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HOW TO COMBAT HAIs IN THE WAKE OF COVID-19

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Helen Boehm Johnson is a physician who has been working in a consulting capacity within the infection prevention and control field for the past eleven years.

Having always had an interest in infectious diseases, Helen transitioned to working with companies in the healthcare sector that specialized in infection prevention and control products after the birth of her youngest children.

She has authored multiple research studies that have been published in peer reviewed medical journals, practice forum white papers, case reports, medical information guides, and numerous trade publications.

Denise Graham

Denise Graham, Founder of DDG Associates, previously served as the Executive Vice President to the Association for Professionals in Infection Control and Epidemiology (APIC)

While serving in this role, she oversaw APIC's Public Policy, Practice Guidance, Research Foundation, Public Relations, and Marketing Departments.

During her more than twenty-five years of experience in the healthcare industry, Denise has authored numerous peer-reviewed articles and has presented before a variety of educational conferences.

Linda R. Greene

RN, MPS, CIC, FAPIC

Director of Infection Prevention, at the University of Rochester Highland Hospital, Rochester, New York. She has extensive experience in Infection Prevention in the acute care, long-term care, and ambulatory surgery settings. She held leadership roles in her local APIC chapter before becoming a member of the APIC Board of Directors in 2010. She was secretary of the APIC Board in 2012-2013 and served as APIC president in 2017.

Greene was also president of the board for APIC Consulting Services in 2015, and she continues to serve APIC and the IPC profession in myriad ways, including as an advisor and contributor to APIC position papers and implementation guides, APIC representative to the 2020 CDC Decennial Steering Committee, and frequent presenter at regional, national, and international conferences. Linda serves as National Faculty for several national HAI reduction projects. She has served on several advisory panels on public reporting of HAIs, and has received several awards in infection prevention, leadership, and nursing. The author of dozens of peer-reviewed publications, Greene is an expert on quality improvement, antimicrobial stewardship, and healthcare-associated infections. She served on the AJIC editorial board from 2015 to 2017.

In 2020 APIC awarded her with the prestigious Carole DeMille award which is given annually to an IP with visionary leadership and extraordinary contributions to the profession.

OBJECTIVES

- ✓ Understand the impact of COVID-19 on other infections (clostridioides difficile, CLABSIs, candida auris, etc.)
- ✓ Discuss healthcare-associated infections surveillance throughout the pandemic
- ✓ Provide lessons learned from U.S. to assist Australian colleagues
- ✓ Discuss post-pandemic surveillance and the light at the end of the tunnel

BACK TO THE BEGINNING

In the US 2019:
At the national level, the acute care hospital HAI highlights:

- ✓ Overall, about **7% decrease** in CLABSIs between 2018 and 2019
- ✓ Overall, about **8% decrease** in CAUTIs between 2018 and 2019
  Largest decrease in ICUs (12%)
- ✓ Overall, there was a **2% increase** in VAEs between 2018 and 2019
  Increase observed in ICUs
- ✓ Overall, **there was no significant change in SSIs** related to the 10 select procedures tracked in the report between 2018 and 2019.
- ✓ About **18% decrease** in hospital onset C. difficile infections between 2018 and 2019

WHAT HAPPENED?

Potential Impact of COVID-19 on Healthcare-Associated Infection Prevention Efforts	**Impact on Traditional Infection Prevention Efforts**	Surveillance resources diverted with subsequent reduced case identification and data quality
		Process measure data collection diverted (for things like compliance with hand hygiene, chlorhexidine bathing, etc.)
		Mitigation resources diverted (for things like real-time data reporting and unit feedback)
		PPE stock issues may lead to compromised PPE deployment for traditional HAIs w/ risk for increased cross-transmission
	Impact of Antimicrobial Stewardship Efforts	AS personnel efforts diverted with reduces post-antibiotic order review with provider feedback
		Influx of critically ill patients may drive suboptimal antibiotic use and antibiotic resistance
		Increased antibiotic use to treat possible secondary bacterial infection may lead to increased rates of C. difficile infection

Clinical features and inflammatory markers in COVID-19 patients: comparison of patients with healthcare-associated infection (HAI) and those without.

