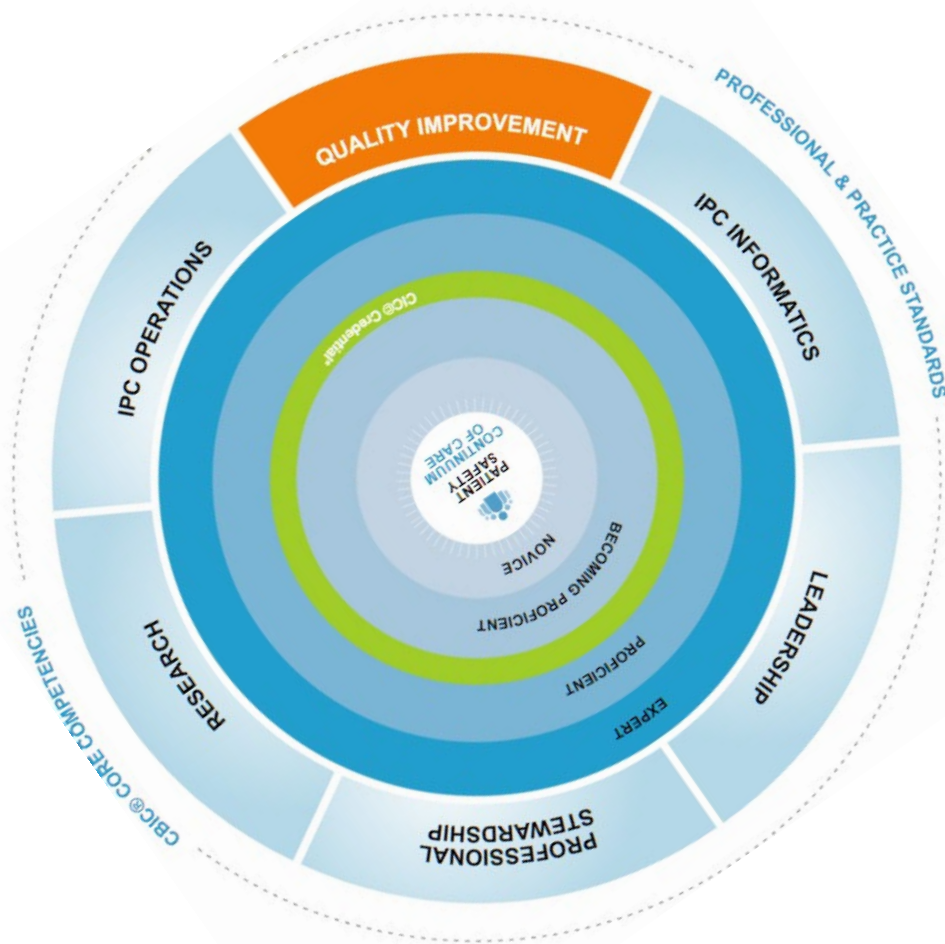


Introduction

- Quality improvement is a fundamental framework that IPs must use to systematically improve care and reduce infections within their healthcare setting and throughout the continuum of care.
- Quality improvement requires meaningful analysis and use of data; a clear comprehension of how to assess risk, apply risk reduction strategies and incorporate performance improvement methodology; and the ability to maintain a focus on patient safety.



Model Competency Domains: Quality Improvement



- The quality improvement subdomains will allow IPs to implement stable processes, reduce variation and improve outcomes to establish a culture of safe and quality of care:
 - Risk Assessment and Risk Reduction
 - Data Utilization
 - Patient Safety
 - Performance Improvement

Model Competency Domains: Quality Improvement/Risk Assessment and Risk Reduction

- Infection Prevention Risk Assessment is performed to identify, quantify and prioritize risk within the facility
- The function of the Infection Prevention Risk Assessment is to inform decision makers and support risk response by identifying relevant threats, vulnerability, impact and likelihood harm can occur
- Infection Prevention Risk Assessments are performed on an annual rotating basis
- The purpose is to eliminate operational risks and improve overall safety of the workplace

FACILITY NAME HERE												
2023 Infection Prevention and Control Risk Assessment												
Potential Risks	Probability	Risk / Impact					Preparedness with Current Systems / Processes					Relative Risk*
	4 = Expected	Possibility of death or permanent injury	Temporary Physical losses and damages	Prolonged Length of Stay	Moderate Clinical / Financial	Minimal Clinical / Financial	NONE	POOR	FAIR	GOOD	EXCELLENT	
	3 = Likely						No Process /	Processes in	Processes in	Processes in	Processes in	
	2 = Maybe						No Policy in	Place, but Need	Place and May	Place and May	Processes in	
	1 = Rare						Place / No	Improvement /	Need Update /	Need Review /	Place and	
	0 = Not Likely to Occur						Training	Uncertain Level	Some Training	Most Trained	Working / All	
	Conducted	of Training	Done		Trained							
INFECTION												
MULTI-DRUG RESISTANT ORGANISMS												
PREVENTION												
ENVIRONMENT												
EMPLOYEE HEALTH												
SARS CoV-2/COVID-19											0%	

Model Competency Domains: Quality Improvement/Risk Assessment and Risk Reduction

FACILITY NAME HERE												
2023 Infection Prevention and Control Risk Assessment												
Potential Risks	Probability	Risk / Impact					Preparedness with Current Systems / Processes					Relative Risk*
	4 = Expected 3 = Likely 2 = Maybe 1 = Rare 0 = Not Likely to Occur	Possibility of death or permanent injury	Temporary Physical losses and damages	Prolonged Length of Stay	Moderate Clinical / Financial	Minimal Clinical / Financial	NONE No Process / No Policy in Place / No Training Conducted	POOR Processes in Place, but Need Improvement / Uncertain Level of Training	FAIR Processes in Place and May Need Update / Some Training Done	GOOD Processes in Place and May Need Review / Most Trained	EXCELLENT Processes in Place and Working / All Trained	
	5	4	3	2	1	5	4	3	2	1	0 - 100%	
ENVIRONMENT												
Inadequate Cleaning / Disinfection - Patient Care areas												0%
Lack of proper segregation of clean and dirty equipment / supplies												0%
Lack / Delay in completion of ICRA prior to construction / renovation / repair activities	4	0	4	0	2	0	0	4	0	0	0	100%
Lack of compliance with ICRA mitigation requirements for construction / renovation / repair	4	0	4	0	2	0	0	5	0	0	0	110%
Lack of corrective action completion on environmental surveillance rounds findings	3	5			2			4				83%
Improper Handling of Biohazard Waste	0					0					0	0%
Improper Storage of Supplies / Equipment	3		4					4				60%

Model Competency Domains: Quality Improvement/Data Utilization

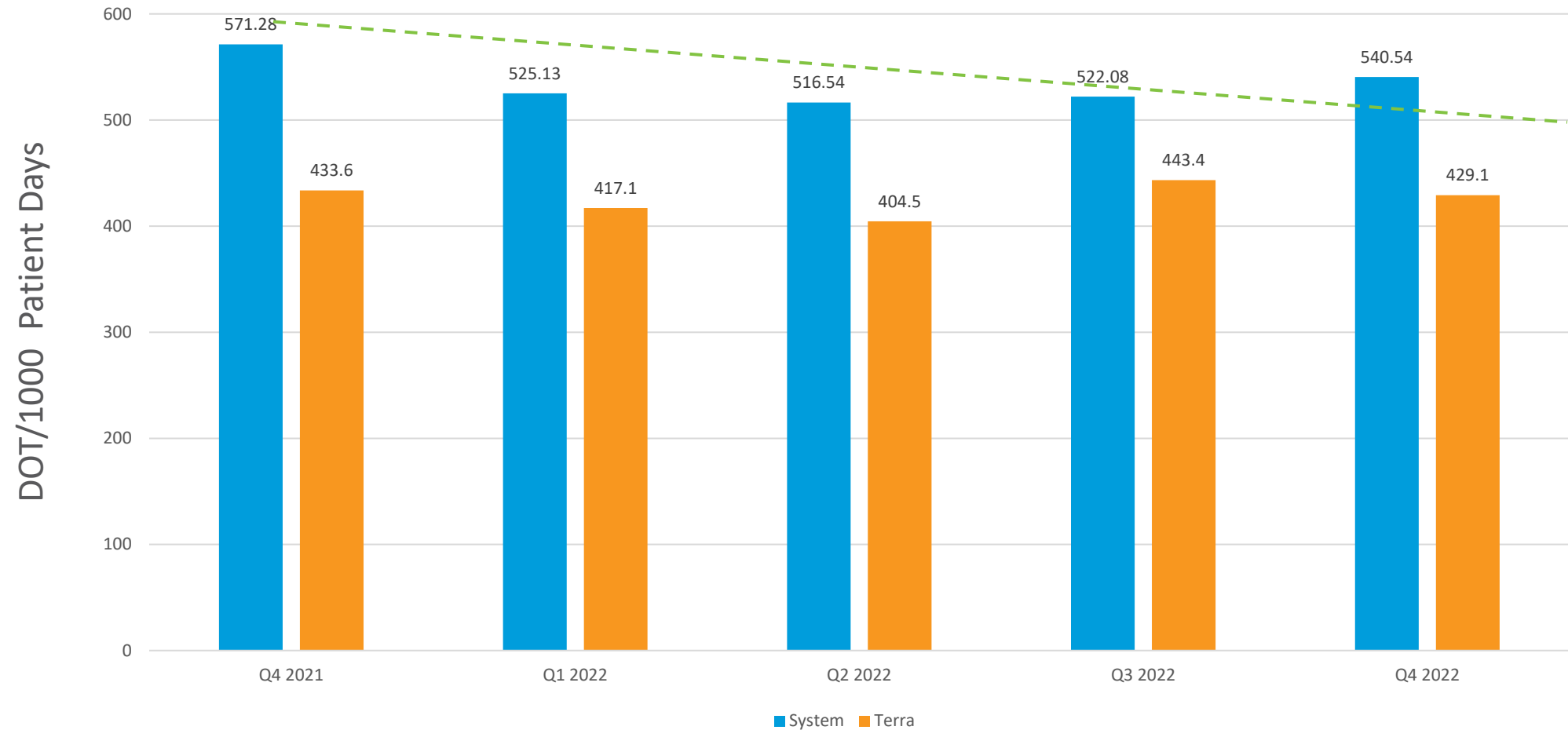
The purpose of data utilization is to aid in:

- Decision-making and goal setting
- Developing annual IPC plans
- Determining priority improvement opportunities
- Seeking collaboration with front-line staff
- Presenting information to leadership

What skills does the IP need to have to successfully use data?

- Select appropriate indicators to measure
- Determine types and source of data
- Perform statistical analysis
- Analyze and interpret the results so they can be applied to future actions
- Discuss results and provide visualization of the results to interested parties

Days of Therapy (DOT) for All Antimicrobial



Model Competency Domains: Quality Improvement/Data Utilization

Indicator

- Reduce adverse events associated with antibiotic use, improvement in rates of antibiotic susceptibilities to targeted antibiotics, and optimization of resource utilization across the continuum of care.

Rationale

- Increased antibiotic DOT can lead to increased adverse events and antibiotic resistance.

Data source

- Day of therapy (DOT) per 1000 patient days
- Theradoc, Buggy, EPIC

Analysis/Discussion/Actions

- Optimization of antibiotic time out
- Assess antimicrobial time out
- Develop an antimicrobial empiric use guidelines
- Analysis of appropriate selection of antimicrobial indication and restriction
- Assess appropriateness of antibiotic selection and duration

Model Competency Domain: Quality Improvement/Patient Safety

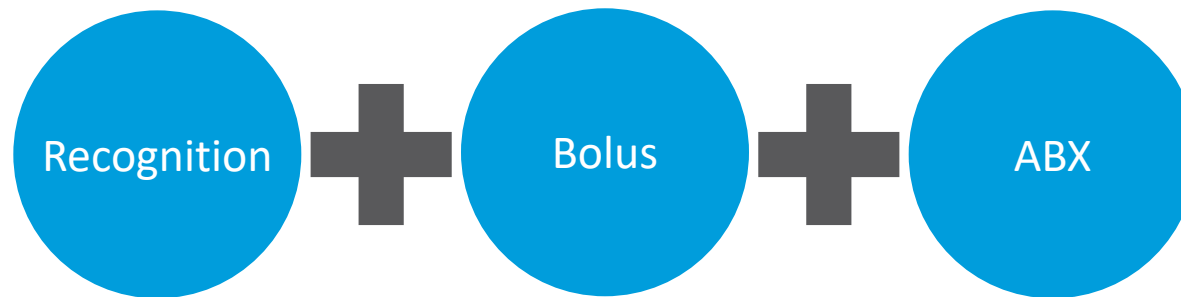
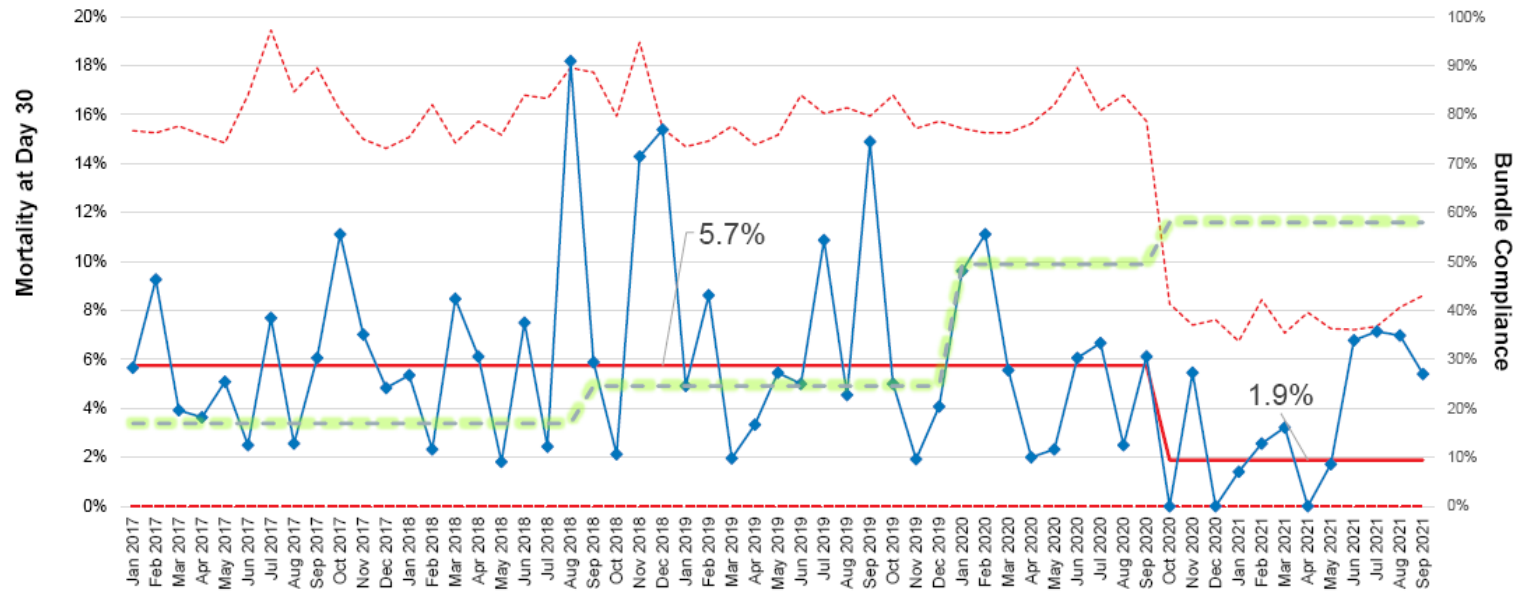
IPs must be actively involved in the facility's overall patient safety program (participation on a patient safety committee, leading teams to reduce facility acquired infections).

- Preoccupation with failure
- Sensitivity to operations
- Reluctance to simplify
- Commitment to resilience
- Deference to expertise

“IPs must remain highly competent in predicting possible failures in the process and practices and act to prevent them.”

