

Best Practices/Evidence-Based Guidelines for Preventing Catheter- Associated Urinary Tract Infections (CAUTI)

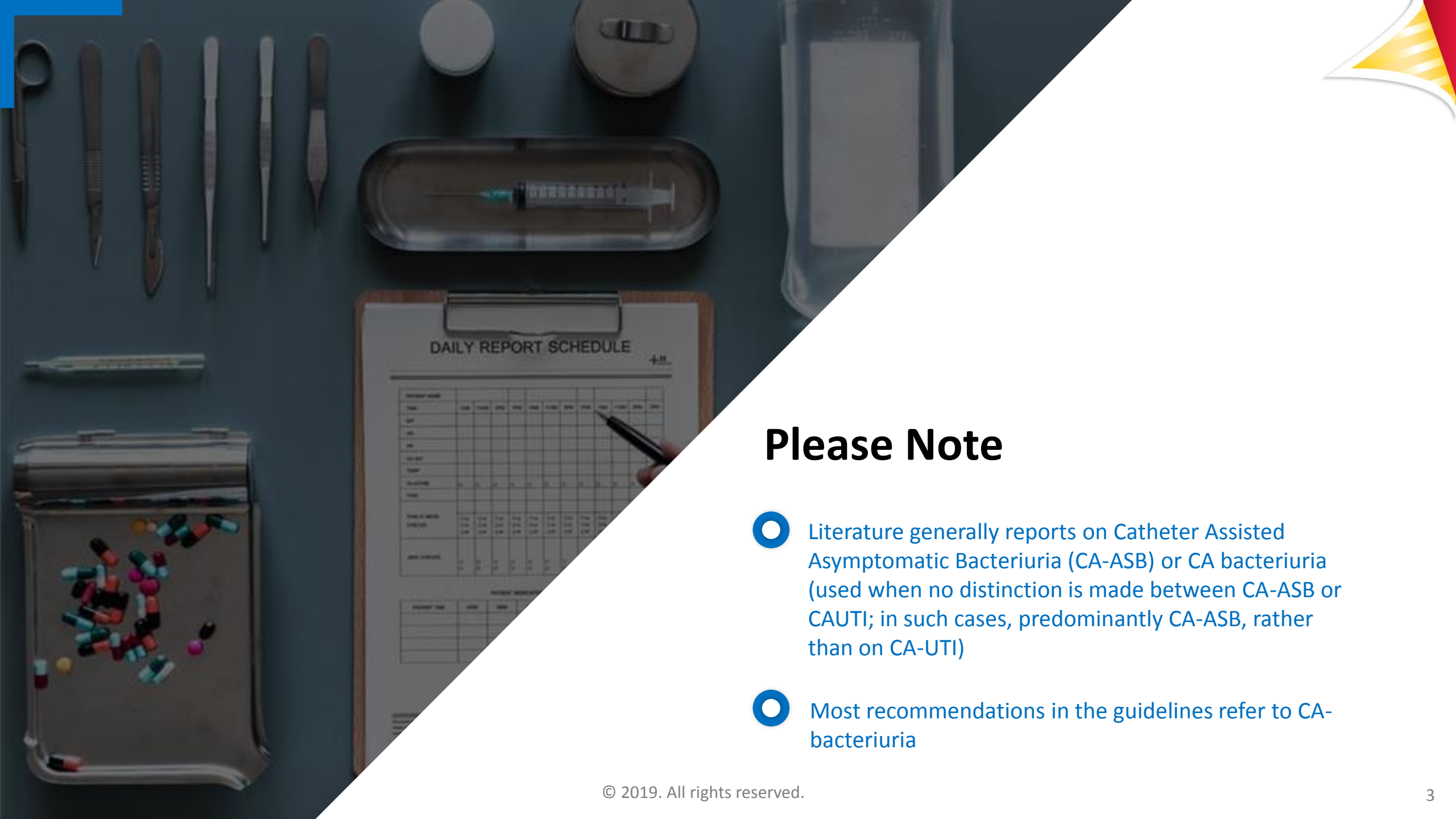
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Capital Nursing Education





Objectives

- Understand what is meant by “Best Practice/Evidence-Based Practice”
- Review the causes and symptoms of CAUTIs
- Discuss the different indications for indwelling urinary catheters
- Explore basic methods of CAUTI prevention in patients with neurological Dx such as spinal cord injury, spinal bifida, multiple sclerosis and cerebral palsy



Please Note

- Literature generally reports on Catheter Assisted Asymptomatic Bacteriuria (CA-ASB) or CA bacteriuria (used when no distinction is made between CA-ASB or CAUTI; in such cases, predominantly CA-ASB, rather than on CA-UTI)
- Most recommendations in the guidelines refer to CA-bacteriuria

Evidence-Based Practice

EBP means "integrating individual clinical expertise with the best available external clinical evidence from systematic research."
(Sackett D, 1996)

EBP is **the integration of clinical expertise, patient values, and the best research evidence into the decision-making process for patient care.**

Evidence-based practice is an interdisciplinary approach to clinical practice that has been gaining ground following its formal introduction in 1992.