Total	No HAI 1506	HAI 59	*p*
SOFA score on admission[a]	0 (0–1), 1506	1 (0–2), 59	0.001
Initial laboratory studies[a]			
WBC	8.1 (5.9–11.4), 1501	10.3 (7.3–14.2), 58	0.004
Lymphocyte count	1.06 (0.73–1.51), 1431	0.85 (0.63–1.26), 59	0.048
Hemoglobin	13 (11.5–14.4), 1501	13.8 (12.7–15), 58	0.012
Platelets	212 (164–275), 1499	228 (161–317), 58	0.35
Troponin	0.02 (0.02–0.02), 1234	0.02 (0.02–0.05), 54	0.21
Lactate	1.1 (0.8–1.5), 846	1.5 (1.1–2.1), 56	0.001
BUN	16 (11–25), 1446	20 (14–33), 58	0.008
Creatinine	1.02 (0.82–1.35), 1447	1.24 (0.96–1.59), 58	0.001
ALT	32 (22–54), 1436	42 (28–67), 57	0.03
Bilirubin	0.5 (0.4–0.7), 1405	0.6 (0.4–0.9), 57	0.046
INR	1.15 (1.07–1.27), 1275	1.15 (1.09–1.35), 59	0.38
aPTT	29.7 (27.1–32.8), 897	28.3 (26.2–31.4), 52	0.24
Ferritin	373 (158–805), 1083	743 (442–1450), 57	0.001
CRP	7.4 (2.9–12.8), 1101	12 (8.9–21.2), 58	0.001
D-dimer	0.79 (0.48–1.45), 1066	0.92 (0.60–2.02), 56	0.001
ICU admissions	422 (28.0%)	58 (98.3%)	0.001
SOFA score on ICU admission[a]	1 (0–3), 400	1 (0–3), 52	0.75
Use of mechanical ventilation (%)	191 (12.7%)	56 (94.9%)	< 0.001
Mechanical ventilation before HAI	150 (10.0%)	25 (42.4%)	< 0.001
Length of mechanical ventilation (days)[a]	6 (1–12), 188	18 (12–29), 55	< 0.001
Required proning if on ventilator (%)	14.6	30.4	0.007
Required paralytic if on ventilator (%)	23.5	51.8	0.001
Required inhaled vasodilators if on ventilator (%)	6.3	17.8	0.007
Required tracheostomy if on ventilator (%)	6.8	25.0	0.001
Use of vasopressors			
Required norepinephrine (%)	11.9	83.0	< 0.001
Required vasopressin (%)	5.5	52.5	< 0.001
Required epinephrine (%)	2.1	13.7	< 0.001
Required angiotensin 2(%)	0.5	1.7	0.24
CVL before HAI (%)	8.1	45.8	< 0.001
Acute renal failure requiring hemodialysis (%)	1.5	22.0	< 0.001
Acute DVT/PE (%)	4.2	22.0	< 0.001

RISK FACTORS

Non-Modifiable

- ✓ Multiple host factor and co-morbidities
- ✓ Viral infections increase risk of co- infection and secondary bacterial infections
- ✓ Prolonged hospital stay

Modifiable

- ✓ Lack of vigilance and staff education
- ✓ Communication breakdowns
- ✓ Lack of adherence to practices in place before COVID

Impact of COVID-19 Pandemic on Central Line-Associated Bloodstream Infections During the Early Months of 2020, National Healthcare Safety Network

The national SIR for CLABSIs increased significantly by **28% in 2020 Q2 versus 2019 Q2.**

Infection control practices changed in many healthcare settings during the pandemic to accommodate increasing numbers of patients and to mitigate shortages of personal protective equipment, supplies, and staffing