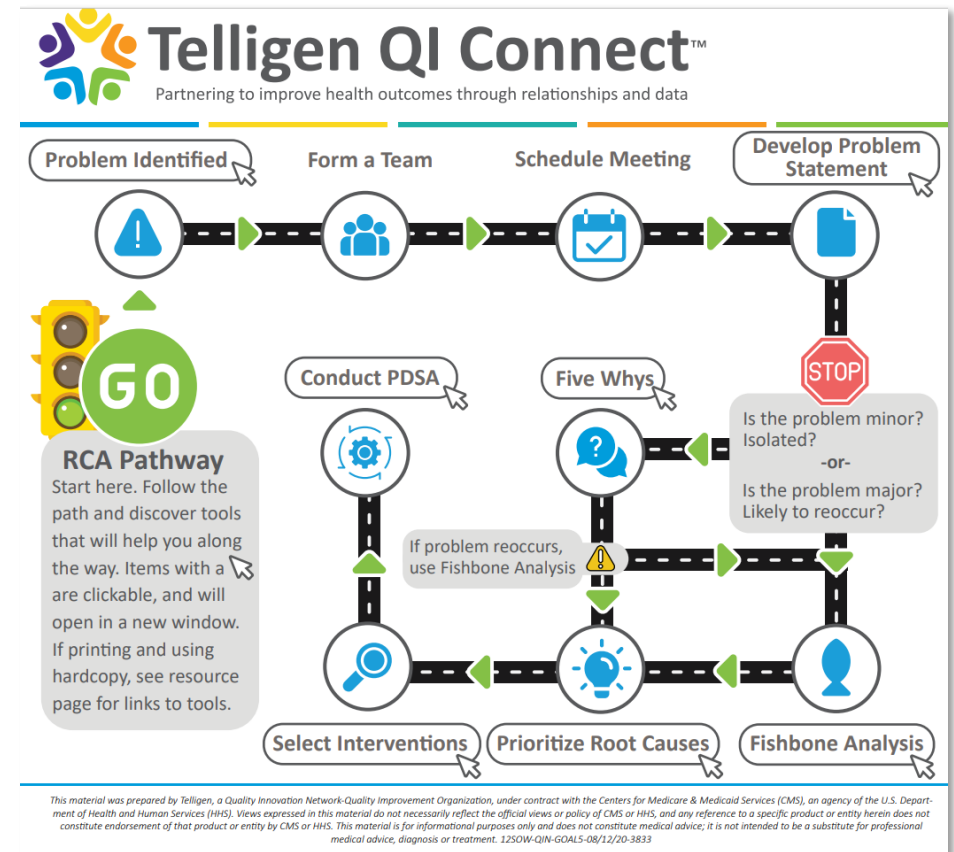
Sepsis Mortality and Sepsis Bundle Compliance

Jan 17 – Sep 21



Model Competency Domain: Quality Improvement/Performance Improvement

- IP will collaborate with other healthcare professionals on performance improvement (PI) processes to create transformational change leading to better clinical outcomes.
- Regardless of the method chosen, the key elements of PI are assessing performance setting achievable goals, using data to initiate changes, incorporating human factors engineering and developing measures that will ensure sustainability of the improvement.



Model Competency Domain: Quality Improvement/Performance Improvement

**Telligen QI Connect™**
Partnering to improve health outcomes through relationships and data

PDSA Pathway Guide

GO

Plan-Do-Study-Act (PDSA) is:

- A structured cycle to test ideas/interventions to improve practices
- A guide to test a change idea/interventions to confirm it is an improvement before implementing facility wide
- The next step after completing a Root Cause Analysis (RCA)

Use this guide to learn how to construct and execute your own PDSA

Thinking Part: Driven by the following questions:

- What are we trying to accomplish?
- How will we know that a change is an improvement?
- What change can we make that will result in improvement?

Doing Part: Testing change ideas by running cycles.

Plan how the test will be done

Do the test as planned

Study collected data from doing the plan

Act on results after studying data collected from doing the plan

Abandon

Adapt

Adopt

Recommended Reading: Science of Improvement: How to Improve
<http://www.ihl.org/resources/Pages/HowtoImprove/ScienceofImprovementHowtoImprove.aspx>

PDSA template:
<https://www.telligenqiconnect.com/resource/pdsa-template/>

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**Telligen QI Connect™**
Partnering to improve health outcomes through relationships and data

Quality Improvement Initiative (QII) PDSA Worksheet

QII ID: _____ CCN: _____

Facility Name: _____

Goal Setting – Describe the problem to be solved

State the problem (ex, who, what when, where, how, how long)	
Identify the Infection Prevention Category (if other, enter category below:)	(Select one) Hand Washing Isolation Precautions (ex. appropriately donning PPE)
What do we want to accomplish/ what idea do you want to test? (Identify the goal and estimated timeframe for resolution)	
What change can be made that will result in improvement (i.e. safety, effectiveness, patient-centered care, timely, efficiency, equitability)?	
Who will be affected by accomplishing the goal?	

Plan – Describe the Change (intervention) to be implemented

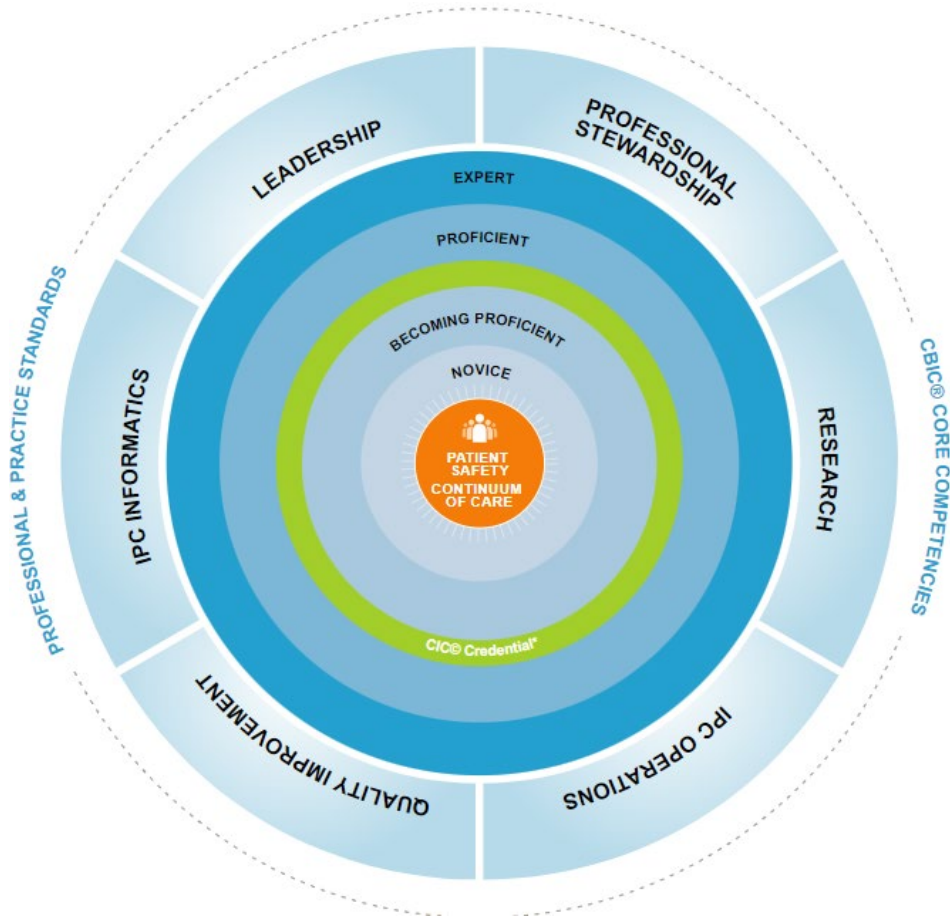
What exactly will be done? (initial intervention(s); expected outcome for each intervention; goal(s) & expected overall outcome goal rate in a percentage format)	
Who will be responsible for implementing the change?	
Where will it take place?	
What will be measured / describe the measure(s) to determine if prediction succeeds?	

This material was prepared by Telligen, the Medicare Quality Innovation Network Quality Improvement Organization, under contract with the Centers for Medicare & Medicaid Services (CMS), an agency of the U.S. Department of Health and Human Services. The contents presented do not necessarily reflect CMS policy. This material is for informational purposes only and does not constitute medical advice; it is not intended to be a

Resources

- **Quality Improvement Process Steps and Tools:** <https://www.telligenqconnect.com/resource/quality-improvement-process-steps-and-tools/>
- **Telligen's Resources and Tools:** <https://www.telligenqconnect.com/resources/>
- **QAPI Process Framework Tool:** <https://www.cms.gov/Medicare/Provider-Enrollment-and-Certification/QAPI/Downloads/ProcessToolFramework.pdf>
- **Institute for Healthcare Improvement:** <http://www.ihl.org>
- **NNHQCC Change Package:** <https://www.telligenqconnect.com/resource/national-nursing-home-quality-care-collaborative-change-package/>
- **All Cause Harm Prevention in Nursing Homes:** <https://www.telligenqconnect.com/resource/all-cause-harm-prevention-in-nursing-homes-change-package/>

Applying APIC's Competency Model



- Clarification of roles and responsibilities
- Orientation and ongoing competency
- Professional development

Session 5 – Infection Prevention Model: Infection Prevention Operations

Thursday, May 4, 2023

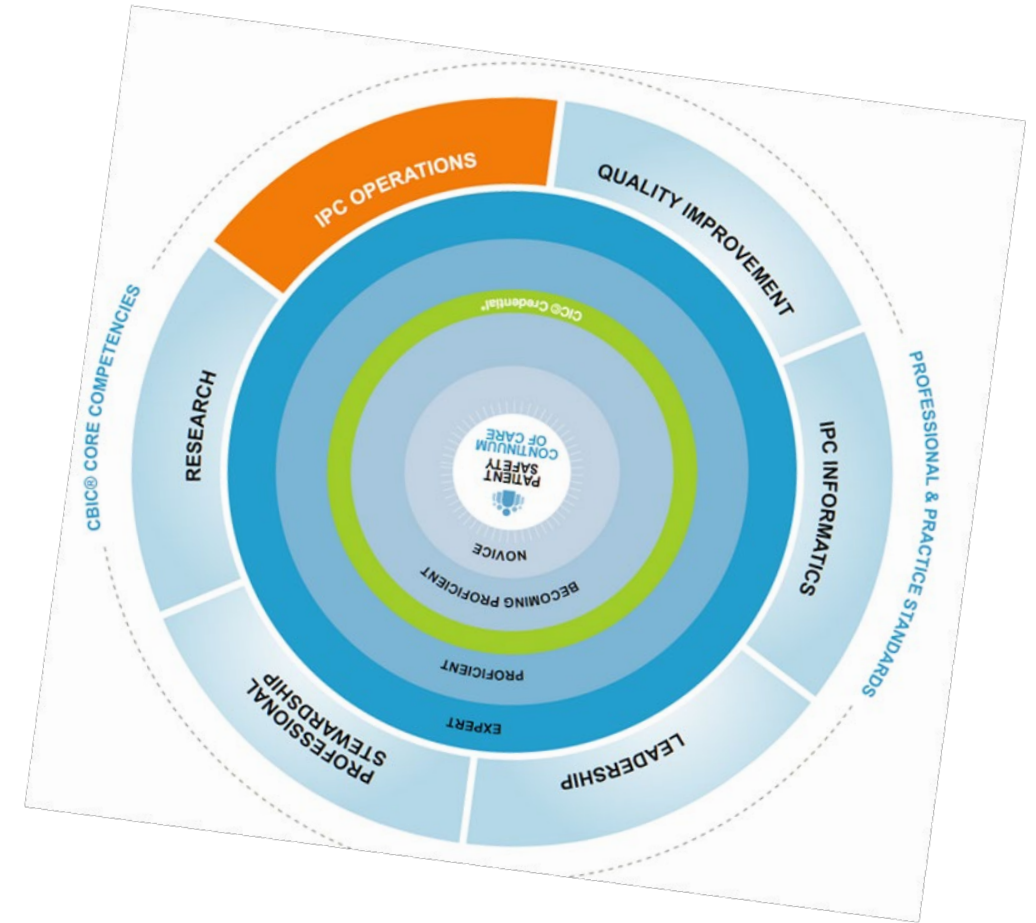
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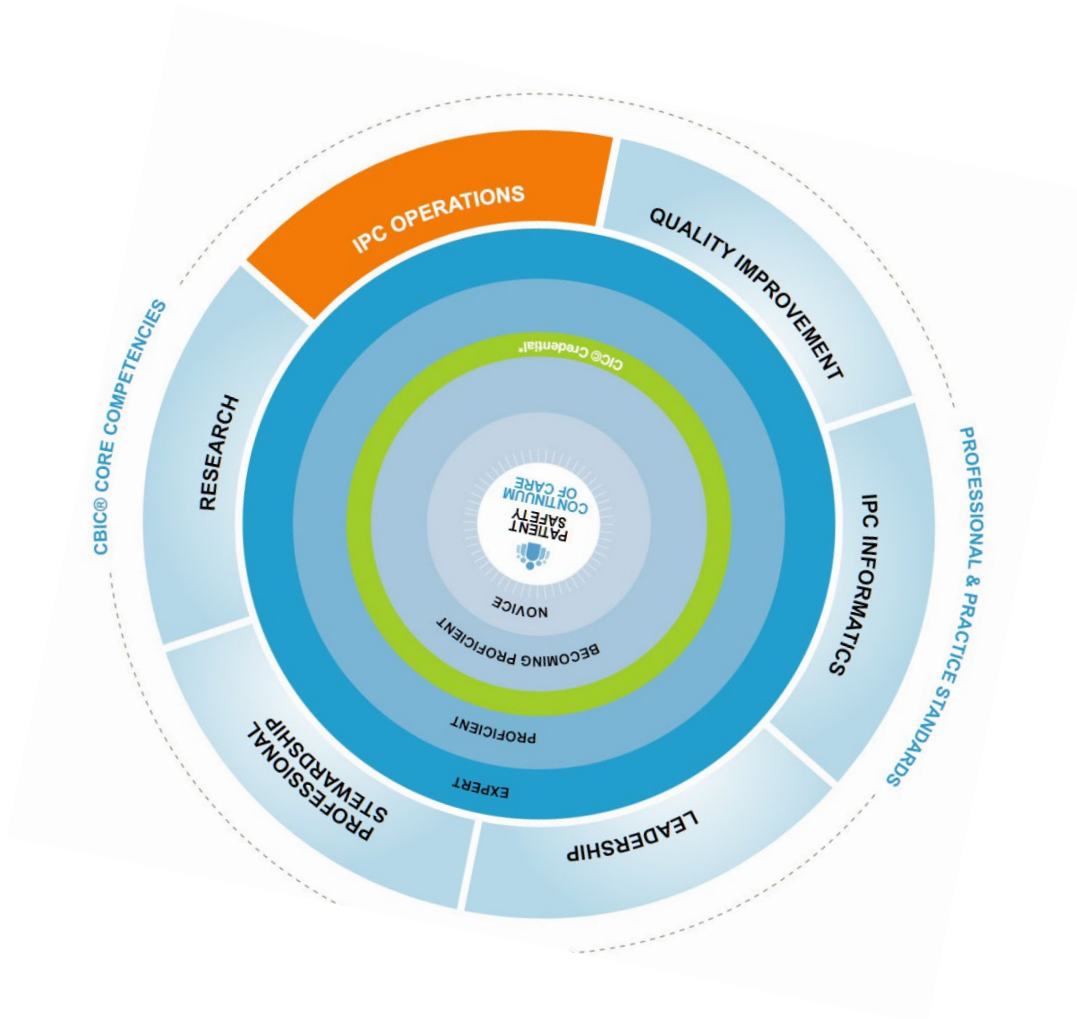
Model Competency Domains: Infection Prevention Operations

The broad scope of functions contained in the IPC operations domain use proactive and reactive approaches to:

- Conduct surveillance
- Identify infection risks
- Implement infection interventions
- Mitigate risks