- ✓ Reduced frequency of patient contacts
- ✓ Alterations in processes of care

CHALLENGES

- ✓ Staff exposure
- ✓ Routine practices not continued
- ✓ Float staff or agency staff
- ✓ Practices to decrease staff in room

OTHER ISSUES

- ✓ Prone Positioning - process to turn may result in pulling or tugging of catheters
- ✓ Decreased visualization of dressings with prone positioning
- ✓ Increased number of patients with kidney injury or kidney disease
- ✓ Addition of surge beds in hallways

Gaps in CLABSI Practice from Studies

Teams reported changes to routine CLABSI prevention practices in intensive care units:

- ✓ Less universal decolonization (e.g. mupirocin administration and chlorhexidine bathing)
- ✓ Alterations in line care due to intravenous pumps placed in hallways (e.g. extension tubing used and less bedside checks on lines)
- ✓ Line and dressing integrity gaps related to proning of patients

RISK

STUDIES CONTINUED

- ✓ Opportunities in scrub-the-hub compliance
- ✓ Increases in line draws for blood cultures
- ✓ Staffing assignment changes
- ✓ Increase in pan culturing

PATHOGENS

- ✓ Increase in Candida species associated CLABSIs [1]
- ✓ Staphylococcus epidermidis, methicillin-sensitive Staphylococcus aureus (MSSA), Enterococcus faecalis, Escherichia coli, methicillin-resistant Staphylococcus aureus (MRSA), Candida albicans and Candida glabrata [2]

1. Fakih *ICHE* 2021
2. Bhatt *Clin Infect Dis*. 2020.

CANDIDA

The most common breaches in the anti-Candida barrier that increase the risk for Candida infections include:

- ✓ Use of antimicrobial agents (which inhibit commensal bacteria and allow Candida overgrowth).
- ✓ Use of intravascular devices (primarily central venous catheters), which may allow vascular access to Candida colonizing the skin, or may become infected by Candida that enter the bloodstream from other location (e.g., the gut).
- ✓ Gastrointestinal surgery (which disrupts the mucosal barrier, allowing commensal Candida in the gut to invade).
- ✓ Use of cytotoxic drugs, which can result in neutropenia (neutrophils and innate immunity being a key component of host defense) and mucositis (which also disrupts the mucosal barrier to Candida invasion).

More Scenarios

- ✓ Single center study Detroit Michigan
- ✓ Statistically significant rise in CLABSIs post
- ✓ COVID CLABSI rate during the pandemic increased 325%.
- ✓ 26% occurred within 5 days after insertion

Findings

Blood culture contamination rates were 19% greater during COVID-19 period.

While blood culture policy did not change, several nurses acknowledged the following lapses in infection control practices:

- ✓ using skin disinfectant for less time than manufacturer's recommendations,
- ✓ collecting serial cultures from same site, and/or
- ✓ failing to collect multiple blood cultures.

Staff disclosed that specimens were frequently obtained from CVCs in order to decrease time in patients' room, as collecting through a CVC is easier and quicker

C. *difficile*

- ✓ Overcrowding
- ✓ Decreased attention to COVID rooms
- ✓ Cleaning product availability
- ✓ PPE conservation
- ✓ Antibiotic stewardship issues.

The other ‘C’: Hospital-acquired Clostridioides difficile infection during the coronavirus disease 2019 (COVID-19) pandemic

- ✓ Observed a decrease first wave
- ✓ Fear, emphasis on hand hygiene
- ✓ Cancellation of elective surgeries
- ✓ Patients not coming to hospital
- ✓ Decreased census

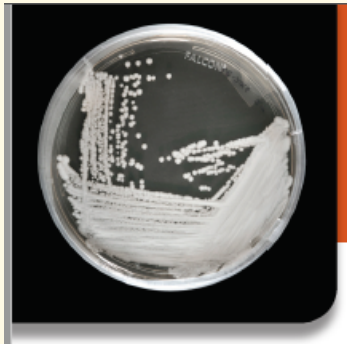
Second Wave

- ✓ Full census
- ✓ Complacency
- ✓ Normal activity

Other Infections

- ✓ Secondary bacterial pneumonias
- ✓ Aspiration risks
- ✓ Intubation – VAE

Candida *auris*



Candida auris:
A drug-resistant germ that spreads in healthcare facilities

Candida auris (also called *C. auris)* is a fungus that causes serious infections. Patients with *C. auris* infection, their family members and other close contacts, public health officials, laboratory staff, and healthcare workers can all help stop it from spreading.

Why is *Candida auris* a problem?

It causes serious infections. *C. auris* can cause bloodstream infections and even death, particularly in hospital and nursing home patients with serious medical problems. More than 1 in 3 patients with invasive *C. auris* infection (for example, an infection that affects the blood, heart, or brain) die.

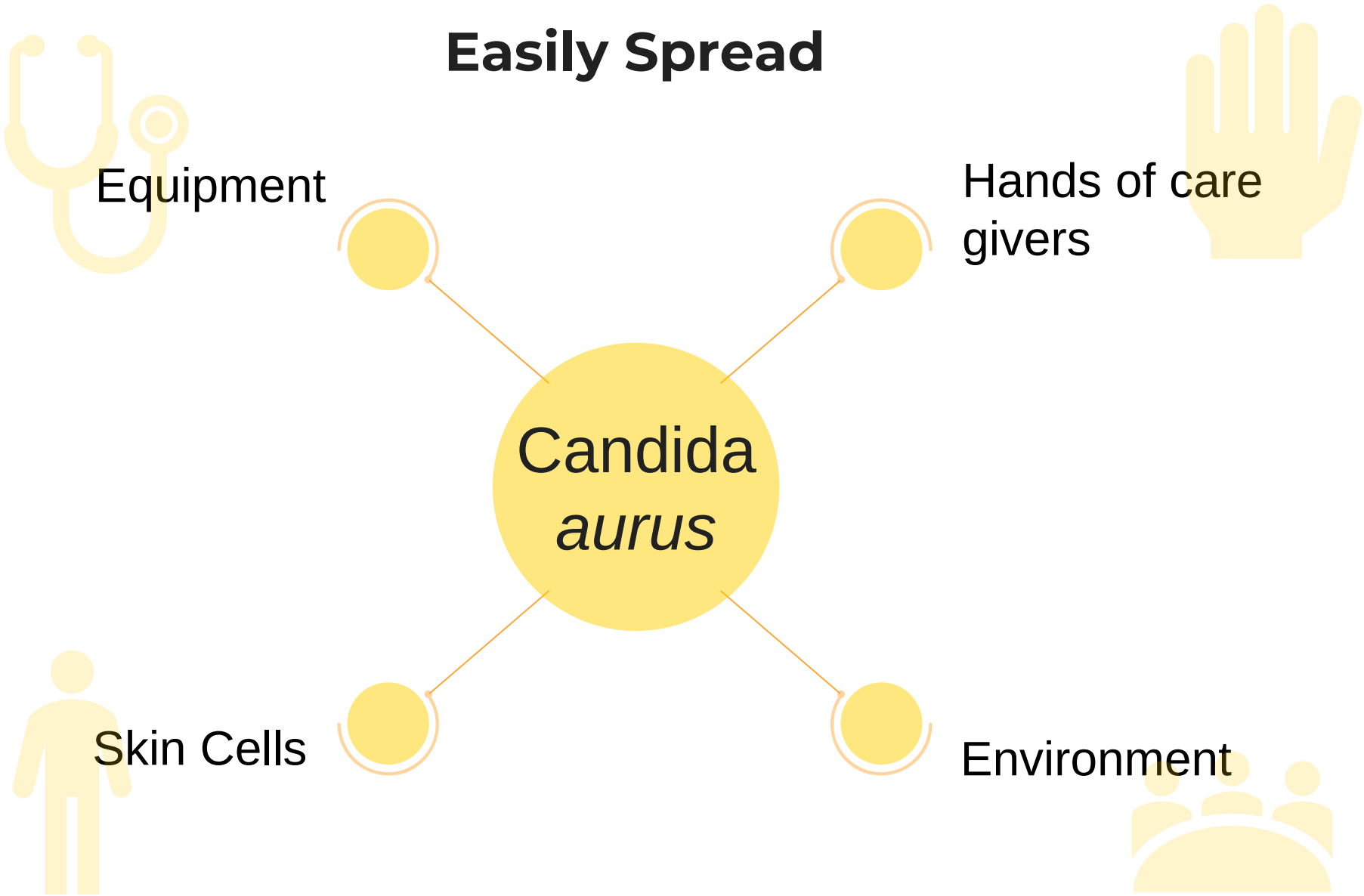
It's often resistant to medicines. Antifungal medicines commonly used to treat *Candida* infections often don't work for *Candida auris*. Some *C. auris* infections have been resistant to all three types of antifungal medicines.