Model Competency Domains: Infection Prevention Operations

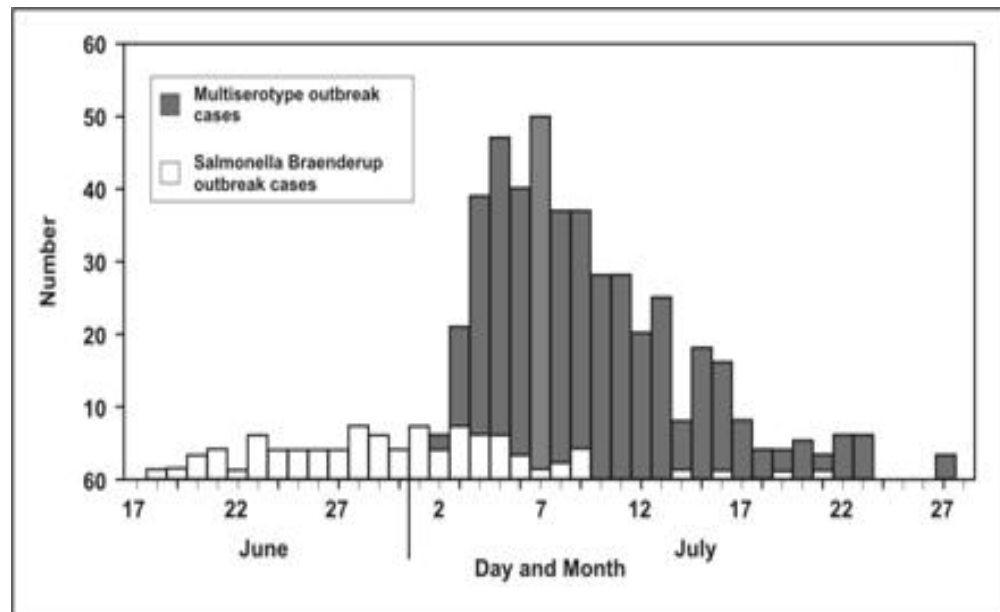


The following IP operational subdomains are:

- Epidemiology and surveillance
- Outbreak detection and management
- Cleaning and disinfection
- IPC rounding
- Antimicrobial Stewardship

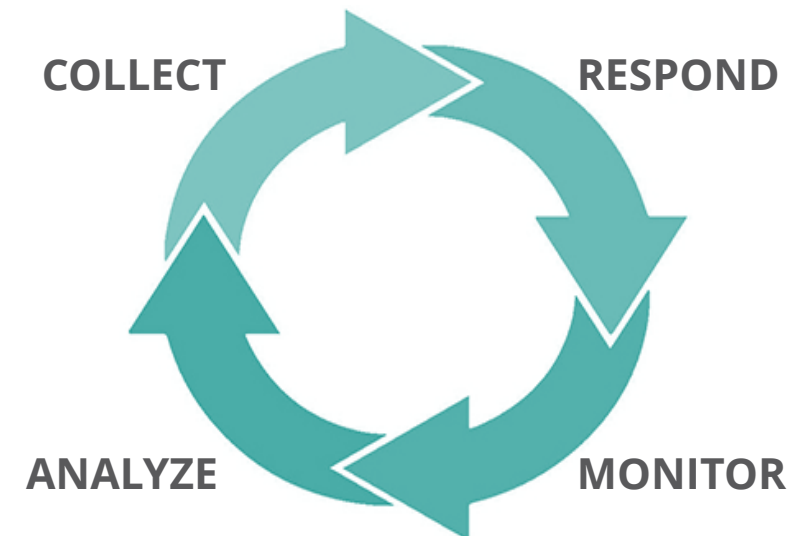
Model Competency Domains: Epidemiology and Surveillance

Epidemiology is the study of the frequency, distribution, cause and control of disease in populations.



Number of Outbreak-Related Salmonellosis Cases by Date of Onset of Illness
United States, June–July 2004

Surveillance is a comprehensive method of measuring outcomes and related processes of care, analyzing the data, and providing information to members of the health care team to assist in improving those outcomes.

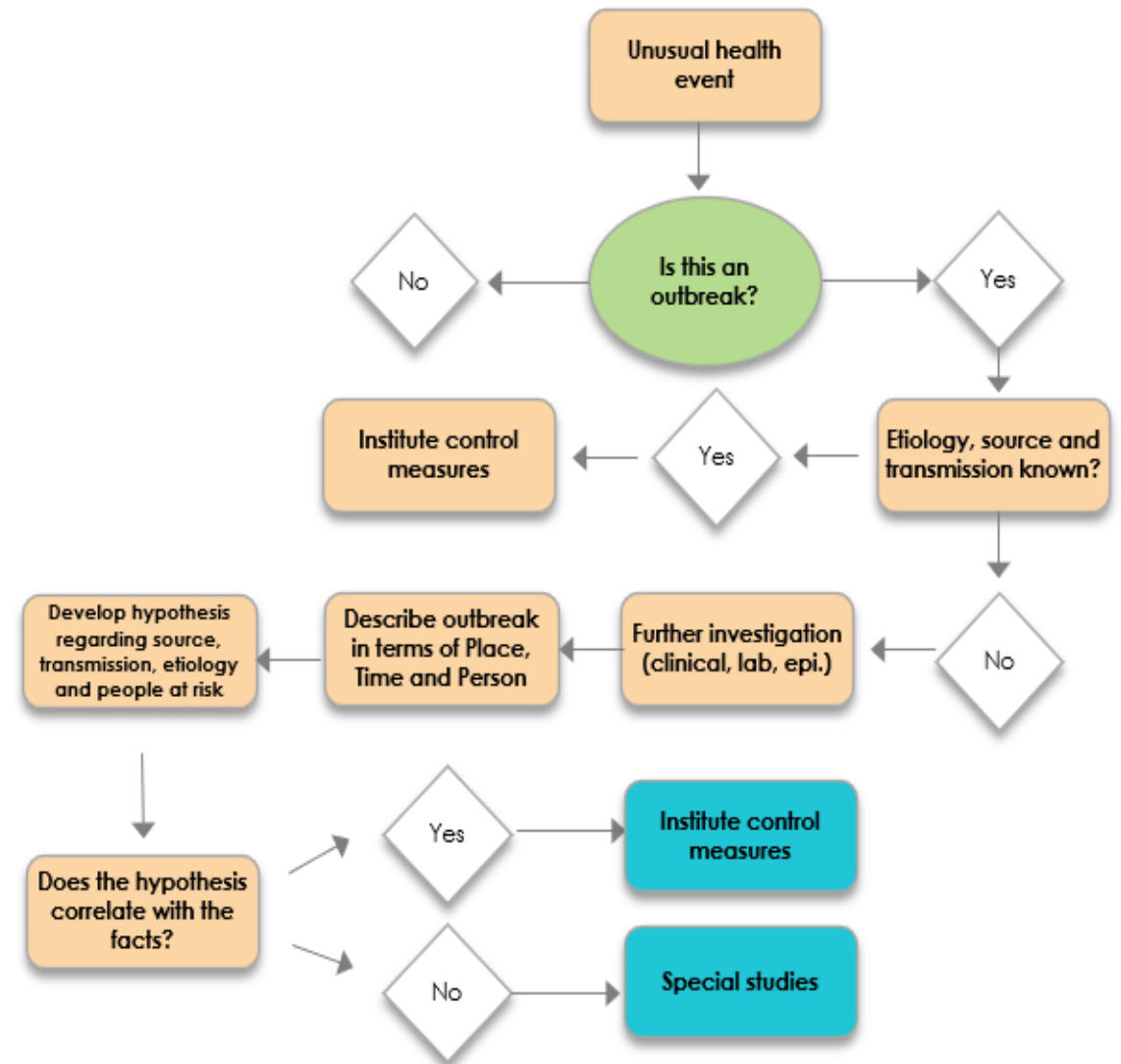


Case Scenario

- May 2022, a clinical microbiologist found a cluster of four nursing home residents with multidrug resistant *Pseudomonas aeruginosa* growing in the respiratory system, blood and urine
- The IP was notified and initiated an investigation
- Cases were defined as residents who had been admitted to Vista Hermosa Nursing Home since January 2022 and had a positive clinical or surveillance sample for *Pseudomonas aeruginosa* resistant to meropenem and tobramycin

Model Competency Domains: Outbreak Investigation and Management

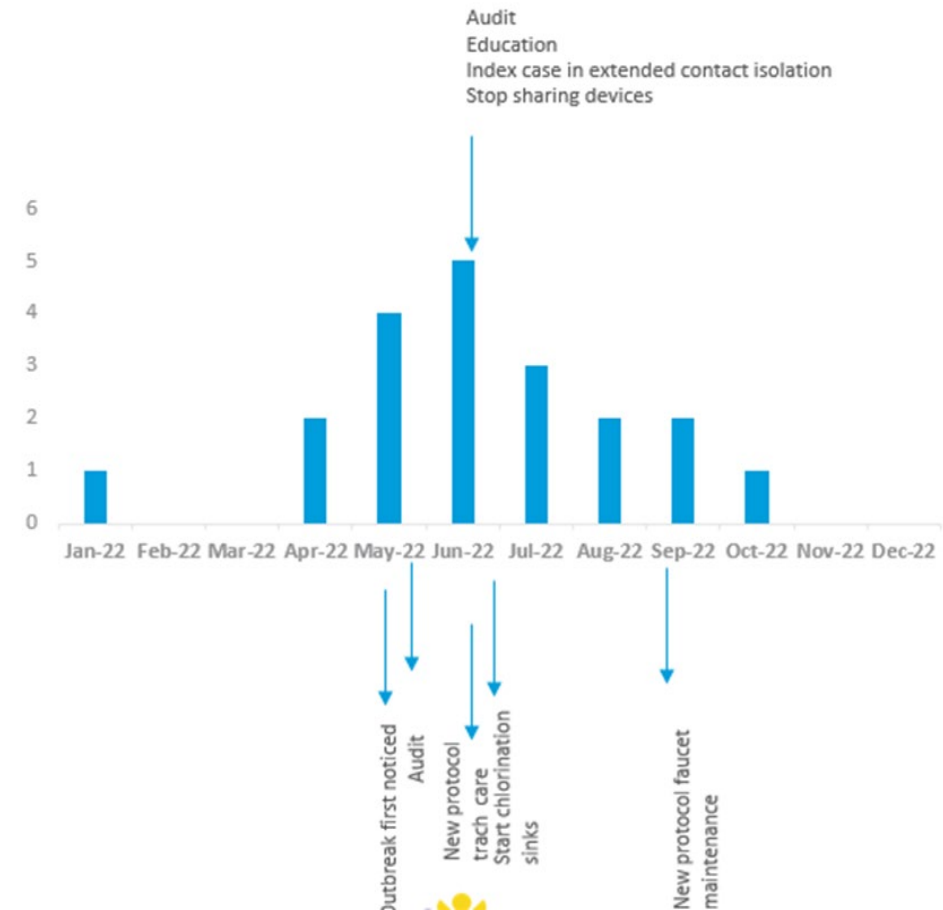
An outbreak is a sudden rise in the number of cases of a disease. An outbreak may occur in a specific community or geographic area or may affect several countries. It may last for a few days or weeks, or even for several years.



Model Competency Domains: Outbreak Investigation and Management

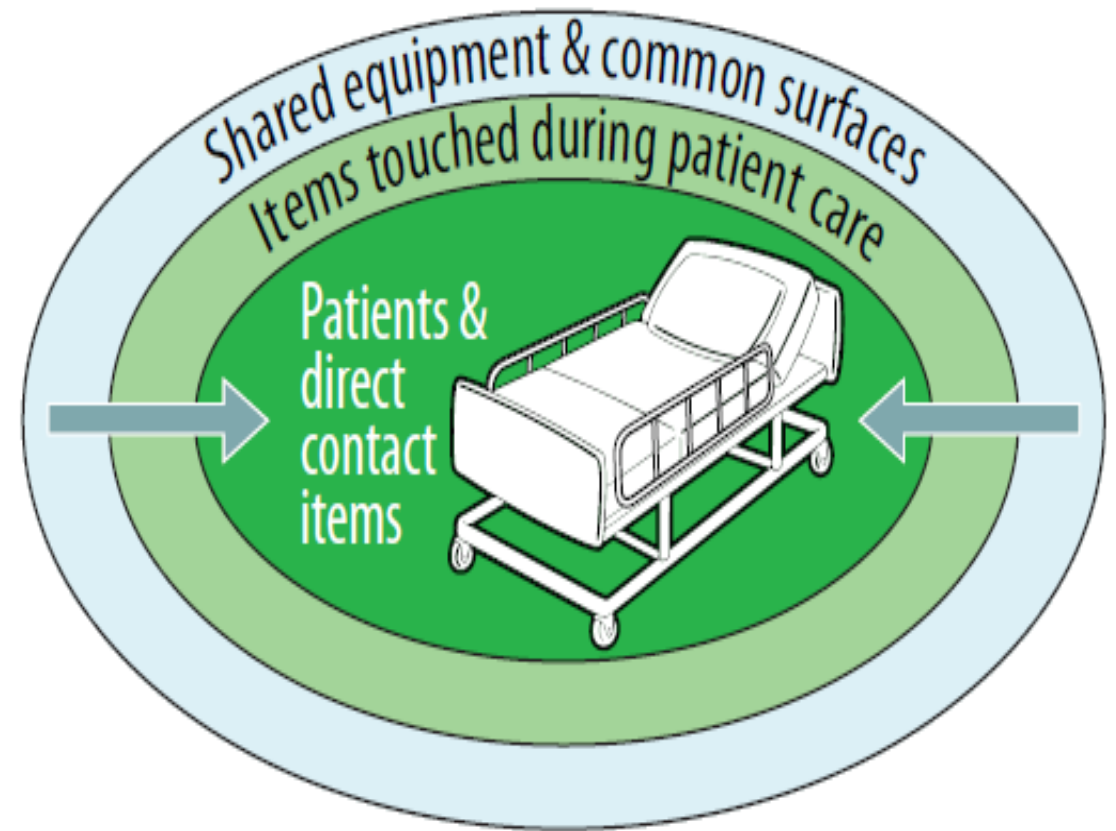
The key components to outbreak detection and management include:

- Confirming an outbreak
- Notifying key partners about the investigation
- Conducting a literature review
- Establishing and refining a case definition and case finding methodology
- Preparing a line list and epidemic curve
- Observing and previewing implicated care activities
- Sampling environment and device if indicated
- Implementing and ongoing review of control measures and performance
- Implementing analytic study if needed



Model Competency Domains: Cleaning and Disinfecting

- Cleaning is the process of *removing* dirt and germs from surfaces or objects that could potentially reach residents or patients
- Disinfection is a different step that is done alone or after cleaning that *kills* germs on surfaces or objects



Model Competency Domains: IPC Rounding

- Infection Prevention and Control (IPC) rounding requires experience and expertise, along with mentoring, training and supervision
- Based on annual and periodic risk assessments, IPs conduct rounds, which may be either interdisciplinary or individual, to ensure compliance with IPC standards while maintaining a sanitary and safe environment for patients, staff and visitors



Model Competency Domains: IPC Rounding

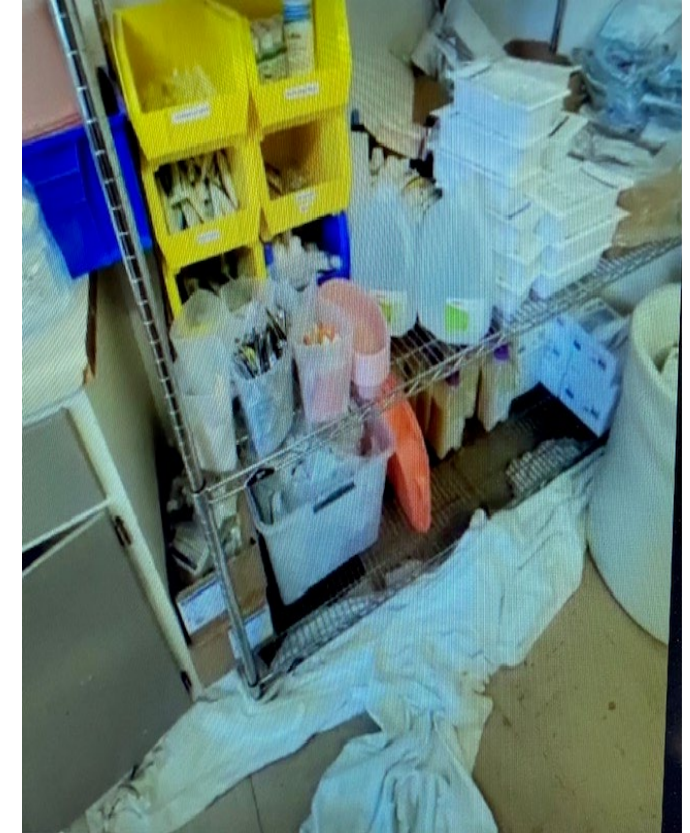
Uncovered linens



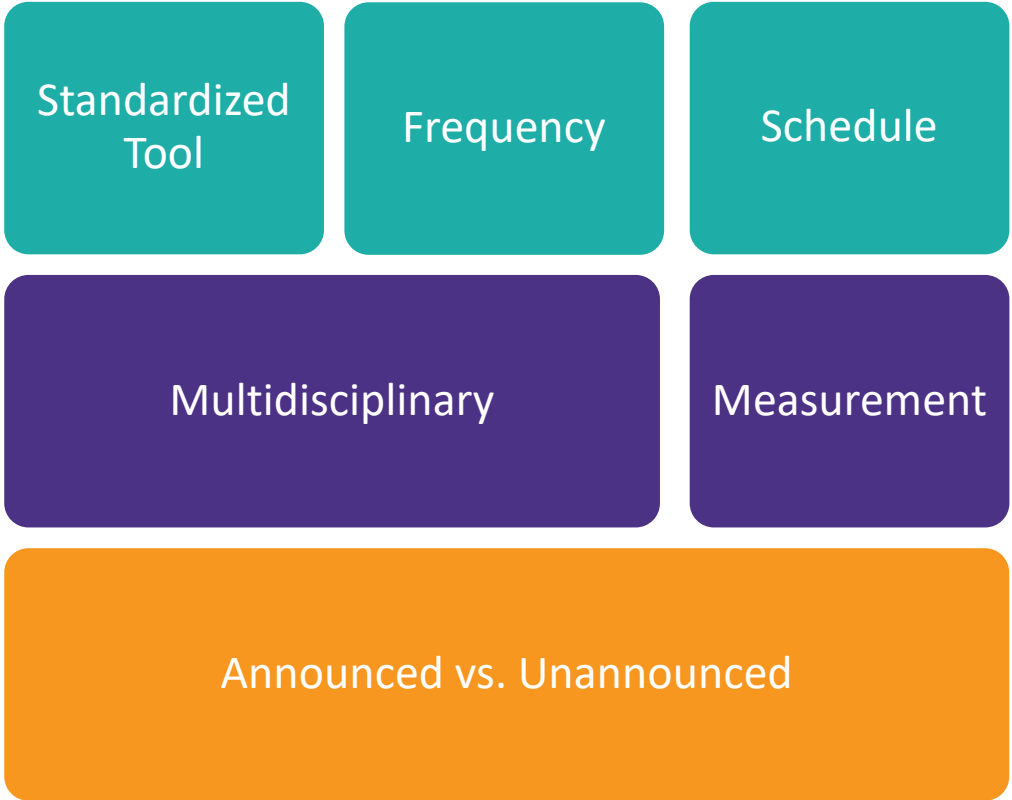
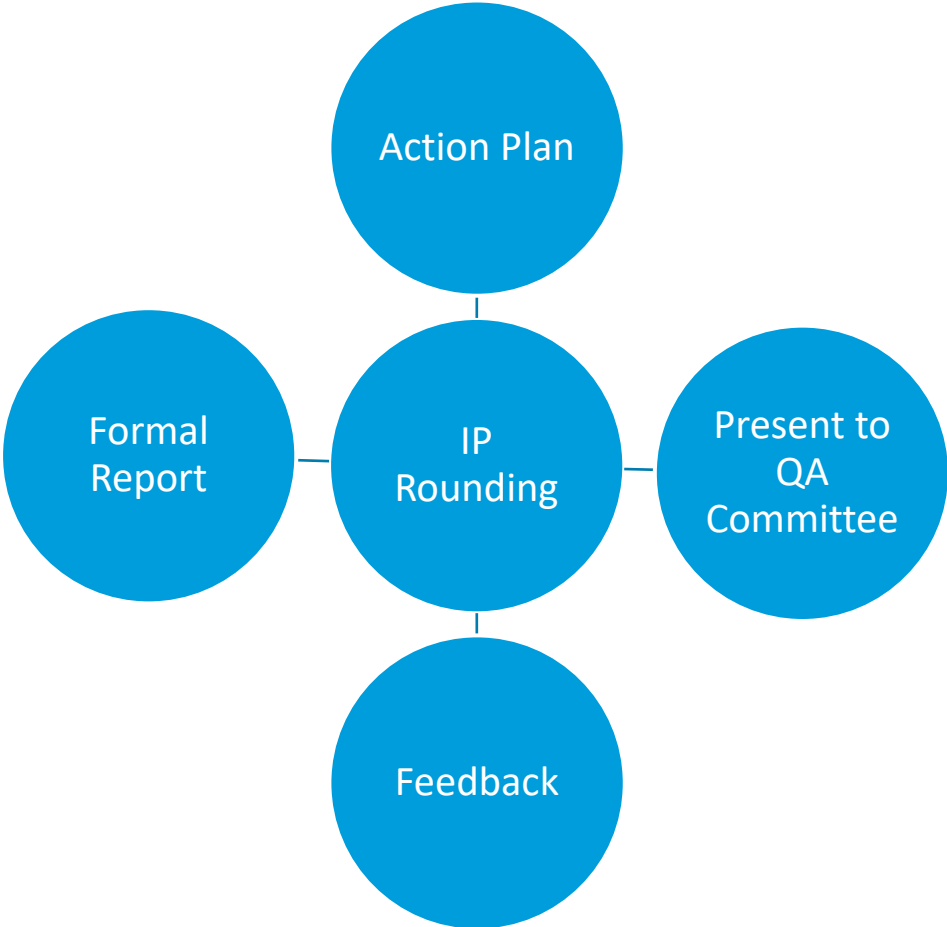
Clean paper towels in janitor's closet



Leak in clean supply room

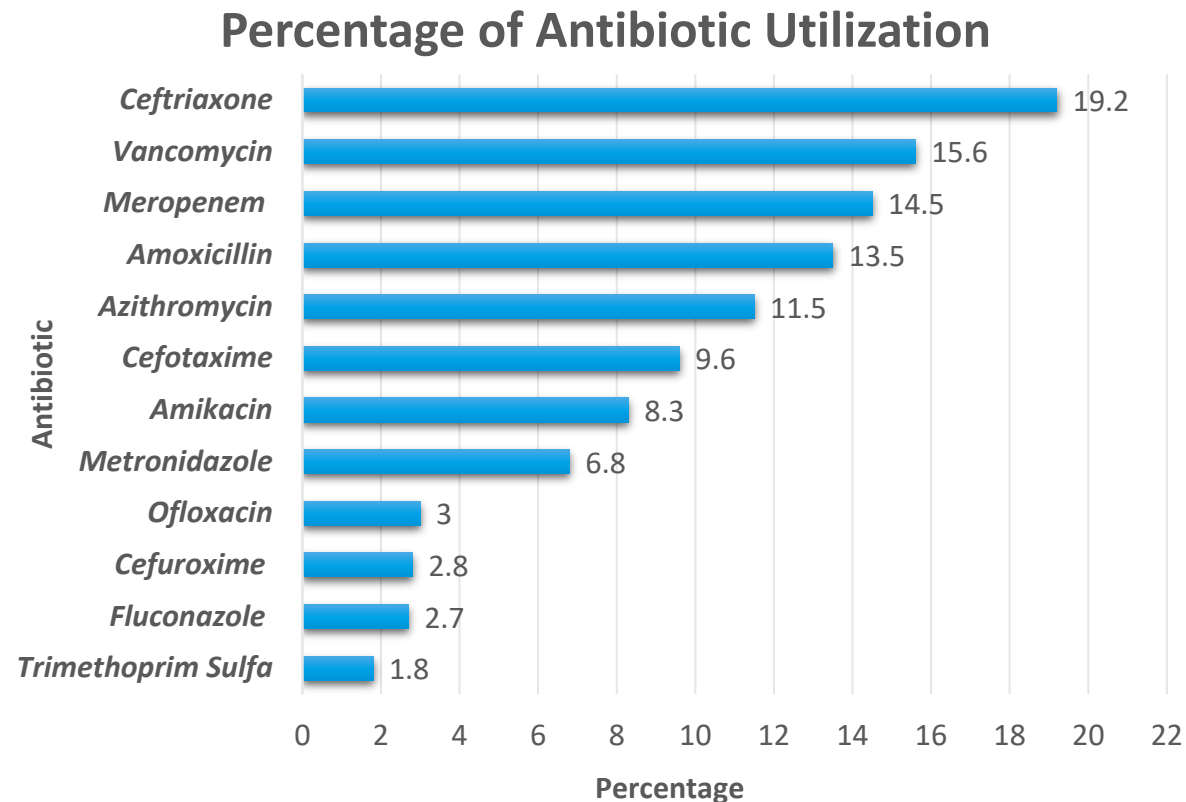


Model Competency Domains: IPC Rounding

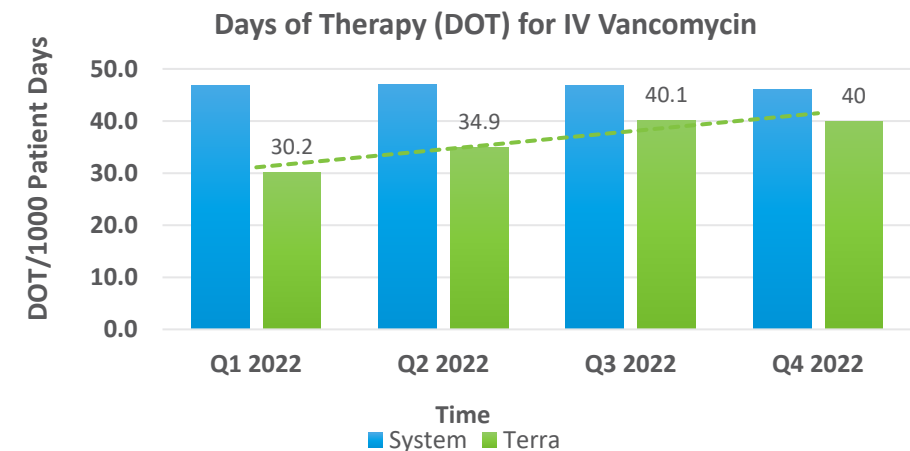
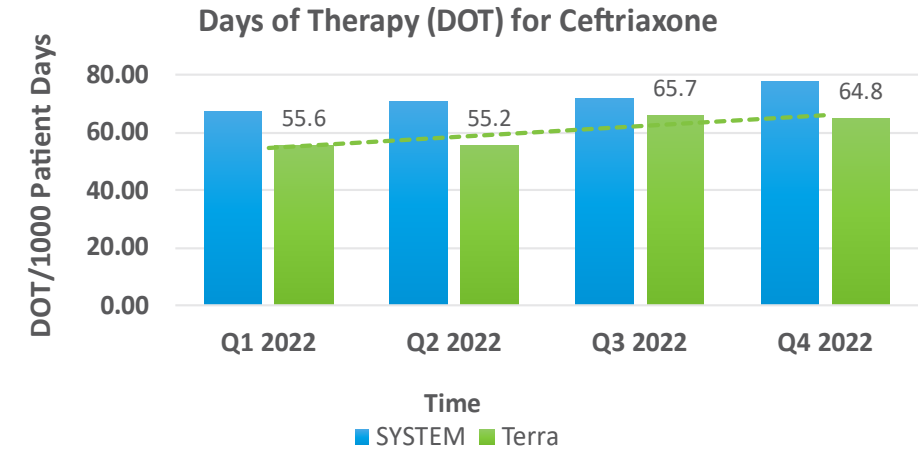
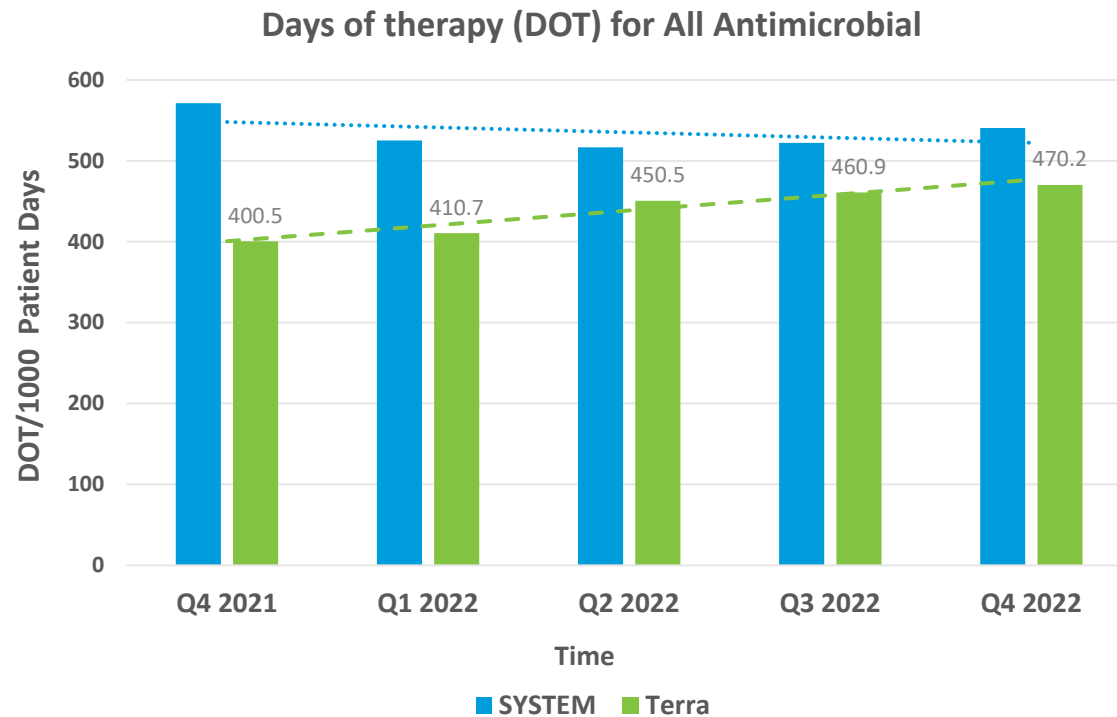


Model Competency Domains: Antimicrobial Stewardship

- Infection preventionists proactively contribute to AS efforts by identifying and detecting multidrug-resistant organisms (MDROs) among the population served, reporting surveillance trends over time, using surveillance data (i.e., treating asymptomatic bacteriuria, collecting contaminated specimens) and analyzing antibiograms and antibiotic use