It's becoming more common. Although *C. auris* was just discovered in 2009, it has spread quickly and caused infections in more than a dozen countries.

It's difficult to identify. *C. auris* can be misidentified as other types of fungi unless specialized laboratory technology is used. This misidentification might lead to a patient getting the wrong treatment.

It can spread in hospitals and nursing homes. *C. auris* has caused outbreaks in healthcare facilities and can spread through contact with affected patients and contaminated surfaces or equipment. Good hand hygiene and cleaning in healthcare facilities is important because *C. auris* can live on surfaces for several weeks.

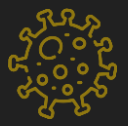
Easily Spread



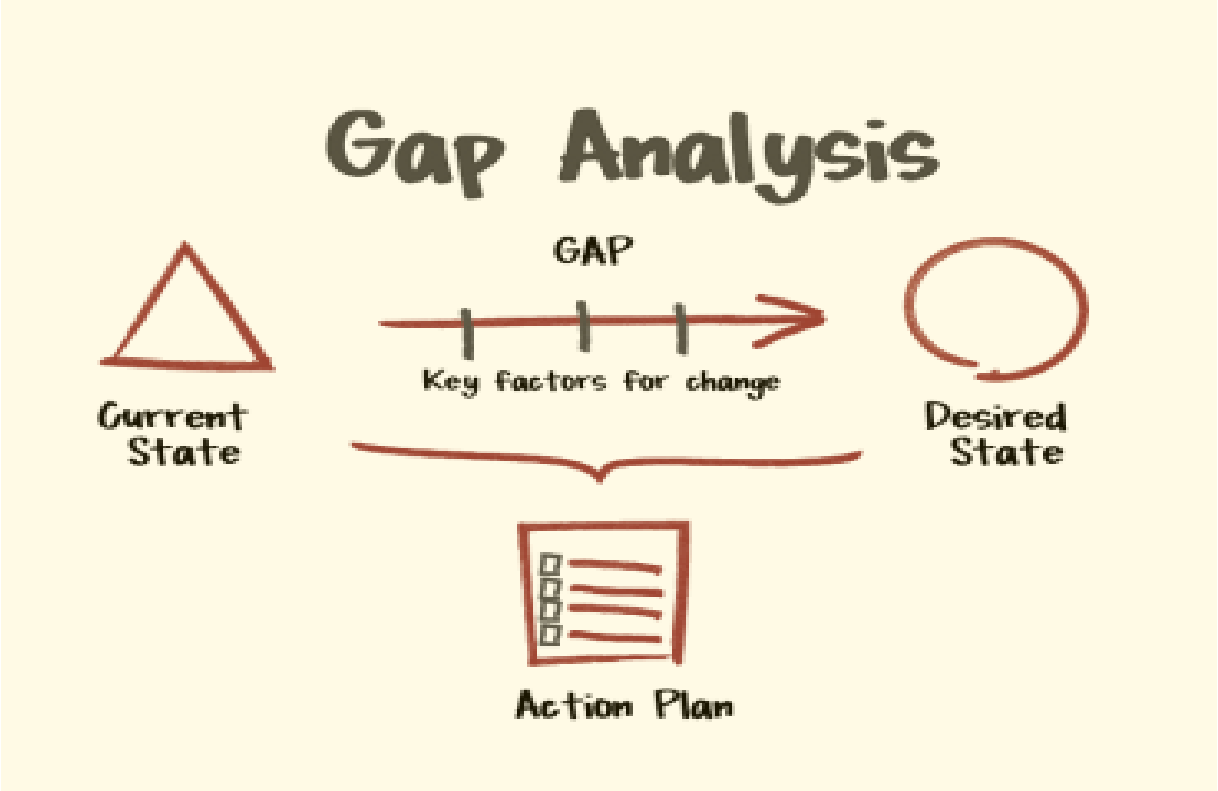
What's Next

- ✓ As hospitals have returned to normal census numbers, patients are presenting after delaying crucial primary and preventative care visits, such that higher acuity in non-COVID-19 patients should be expected.
- ✓ Increased acuity may lead to increased CLABSI CAUTI , C *difficile*
- ✓ As COVID continued, several nursing-related practices related to infection prevention strategies, such as disinfecting needleless access devices, conducting peer audits, etc. may experience decreases in compliance due to staffing shortages and burn-out/low morale

RISK MITIGATION



How do we get back to basics?



Sample Process Gap CLABSI

PROCESS	Y/N
Limit access	N
Timing of access	N
Daily CHG bathing	Not consistent
Replace dressings when wet or soiled	Not consistent
Scrub the hub	Not consistent
Hand Hygiene	Y
Real time feedback	N

505. Use of CLABSI Prevention Bundle Audits to Decrease CLABSI Rates in COVID Positive ICU Patients in an Acute Care Hospital in New York City During the COVID-19 Epidemic

A baseline assessment, using the central line maintenance bundle, was conducted on all COVID patients with central lines.

This assessment revealed issues with central line maintenance, including: undated, bloody, and non-intact dressings, poorly placed CHG impregnated disks; blood in end-caps, and missing alcohol impregnated caps on ports.