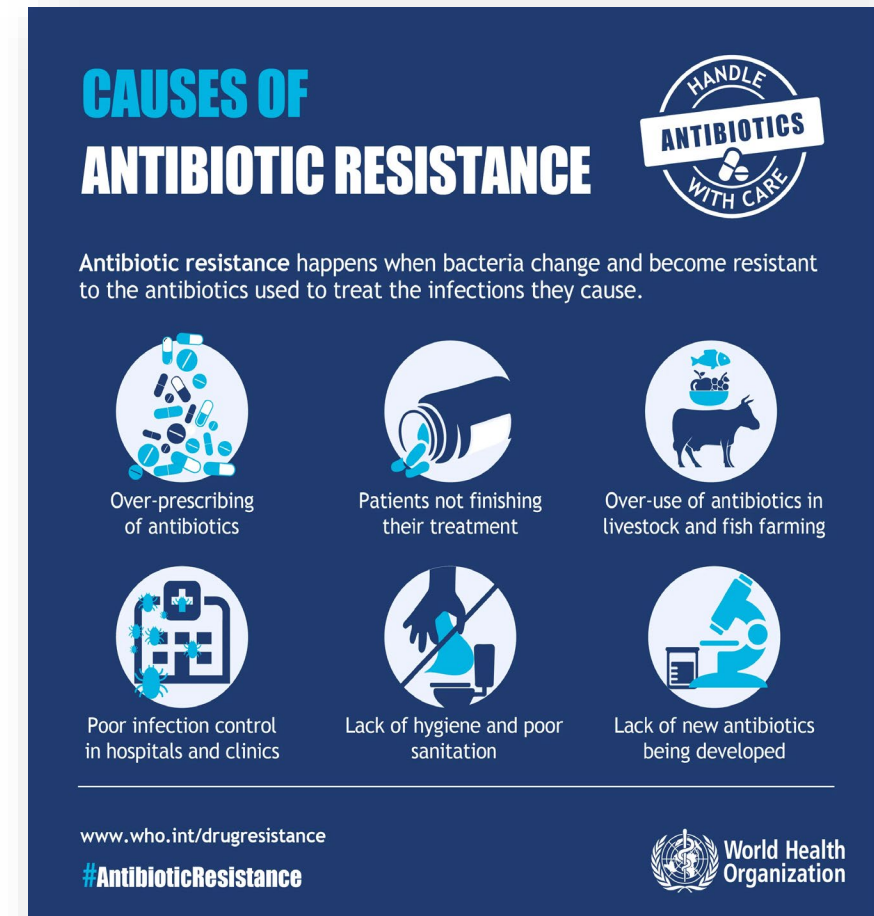


Model Competency Domains: Antimicrobial Stewardship

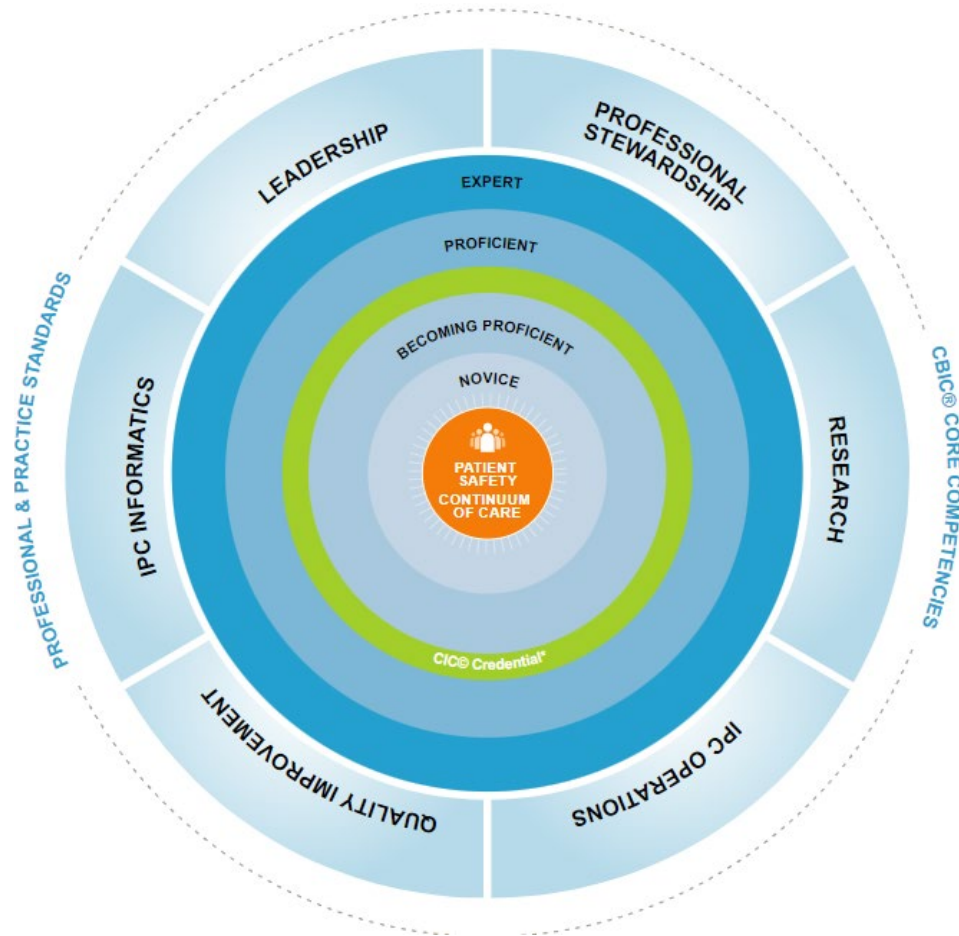


Model Competency Domains: Antimicrobial Stewardship

- IPs further support antimicrobial stewardship initiatives by:
 - Assisting with early organism and infected patient identification
 - Promoting compliance with standard and transmission-based precautions
 - Using care bundle practices and hand hygiene
 - Developing and providing educational programs for staff, patients and visitors



Applying APIC's Competency Model



- Clarification of roles and responsibilities
- Orientation and ongoing competency
- Professional development

Session 6 – Infection Prevention Model: Research

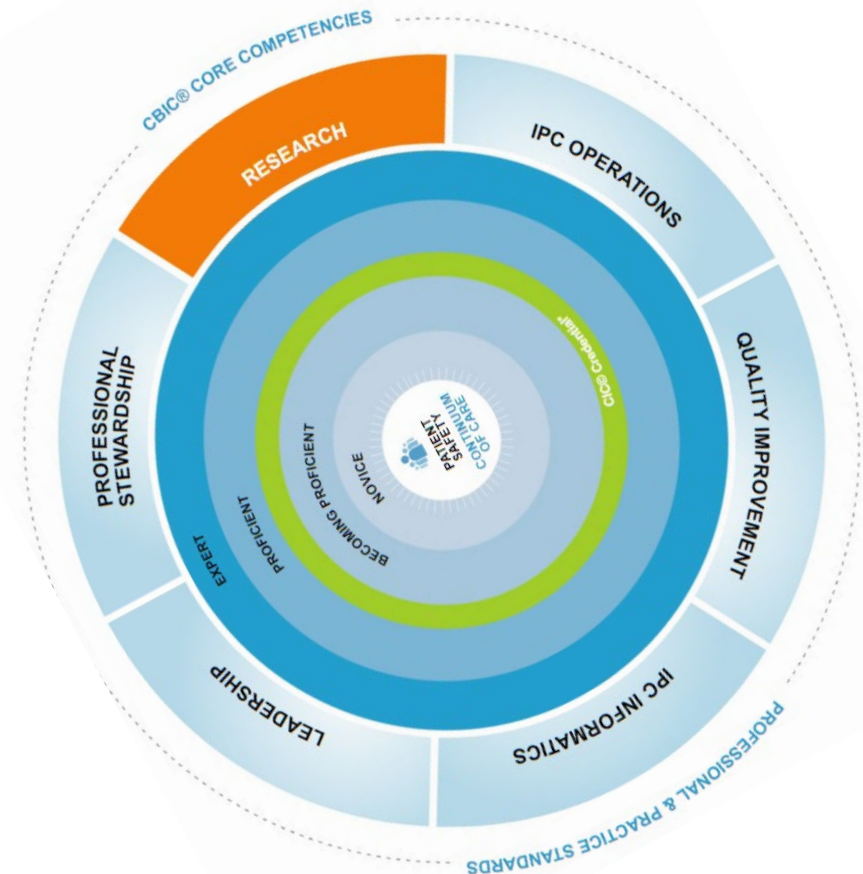
Thursday, May 11, 2023

Jaime Zapata, CIC, LSSGB, Infection Preventionist Specialist



Model Competency Domains: Research

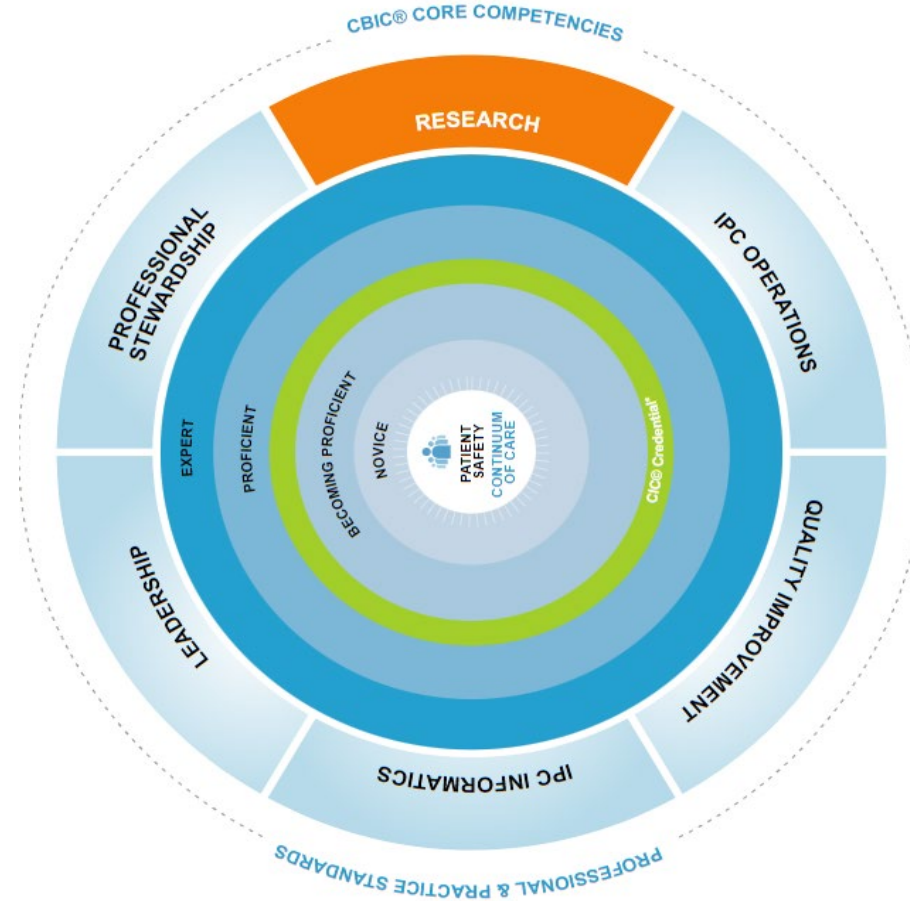
- Research is an essential skill set that supports and advances the *infection and prevention control* (IPC) field.
- This domain highlights the importance of applied research and implementation of science.
- Research equips the IP with the opportunity to
 - Synthesize
 - Apply
 - Evaluate research information



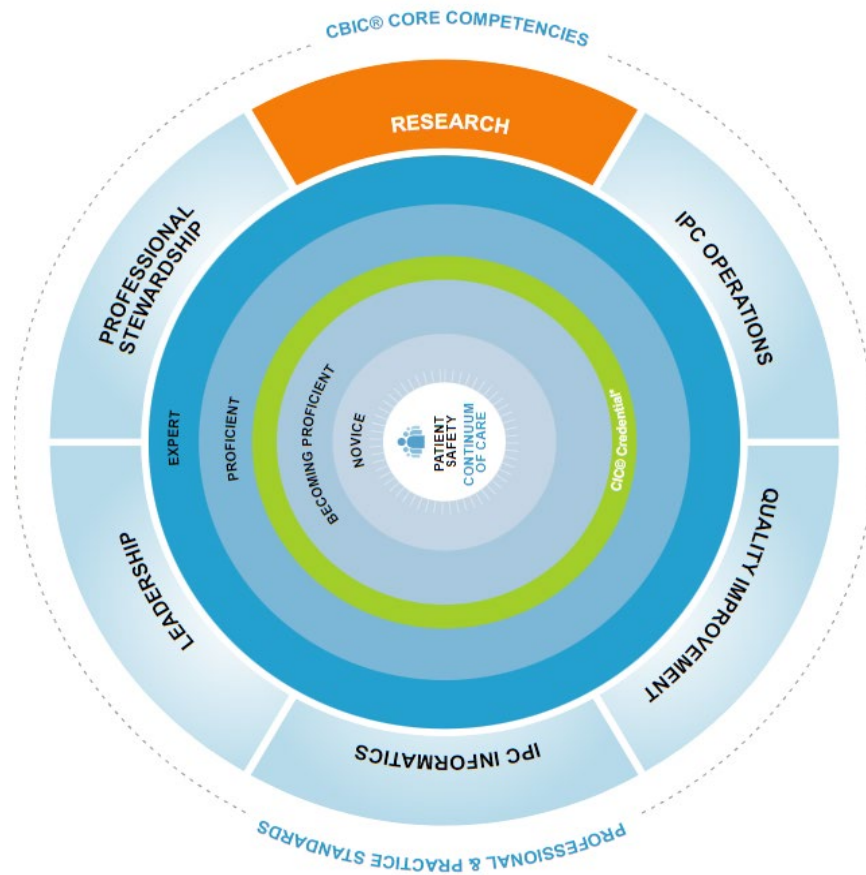
Model Competency Domains: Evaluation of Research

When evaluating research:

- Identify the Research Question
 - Identify the question or problem that the study is addressing, helping you determine whether the study is relevant to your needs
- Assess the Study Design
 - Assess whether the study design is appropriate for the research question and whether it is likely to produce reliable and valid results
- Evaluate the Sample
 - Evaluate whether the sample size is adequate and whether participants are representative of the population under study



Model Competency Domains: Evaluation of Research



When evaluating research:

- Review the Data Collection Methods
 - Ensure methods used in the study are valid and reliable, including assessing the measures and procedures used to collect data
- Examine the Statistical Analysis
 - Examine whether the statistical analysis is appropriate for the research question and whether it is likely to produce valid and reliable results
- Assess the Conclusions and Consider the Limitations
 - Evaluate whether the data supports the conclusions drawn from the study and whether they are relevant to the research question
 - Consider potential biases or confounding factors that may influence the results

Model Competency Domains: Evaluation of Research



Original Investigation | Infectious Diseases

Assessment of the Appropriateness of Antimicrobial Use in US Hospitals

Shelley S. Magill, MD, PhD; Erin O'Leary, MPH; Susan M. Ray, MD; Marion A. Kainer, MBBS, MPH; Christopher Evans, PharmD; Wendy M. Bamberg, MD; Helen Johnston, MPH; Sarah J. Janelle, MPH; Tolulope Oyewumi, MD, MPH; Ruth Lynfield, MD; Jean Rainbow, MPH, RN; Linn Warnke, RN, MPH; Joelle Nadle, MPH; Deborah L. Thompson, MD, MSPH; Shamima Sharmin, MBBS, MSc, MPH; Rebecca Pierce, PhD, MS, BSN; Alexia Y. Zhang, MPH; Valerie Ocampo, MIPH, RN, BSN; Meghan Maloney, MPH; Samantha Greissman, MD, MPH; Lucy E. Wilson, MD, ScM; Ghinwa Dumyati, MD; Jonathan R. Edwards, MStat; Nora Chea, MD, MS; Melinda M. Neuhauser, PharmD, MPH; for the Emerging Infections Program Hospital Prevalence Survey Team

- In 2021, >50% hospital antibiotic was used inappropriately
- 77% and 8% inappropriate for UTI and CAP

Key Points

Question What percentage of hospital antimicrobial use in the US deviates from recommended practices, such as treatment selection or duration, on the basis of medical record documentation?

Findings In this cross-sectional study of 1566 patients at 192 hospitals, antimicrobial use deviated from recommended practices for 55.9% of patients who received antimicrobials for community-acquired pneumonia or urinary tract infection present at admission or who received fluoroquinolone or intravenous vancomycin treatment.

Meaning The findings suggest that standardized assessments of hospital antimicrobial prescribing quality can be used to estimate the appropriateness of antimicrobial use in large groups of hospitals.

Model Competency Domains: Evaluation of Research

Limitations

- Study has limitations. The number of hospitals and patients included in our analysis were limited, and from just 10 states; consequently, the results may not be generalizable.
- Assessed antimicrobial treatment only and not surgical or medical prophylaxis.
- Included only selected patients who were treated for a single infection type.

Conclusions

- Findings suggest that *standardized assessments* of hospital *antimicrobial prescribing* quality can be used to estimate the *appropriateness* of antimicrobial use in large groups of hospitals.
- National assessments of prescribing quality depend on the *ability to access and analyze electronic health record data* across hundreds or thousands of healthcare facilities.