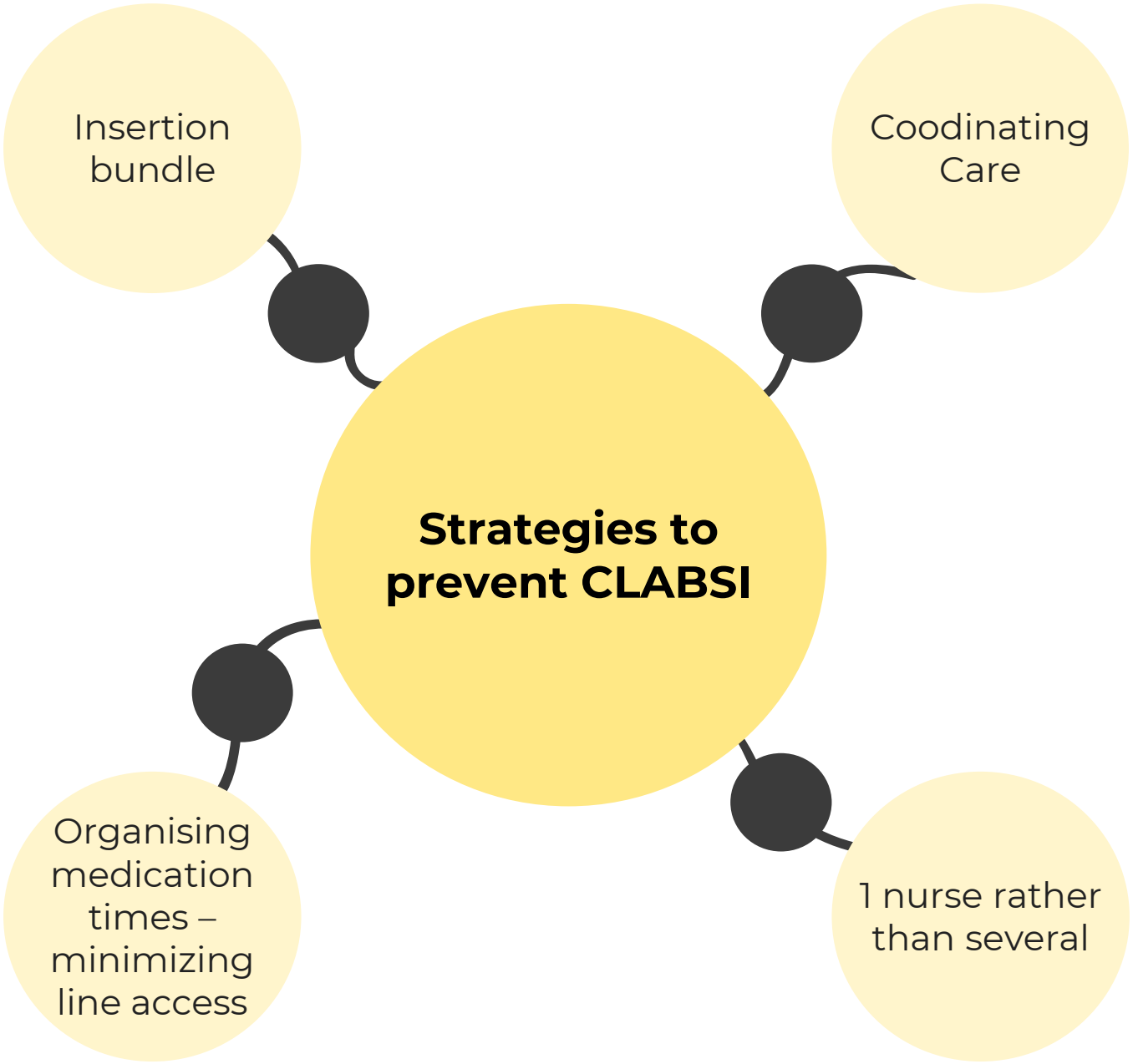
Moss ,*Open Forum Infectious Diseases*, Volume 7, Issue Supplement_1, October 2020

Innovation Strategy

- ✓ Brought in infusion nurses from an offsite location
- ✓ Performed daily intensive maintenance bundles
- ✓ Daily reports to nursing leadership

The Role of IP

- ✓ Chronicity of COVID
- ✓ Re-examine priorities
- ✓ What did we leave behind and what can we bring back?


Insertion bundle
Coodinating Care
Strategies to prevent CLABSI
Organising medication times – minimizing line access
1 nurse rather than several

Sample Process CAUTI GAP

PROCESS	Y/N
Aseptic insertion	Y
Appropriate indications for insertion	Not always
Remove as soon as possible	N
Culture only if clinically indicated	N – Pan culturing continues
Utilize nurse driven protocol for removal	N
Collect and send culture according to Guidelines	Y
Maintain catheter according to guidelines	Not always- proning
Alternate to Urinary catheter considered	N- not always

Healthcare Worker Practices (HCWs)

- ✓ Perform meticulous hand hygiene with soap and water or an alcohol based hand rub when caring for patients with C. difficile (Follow CDC or WHO guidelines)
- ✓ Monitor hand hygiene compliance and give feedback to HCWs
- ✓ Ensure proper hand hygiene technique
- ✓ Use full barrier precautions (Gown and gloves) for contact with patient or their environment
- ✓ Ensure proper donning and doffing of gowns and gloves
- ✓ Provide feedback on C. difficle infection incidence rates to HCWs and administration
- ✓ Algorithm for appropriate testing

Important Issue

- ✓ Antibiotic Stewardship
- ✓ Increase in utilization of antibiotics due to secondary bacterial infections
- ✓ Added additional providers due to volumes
- ✓ Cleaning protocols hurried and varied

HOW DO WE GET BACK ON TRACK?