Model Competency Domains: Evaluation of Research

JAMA Pediatrics | Original Investigation

Short- vs Standard-Course Outpatient Antibiotic Therapy for Community-Acquired Pneumonia in Children The SCOUT-CAP Randomized Clinical Trial

Derek J. Williams, MD, MPH; C. Buddy Creech, MD, MPH; Emmanuel B. Walter, MD, MPH; Judith M. Martin, MD; Jeffrey S. Gerber, MD, PhD; Jason G. Newland, MD, MSCE; Lee Howard, MD; Meghan E. Hofto, MD, MPH; Mary A. Staat, MD, MPH; Randolph E. Oler, MS; Bonifride Tuyishimire, PhD; Thomas M. Conrad, MS, PhD; Marina S. Lee, PhD; Varduhi Ghazaryan, MD, MPH; Melinda M Pettigrew, PhD; Vance G. Fowler Jr, MD, MHS; Henry F. Chambers, MD; Theoklis E. Zaoutis, MD, MSCE; Scott Evans, PhD; W. Charles Huskins, MD, MSc; and The DMID 14-0079 Study Team

- Children responding to initial treatment for outpatient CAP, a 5-day antibiotic strategy was superior to a 10-day strategy
- The shortened approach resulted in similar clinical response

Key Points

Question Is a 5-day strategy of antibiotics superior to a 10-day strategy for treatment of nonsevere pneumonia in young children demonstrating early clinical response?

Findings In this randomized clinical trial of 380 children with community-acquired pneumonia, a 5-day strategy resulted in similar treatment response with fewer antibiotic days compared with a 10-day strategy. For the primary composite outcome, the 5-day strategy was associated with a 69% probability of a more desirable outcome and a significantly lower abundance of antibiotic resistance genes.

Meaning Among young children responding to initial therapy, a 5-day antibiotic strategy was superior to a 10-day strategy for treatment of nonsevere pneumonia.

Model Competency Domains: Evaluation of Research

- Limitations

- Microbiologic testing, such as blood culture, and chest radiography were not routinely performed as part of study protocol. National guidelines discourage use of these diagnostic tests for pneumonia in the outpatient setting.
- Although all enrolled participants had clinician confirmed pneumonia and received antibiotics, it is almost certain that some did not have bacterial pneumonia.

- Conclusions

- A 5-day course of guideline-recommended antibiotics is a safe and effective approach for treating young children with uncomplicated outpatient CAP who demonstrate early clinical improvement.
- Implementation of this strategy is encouraged to optimize treatment efficacy, lessen unnecessary antibiotic use and reduce prevalence of antimicrobial resistance genes.

Model Competency Domains: Implementation and Dissemination of Science

- Research that creates new knowledge about how best to design, implement and evaluate quality improvement initiatives.
- Ability to promote the uptake of evidence-based practice and research findings into routine practice.
- Provides the IP with means of identifying what and how guidelines and standards should inform daily clinical practice, how the evidence should be adopted as accepted practice and implemented at the patient bedside, and how to apply research that appears in scientific, peer-reviewed journal to policies and practices.

Model Competency Domains: Implementation and Dissemination of Science

BMC Infectious Diseases



Research article

Open Access

How long do nosocomial pathogens persist on inanimate surfaces? A systematic review

Axel Kramer^{*1}, Ingeborg Schwebke² and Günter Kampf^{1,3}

Address: ¹Institut für Hygiene und Umweltmedizin, Ernst-Moritz-Arndt Universität, Greifswald, Germany, ²Robert-Koch Institut, Berlin, Germany and ³Bode Chemie GmbH & Co. KG, Scientific Affairs, Hamburg, Germany

Email: Axel Kramer^{*} - kramer@uni-greifswald.de; Ingeborg Schwebke - schwebkei@rki.de; Günter Kampf - guenter.kampf@bode-chemie.de

^{*} Corresponding author

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Abstract

Background: Inanimate surfaces have often been described as the source for outbreaks of nosocomial infections. The aim of this review is to summarize data on the persistence of different nosocomial pathogens on inanimate surfaces.

Methods: The literature was systematically reviewed in MedLine without language restrictions. In addition, cited articles in a report were assessed and standard textbooks on the topic were reviewed. All reports with experimental evidence on the duration of persistence of a nosocomial pathogen on any type of surface were included.

Results: Most gram-positive bacteria, such as *Enterococcus* spp. (including VRE), *Staphylococcus aureus* (including MRSA), or *Streptococcus pyogenes*, survive for months on dry surfaces. Many gram-negative species, such as *Acinetobacter* spp., *Escherichia coli*, *Klebsiella* spp., *Pseudomonas aeruginosa*, *Serratia marcescens*, or *Shigella* spp., can also survive for months. A few others, such as *Bordetella pertussis*, *Haemophilus influenzae*, *Proteus vulgaris*, or *Vibrio cholerae*, however, persist only for days. Mycobacteria, including *Mycobacterium tuberculosis*, and spore-forming bacteria, including *Clostridium difficile*, can also survive for months on surfaces. *Candida albicans* as the most important nosocomial fungal pathogen can survive up to 4 months on surfaces. Persistence of other yeasts, such as *Torulopsis glabrata*, was described to be similar (5 months) or shorter (*Candida parapsilosis*, 14 days). Most viruses from the respiratory tract, such as corona, coxsackie, influenza, SARS or rhino virus, can persist on surfaces for a few days. Viruses from the gastrointestinal tract, such as astrovirus, HAV, polio- or rota virus, persist for approximately 2 months. Blood-borne viruses, such as HBV or HIV, can persist for more than one week. Herpes viruses, such as CMV or HSV type 1 and 2, have been shown to persist from only a few hours up to 7 days.

Conclusion: The most common nosocomial pathogens may well survive or persist on surfaces for months and can thereby be a continuous source of transmission if no regular preventive surface disinfection is performed.

Model Competency Domains: Implementation and Dissemination of Science

- Step 1: Categorize the risk factors that determine the need for environmental cleaning
- Step 2: Determine the Total Risk Stratification Score
- Step 3: Determine the cleaning frequency based on the risk stratification matrix

Cleaning Frequency Based on Total Risk Score

Total Risk Score	Risk Type	Minimum Cleaning Frequency
7	High Risk	Clean after each case/event/procedure and clean additionally as required
4-6	Moderate Risk	Clean at least once daily Clean additionally as required (e.g., gross soiling)
2-3	Low Risk	Clean according to a fixed schedule Clean additionally as required (e.g., gross soiling)

General patient areas-outpatient or ambulatory care wards

Table 7. Recommended Frequency, Method and Process for Routine Cleaning of Inpatient Wards

Frequency	Method	Process
At least once daily (e.g., per 24-hour period)	Clean	High-touch surfaces and floors Handwashing sinks
Scheduled basis (e.g., weekly) and when visibly soiled	Clean	Low-touch surfaces; see 4.2.4 Scheduled cleaning

Model Competency Domains: Implementation and Dissemination of Science

Resources - Equipment

- Cleaned/maintained/documented
- Automatic chemical dispensers
- Cleaning items – mops, cloths, vacuums, brooms
- Handles and poles
- Shelf life/expiration date



Microfiber Versus Cotton

Microfiber cloths and microfiber tube mops/pads –

- preferred over cloth- attract more dirt and microorganisms due to being positively charged; are more absorbent.
- can be damaged by high pH which makes them not compatible with all disinfectant products (especially chlorine-based).



Anti-Microbial Surface Coatings /Continuous Room Disinfection

Surface Disinfectants (“self-disinfecting”):

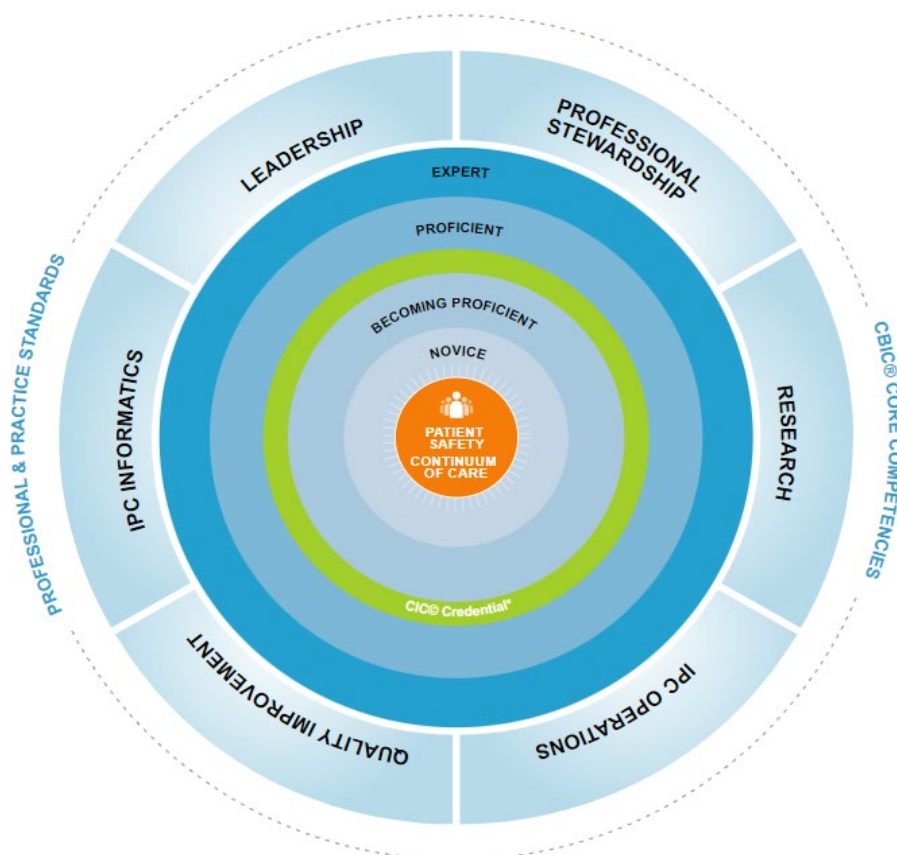
- Persistent disinfectants such as copper and silver
- Others: Altered topography (micro-patterned), polycationic and light-activated antimicrobial surfaces,
- Bacteriophage-modified surfaces

Surface Disinfection (“remote or hands –free”)

- High-intensity narrow-spectrum visible light (405nm)
- UV-C irradiation (200-280nm)
- Low dose continuous hydrogen peroxide
- Ozone mists/Vaporized hydrogen peroxide in mists and sprayers



Applying APIC's Competency Model



“Quality research is more important than ever before, in the face of new infectious threats. Emerging pathogens, constrained resources and fewer treatments for resistant infections means that we must use evidence to guide our actions and that evidence is generated from research.”

Session 7 – Infection Prevention Model: Informatics

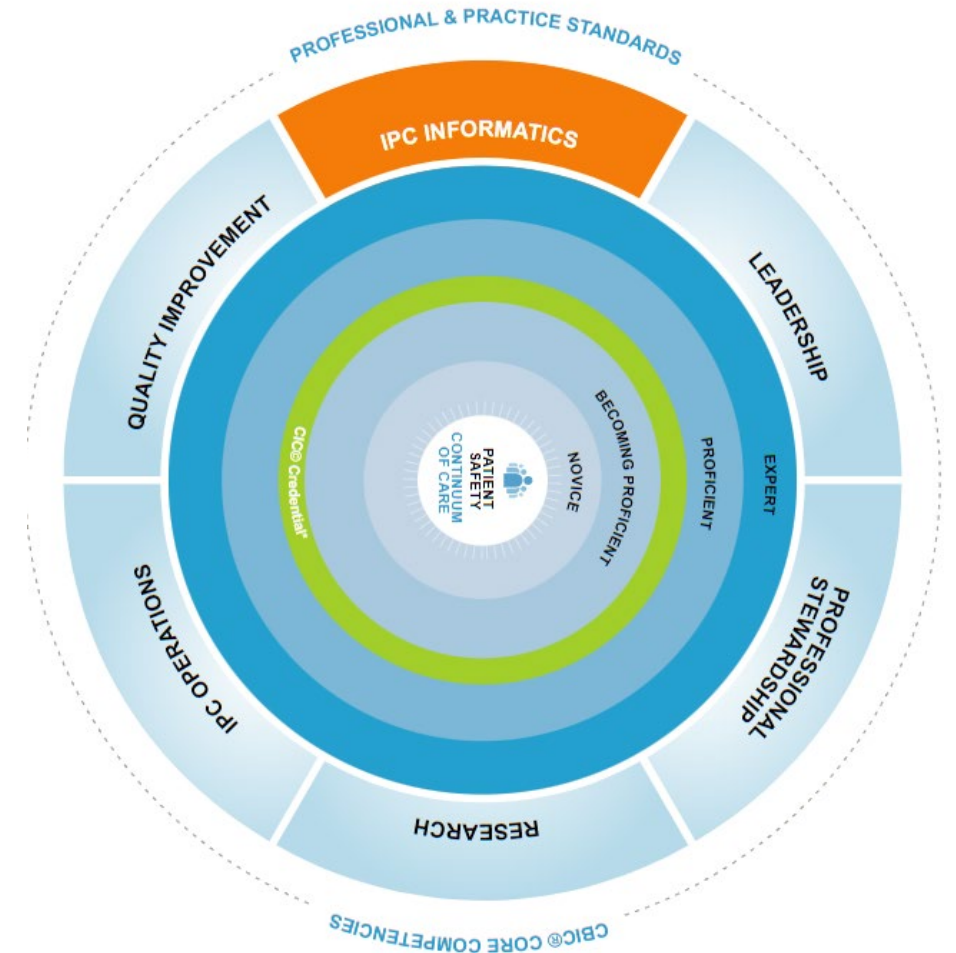
Thursday, May 18, 2023

Jaime Zapata, CIC, LSSGB, Infection Preventionist Specialist



Model Competency Domains: Informatics

- IPs must be up to date and proficient in using and leveraging systems to *input, analyze, extract and manage data* to support and *drive data integrity*, streamlining of processes, innovative IPC practices and positive patient outcomes:
 - Data and diagnostic laboratory tests
 - Real-time decision-making
 - Data dissemination
 - Machine learning
 - AI



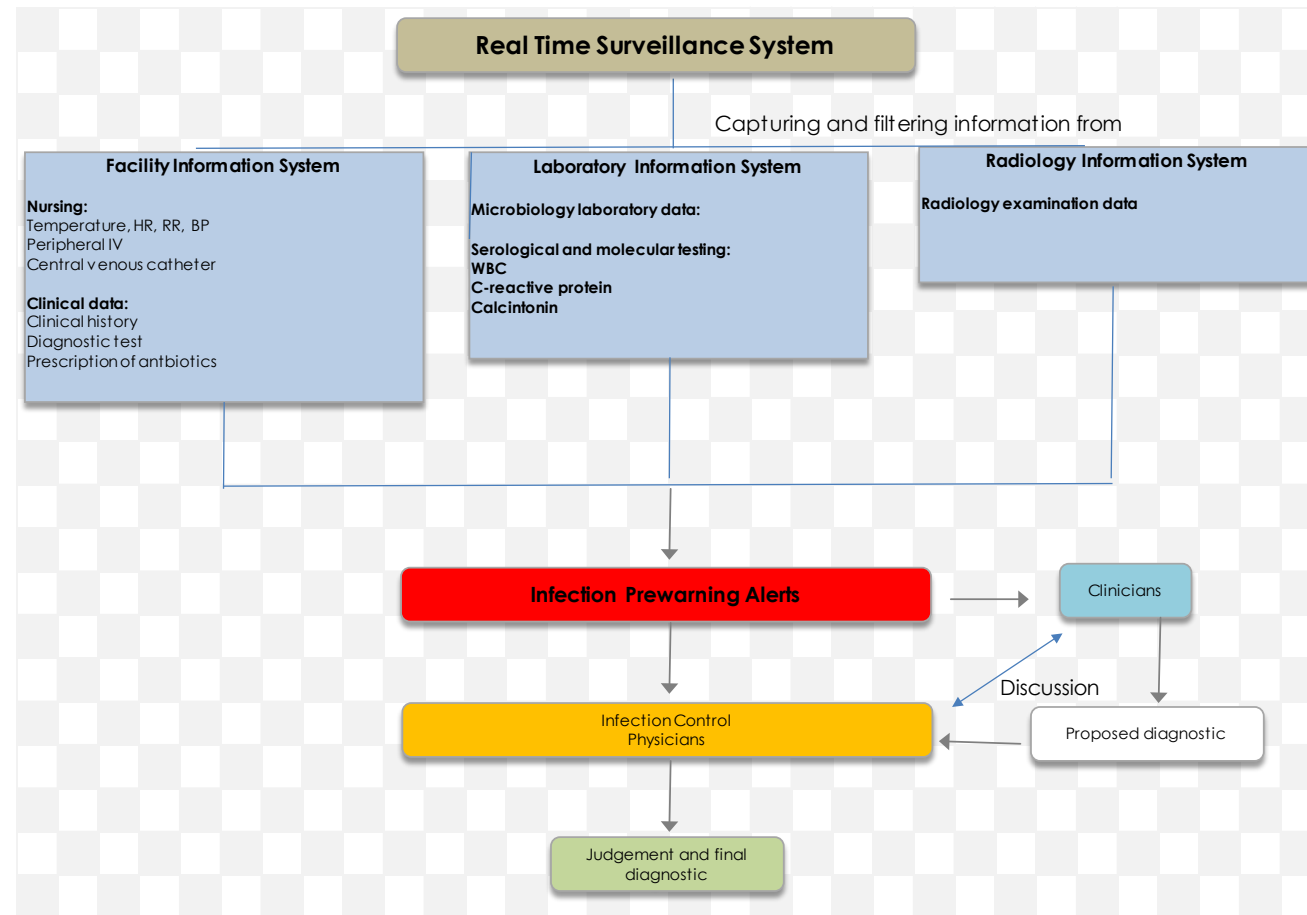
Model Competency Domains: Surveillance Technology

- Surveillance is a comprehensive method of measuring outcomes and related processes of care, analyzing the data and providing information to members of the healthcare team to assist in improving those outcomes and processes.
- Continuous monitoring of facility acquired infection rates can be used to implement improvement initiatives and assess effectiveness of interventions.
- Surveillance can also be used to quickly identify outbreaks and provide epidemiological profiles for clinical and research studies.
- The adoption of a real time automatic facility acquired infection surveillance system is useful to prevent and control infections.
- Surveillance systems (for example) help improve accuracy in MDROs infection case reporting, which can timely and accurately guide clinicians in implementing infection prevention and control measures.

[*Infection preventionist \(IP\) competency model – APIC*](#)

[*Effect of a real-time automatic nosocomial infection surveillance system on hospital-acquired infection prevention and control | BMC Infectious Diseases | Full Text \(biomedcentral.com\)*](#)

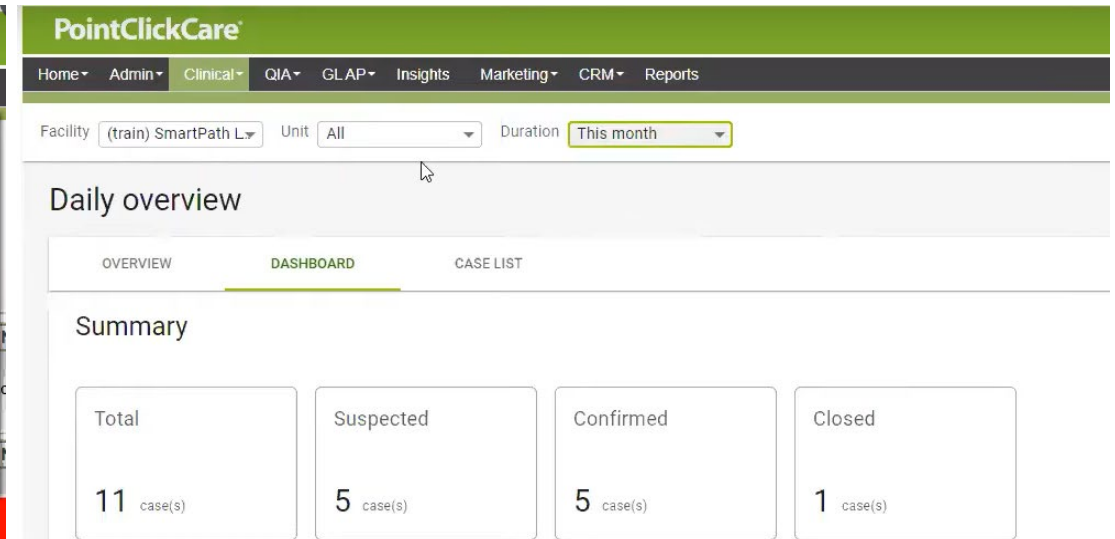
Infection Surveillance Operational Process



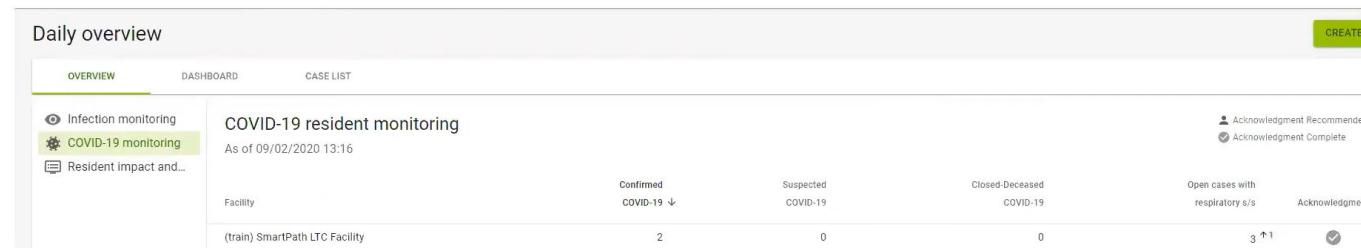
Model Competency Domains: Surveillance Technology



The image shows the PointClickCare navigation menu. The top bar is green with the PointClickCare logo. Below it is a dark grey navigation bar with links: Home, Admin, Clinical, QIA, GLAP, Insights, Marketing, CRM, Reports. The main menu is divided into several sections: People (Residents), Actions (Quick ADT, New Resident, New Staff, New Medical Professional, Manage Users), Facility Bulletin (Date Posted, Show expired), PointClickCare A (Message), and a red banner at the bottom that says "Attention Integrated Medication Management Users". The main menu is organized into columns: People, Care Management (Dashboard, Calendar, Hospital Tracking, MDS, Communications, Orders, Lab/Rx Results, Risk Management, Weights and Vitals, Exchange Center, UDA, Clinical Chart Dashboard, Infection Control), Quick Entry (Therapy Minutes, Physician Visits, Immunization, Weight, Blood Pressure, Temperature, Pulse, Respiration, Blood Sugar, O2 Saturation, Pain Level), Modules (POC, eMAR), and Other (Reports, Setup, Help).



The image shows the PointClickCare Daily overview dashboard. The top bar is green with the PointClickCare logo. Below it is a dark grey navigation bar with links: Home, Admin, Clinical, QIA, GLAP, Insights, Marketing, CRM, Reports. The main dashboard has a header with filters: Facility (train) SmartPath L, Unit (All), and Duration (This month). The dashboard is divided into sections: Overview, Dashboard, and Case List. The Overview section shows a Summary with four cards: Total (11 case(s)), Suspected (5 case(s)), Confirmed (5 case(s)), and Closed (1 case(s)).



The image shows the PointClickCare COVID-19 resident monitoring dashboard. The top bar is green with the PointClickCare logo. Below it is a dark grey navigation bar with links: Home, Admin, Clinical, QIA, GLAP, Insights, Marketing, CRM, Reports. The main dashboard has a header with filters: Facility (train) SmartPath LTC Facility, Unit (All), and Duration (This month). The dashboard is divided into sections: Overview, Dashboard, and Case List. The Overview section shows a Summary with four cards: Total (11 case(s)), Suspected (5 case(s)), Confirmed (5 case(s)), and Closed (1 case(s)). The Dashboard section shows a table of COVID-19 resident monitoring data. The table has columns: Facility, Confirmed COVID-19, Suspected COVID-19, Closed-Deceased COVID-19, Open cases with respiratory s/s, and Acknowledgment. The data row shows: (train) SmartPath LTC Facility, 2, 0, 0, 3 ↑, and a checkmark.

Model Competency Domains: Surveillance Technology

Daily overview

CREATE CASE

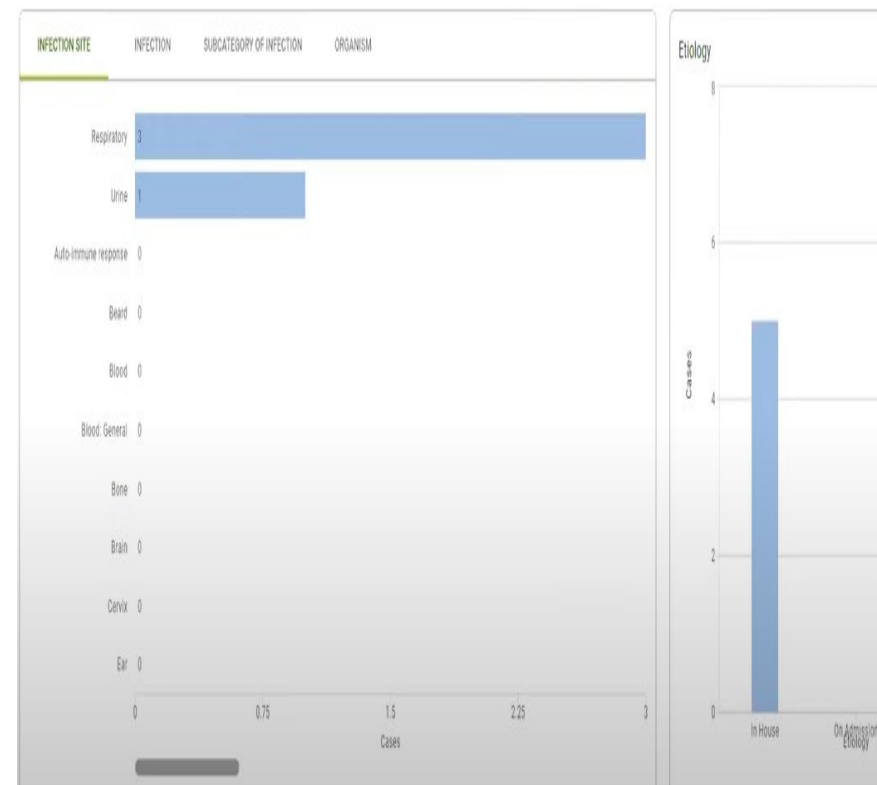
OVERVIEW

DASHBOARD

CASE LIST

Case List

Etiology	Status	Name	Unit	Room	Onset date ↓	Evaluation	Diagnostic order	Pharmacy order	Infection type	Infection	Subcategory of infection	Infection site
🏠	✔️ Confirmed (D)	donna partis	Cherry Tree	1N03	09/01/2020	Attach	Attach	Attach	Bacterial	Urinary Tract Infection	CAUTI	Urine
-	✔️ Confirmed (P)	fred flinston	Oak Grove	1S07	09/01/2020	View	View	Attach	Bacterial	Respiratory Infection	-	-
🏠	⬛ Resolved	Sally Field			09/01/2020	Attach	Attach	Attach	Bacterial	Pneumonia	Pneumococcal	-
N/A	🕒 History of	Sally Jones	Apple Lane	1E01	09/01/2020	Attach	Attach	Attach	Viral	Shingles	herpes zoster	Skin
🏠	✔️ Confirmed (P)	Betty Boop	Peach Blossom	1W05	09/01/2020	View	View	Attach	Viral	COVID-19	N/A	Respiratory
-	⚠️ Suspected	Betty Boop	Peach Blossom	1W05	09/01/2020	Attach	Attach	Attach	Unknown	Unknown	N/A	-
-	⚠️ Suspected	Mathew Johns	Apple Lane	1E05	08/25/2020	View	Attach	Attach	Unknown	-	-	-
-	⚠️ Suspected	Betty Boop	Peach Blossom	1W05	08/19/2020	View	Attach	Attach	Unknown	-	-	-
-	⚠️ Suspected	Jack Box	Cherry Tree	1N06	08/19/2020	Attach	Attach	Attach	Unknown	Unknown	N/A	-
-	⚠️ Suspected	Delilah Adams	Apple Lane	1E01	08/18/2020	View	Attach	Attach	Unknown	-	-	-
🏠	✔️ Confirmed (P)	Anna Banana			08/18/2020	Attach	Attach	Attach	Viral	Influenza	HPIV-1	Respiratory



Model Competency Domains: EMR

- The IP must be able to guide IT solutions for everyday IP issues such as simplifying and streamlining surveillance processes and building rules for clinical alerts and real-time decision making.
- IPs need to be involved in the evaluation and selection of an EMR vendor, should be trained in its use, actively tailor the system to enhance data accuracy and IP productivity, and be involved in changes made to the system that impact IPC.

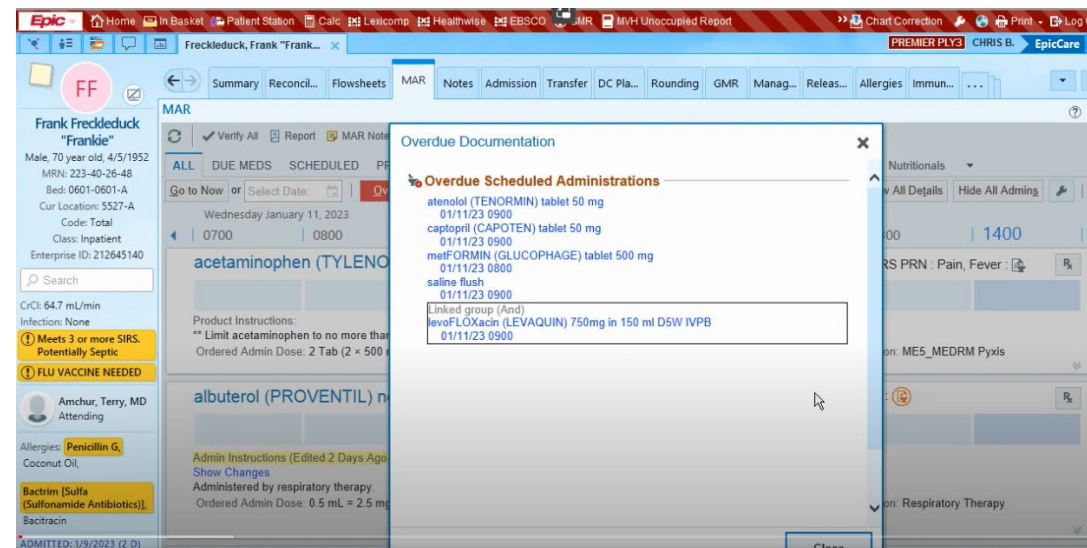
Admission Screening Process

The screenshot displays the 'ED UT Triage Web' interface for the 'Admission Screening Process'. The form is organized into several sections:

- Patient Arrival:** Includes 'Patient Arrived From', 'Mode of Arrival', and 'VS taken within 30 minutes'.
- Presenting Complaint:** Includes 'Segoe UI' and a dropdown for '9'.
- Treatment Prior to Arrival:** Includes checkboxes for 'Antiemetics', 'Aspirin', 'Finger stick', 'Foley catheters', 'Fluid', 'Immobolization', 'Immobolized on backboard', 'Intubation', 'IV', 'Morphine', 'Nebulizer treatments', and 'Nitroglycerin'.
- Vitals:** Includes fields for 'Temp (TA)', 'Temp (U)', 'Temp (R)', 'Pulse', 'Resp', 'B/P and B/P Method', 'SpO2', 'O2 L/M', 'O2/Del', 'F5 Glucose', and 'If 500 or >, check Critical High ONLY'.
- Immunizations:** Includes 'Current', 'Last Tetanus', 'Weight (lbs)', 'Weight (kg)', 'Height feet/inches', 'Height (in)', 'BMI', and 'IBW'.
- Medical/Surgical History:** Includes 'Usual Source of Medical Care' and 'LMP'.
- New Onset Neuro Symptoms:** Includes a section for 'Is patient presenting with any of the following: Difficulty speaking, Sudden severe headache, Facial droop, Weakness, numbness or paralysis of extremities'.
- Chest Pain:** Includes a section for 'Is patient presenting with Chest Pain and any of the following: Does patient have previous cardiac history? Pain or pressure radiating to jaw, neck, back or upper extremities. Nausea or vomiting, Shortness of breath, Diaphoresis'.
- Sepsis Screening:** Includes a section for 'Known or Suspected Infection?' with options 'Yes', 'No', and 'Unable to obtain'. This section is highlighted with a red box.
- Baseline Pain Assessment:** Includes a section for 'Is patient depressed, positive for ETOH, agitated, physically/verbally aggressive, violent, suicidal, homicidal or exhibiting bizarre behavior?'.
- Infectious Disease Screening:** Includes a section for 'Has patient had persistent coughing for >= 3 weeks?'.
- Events:** Includes a 'Tracking Group' dropdown and a table with 'Event' and 'Status' columns.
- Tracking:** Includes a 'Tracking Group' dropdown, 'Tracking Acuity', 'Family Present', and 'Triage Date'.
- Vitals Hx:** Includes a section for 'No Data Available' and 'ED Arrival Date and Time Hx'.