Care Bundles and Safe Distancing: Keeping the Patient Not So Distant

- ✓ Follow your care bundle
- ✓ Leadership Rounding
- ✓ Multidisciplinary Triad rounding
- ✓ Electronic protocols and reports
- ✓ Frontline peer validation and feedback
- ✓ **Environmental bundle**

Surface Disinfection and Microbiology

- ✓ Pathogen able to survive for prolonged periods of time on environmental surfaces (all pathogens)
- ✓ Ability to remain virulent after environmental exposure (all)
- ✓ Contamination of the hospital environment frequent (all)
- ✓ Ability to colonize patients (Acinetobacter, C difficile, MRSA, VRE, Candida aurus)
- ✓ Ability to transiently colonize the hands of health care workers (all)
- ✓ Transmission via the contaminated hands of healthcare workers (all)
- ✓ Small inoculating dose (C difficile, norovirus)
- ✓ Relative resistance to disinfectants used on environmental surfaces
- ✓ (C difficile, norovirus)

Principles of Cleaning and Disinfection

Important to Remember:

- ✓ Cleaning refers to the removal of visible soil and organic material
- ✓ Thorough cleaning is needed before disinfection or sterilization because organic material can decrease the effectiveness of those processes.

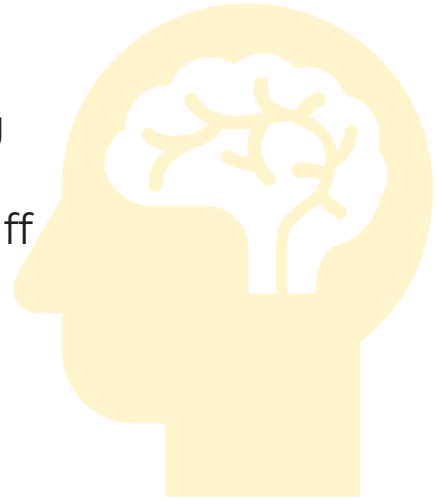
Cleaning

The Benefit of Microfiber

- ✓ Highly Absorbent
- ✓ Attracts Dirt
- ✓ Penetrates Small Spaces
- ✓ Lint Free
- ✓ Strong and Durable
- ✓ Cost Efficient
- ✓ Light Weight
- ✓ Resists Shrinking and Stretching

Strategies

- ✓ Technology- automation in device use, smart hand hygiene systems
- ✓ Continue to educate staff in a manner that they understand the importance of steps in a process.
- ✓ Leverage virtual approaches to enhance learning
- ✓ Continue to monitor for compliance and hold staff accountable
- ✓ Environmental monitoring



Linda's Lessons Learned

Team work – working collaboratively with people I seldom worked with : HR, Patient Flow, Specific MD's

Heighted value of IP – valued and appreciated

Things put on the back burner don't go away

Creativity and innovation- zoom meetings, work from home

Other Lessons Learned

1. Expect the unexpected
2. Query staff on the “what ifs”
3. Need clear messaging to patients
4. More frequent cleaning – identify “ who and how often”
5. One size does not fit all “ Standardize the what, leave room for the how”
6. People are creative and innovative when you empower and support them
7. Cross-functional working within organizations and systems facilitates faster and more robust change

Final Thoughts

“Once you embrace chaos, you'll know that you need to expect the unexpected, accept failures, plan for contingencies and connect dots in ways that you can't predict”

Minter Daniel Executive Network Blog