Model Competency Domains: EMR

- Use of an EMR can include:
 - Chart review
 - Automated collection of device-days and procedures
 - Alerts to clinicians of continued presence of devices such as urinary catheters
 - Real-time management of patients in isolation precautions, and names of personnel needing post-exposure follow-up from possible occupational exposure to infectious disease



Model Competency Domains: EMR

Infection Based Pathways

Search: sepsis

Up Sepsis Bundle

- Pneumonia with or without Sepsis/Septic Shock Pathway
- Meningitis with or without Sepsis/Septic Shock Pathway
- Endocarditis with or without Sepsis/Septic Shock Pathway
- Febrile Neutropenia with or without Sepsis/Septic Shock Pathway
- Cholecystitis/Cholangitis with or without Sepsis/Septic Shock Pathway
- Infection Source Unknown with or without Sepsis/Septic Shock Pathway
- Osteomyelitis/Septic Joint with or without Sepsis/Septic Shock Pathway
- UTI/Pyelonephritis/Prostatitis with or without Sepsis/Septic Shock Pathway
- Infectious Diarrhea/C Diff with or without Sepsis/Septic Shock Pathway
- Cellulitis/Necrotizing Soft Tissue Infection/Diabetic Foot with or without Sepsis/Septic Shock Pathway

Search: cellulitis

Up Cellulitis/Necrotizing Soft Tissue Infection/Diabetic Foot with or without Sepsis/Septic Shock Pathway

"Enter" to Search

Advanced Options Type: All Orders

Search: source

Up Infection Source Unknown with or without Sepsis/Septic Shock Pathway

"Enter" to Search

Advanced Options Type:

Sepsis Bundle

Sepsis Bundle (Initiated Pending)

Condition/Code Status

Provider QM Documentation Note

*** Document reasons for antibiotic choices below:

☒ QDN: Patient has additional source of infection T;N, Sepsis/Septic shock: possible blood, urine, lung infection.

Nursing Orders

Communication Orders

☒ Communication to HUC (Communication to HUC - One Time Task) T;N, Sepsis Bundle has been ordered on your patient. Please notify the nurse and text page your area's phar...

☒ Communication to Nurse (Communication to Nurse - One Time Task) T;N, The Sepsis Bundle has been ordered on your patient

☒ Communication to Nurse (Communication to Nurse - One Time Task) T;N, Sepsis Bundle Blood Cultures. PLEASE READ ORDER Sepsis Bundle Blood Cultures. Both sets of blood cultures...

IV Solutions

IV Fluid Bolus

☒ Sodium Chloride 0.9% (NS Bolus) 1,000 mL, IV Piggyback, 1TIME, STAT, Dose Form: INJ Sepsis Bundle. Give 1000 mL over 60 minutes.

Medications

***Choose ONLY ONE antibiotic subphase below based on infection risks**

REMEMBER! The antibiotics included in these subphases are for first dose only!

☐ Cefepime Only Broad Spectrum Antibiotics

☐ Cefepime Plus Vancomycin: Broad Spectrum Plus MRSA

☐ Aztreonam/Vancomycin: Penicillin Allergy

☐ Cefepime/Linezolid: Broad Spectrum/MRSA for Vanco...

☐ Aztreonam/Linezolid: Broad Spectrum/MRSA for Peni...

***IF CAP an option, add azithromycin OR levofloxacin to above**

***IF C. difficile an option, add metronidazole OR oral vancomycin to above**

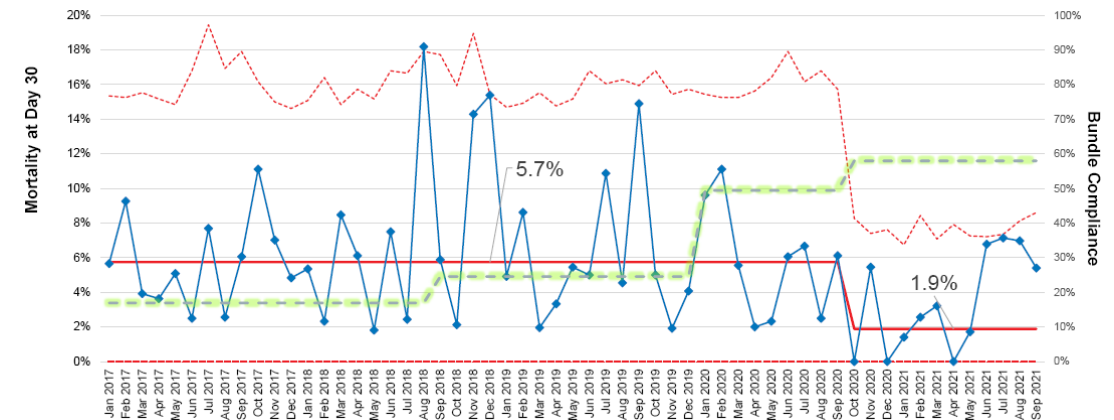
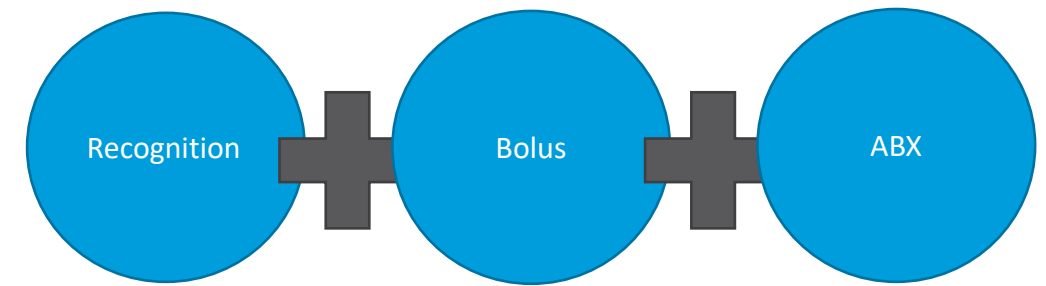
Pharmacy Communications

☒ Pharmacy Communication Sepsis Bundle, Start: T;N, STAT, Duration: 24 hr The Sepsis Bundle has been ordered on your patient

ENSURES PROMPT ANTIBIOTICS AND BLOOD CULTURES

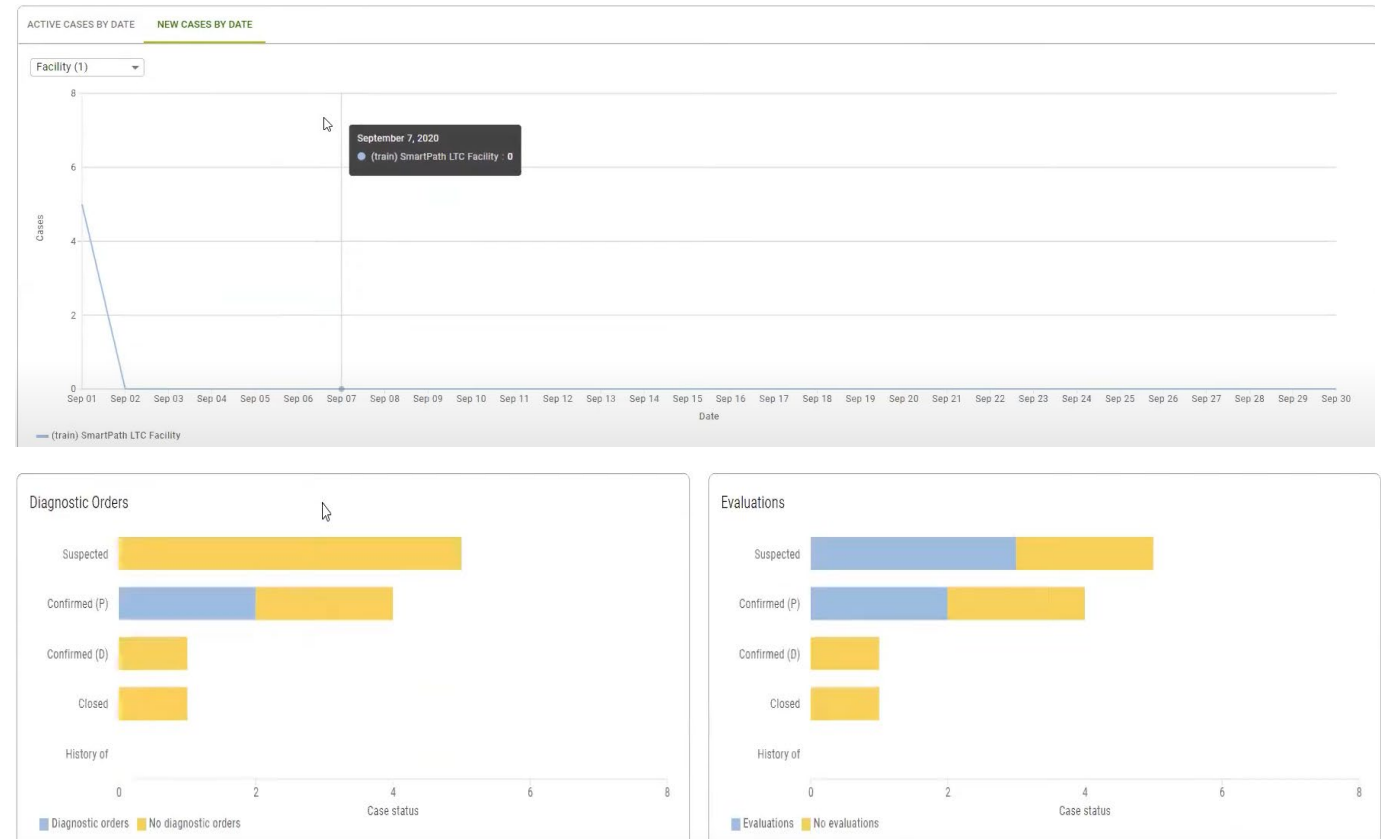
Model Competency Domains: Data Management, Analysis and Visualization

- Keeping abreast of the current technologies available to streamline the surveillance process is crucial as IPs incorporate the correct data streams to ensure relevant and accurate reporting of data
- Advances in machine learning help expedite identification of trends and assist IPs in the identification and early prevention of HAIs, outbreaks, and areas of focus for improvement activities.



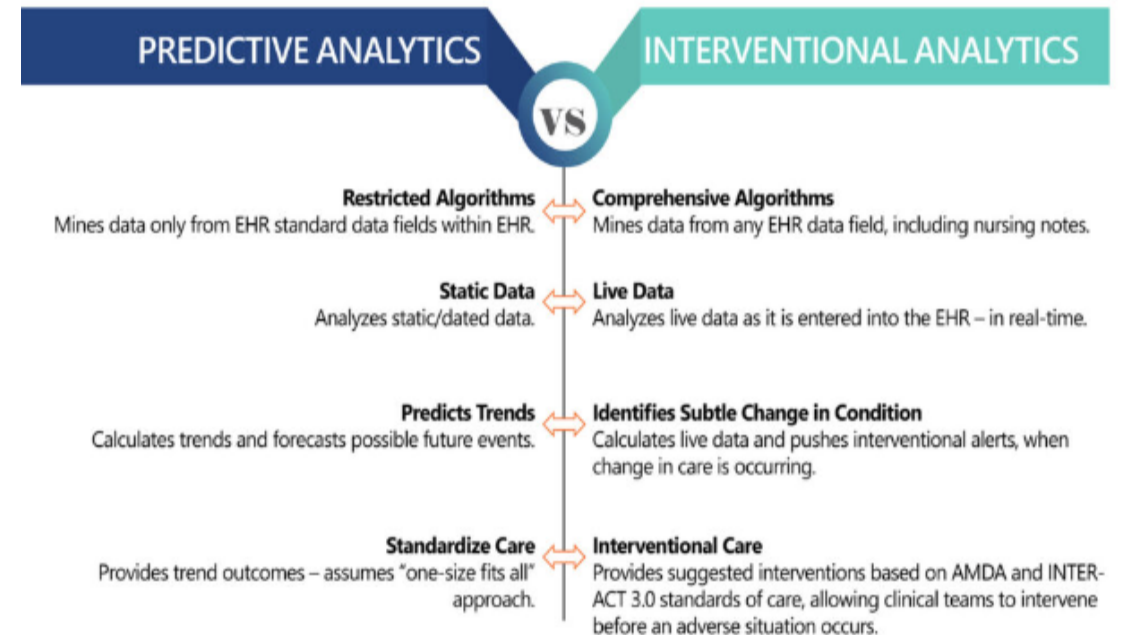
Model Competency Domains: Data Management, Analysis and Visualization

- IPs should adopt visualization methods to help enhance identification of patterns, trends, and correlations that otherwise might go undetected, as well as incorporate and tailor data visualization methods when disseminating IPC data to end users.

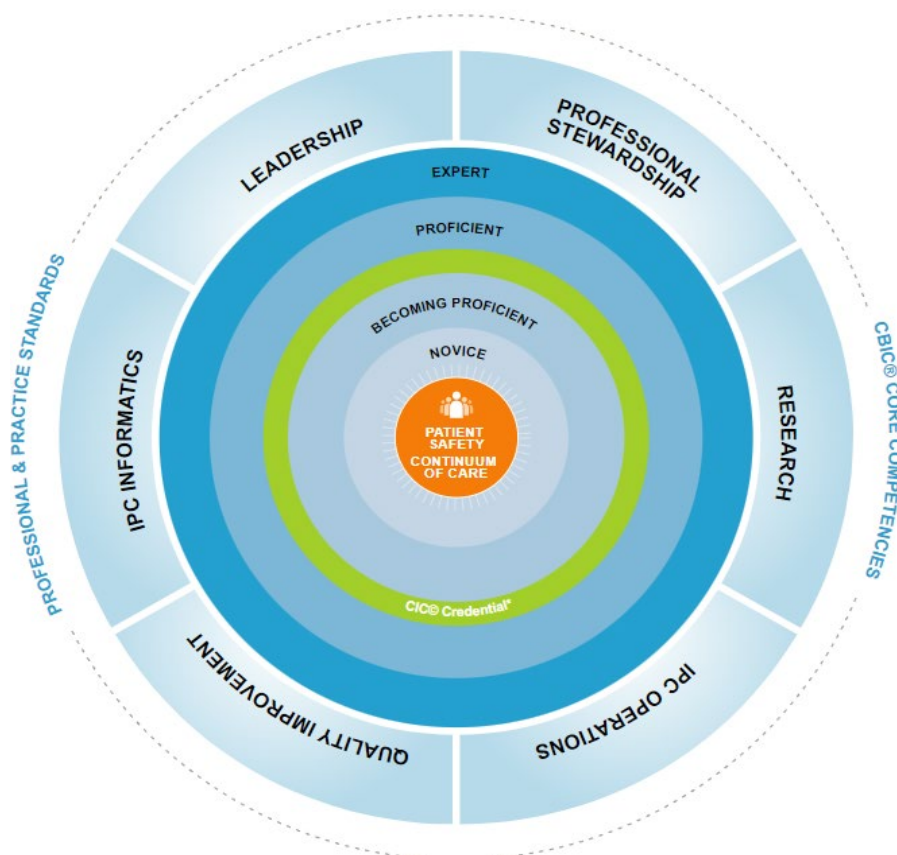


Model Competency Domains: Application of Diagnostic Testing

- IPs need to collaborate with the laboratory and radiology to assure ongoing self-education of novel diagnostic technologies being used at their facility.
- IPs also need to interpret and judiciously apply the findings from new diagnostic testing methods into their IPC program, such as determining the initiation or removal of a patient from isolation precautions.
- Predictive analytics will connect our diagnostic technology with clinical documentation to facilitate more rapid intervention in patient care and improve clinical outcomes.



Applying APIC's Competency Model



- Clarification of roles and responsibilities
- Orientation and ongoing competency
- Professional development

Contact Us



- General Inquiries | QIConnect@telligen.com
- www.telligenqiconnect.com
- Jaime Zapata | jazapata@telligen.com