Facts

The most effective way to reduce the incidence of CA-ASB and CAUTI is to:

- 1 Reduce the use of urinary catheterization
- 2 Restrict its use to patients who have clear indications
- 3 Remove the catheter as soon as it is no longer needed



Facts

- 80% of Hospital Acquired Infections (HAI) are associated with a urinary catheter
- Between 12-16% of hospitalized patients receive indwelling urinary catheters during their hospital stay
- There is a 3%-7% increased risk of acquiring a CAUTI each day that the patient remains in the ICU
- It is estimated that each year, more than 13,000 deaths are associated with UTIs
- Catheters should only be used for appropriate indications and should be removed as soon as they are no longer needed

Facts

- Rates are on the rise!
- CAUTI is the most commonly reported HAI; more than 560,000 patients develop CAUTIs each year
- 70% of CAUTIs are preventable
- Active prevention could result in about 380,000 fewer infections
- Active prevention could result in 9,000 fewer deaths annually

Diagnosing CA-ASB (Catheter Associated Asymptomatic Bacteriuria) and CAUTI (Catheter Associated Urinary Tract Infection)

Signs and symptoms of UTI with no other identified source of infection, along with:

>10³ colony-forming units of >1 bacterial species in a single catheter urine specimen or mid-stream voided specimen from a patient whose urethral, suprapubic or condom catheter has been removed within the previous 48 hours.

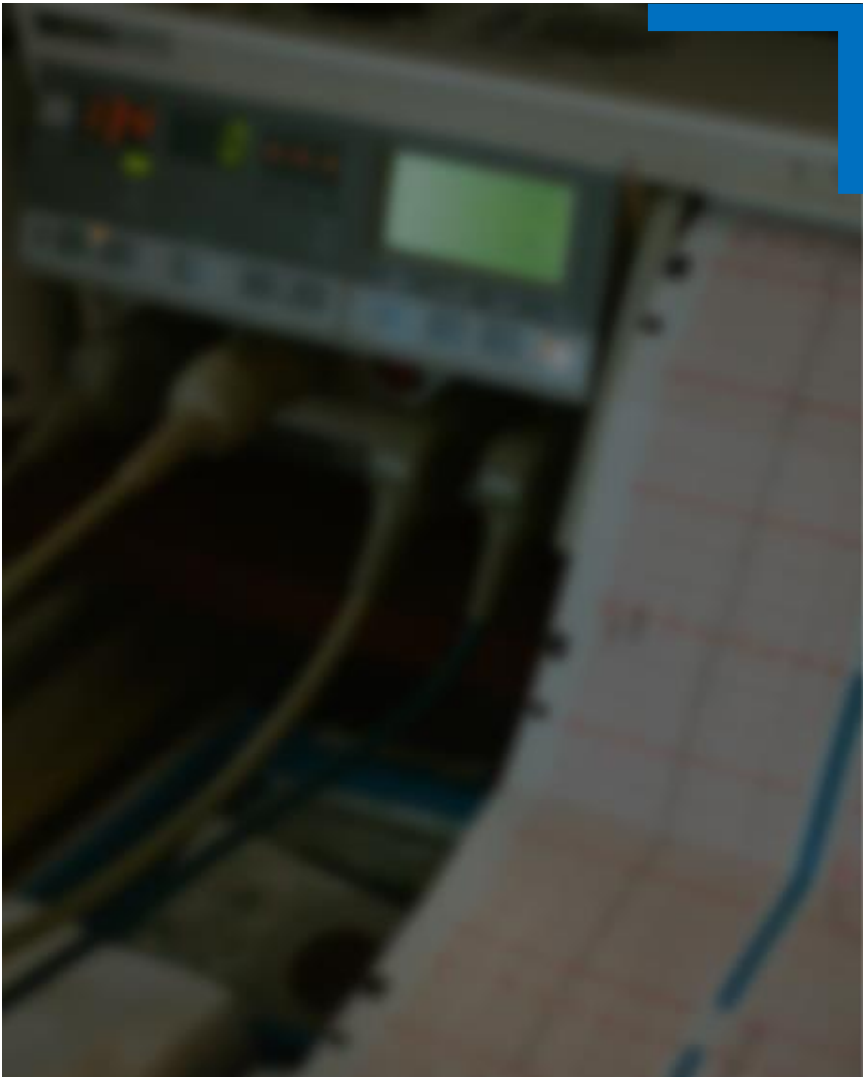




CAUTI Signs And Symptoms

- Cloudy urine
- Hematuria
- Strong urine odor
- Leakage around the catheter
- Vomiting

- Unexplained fatigue
- Dysuria
- Suprapubic tenderness
- Fever
- Chills
- Confusion in elderly



Causes of CAUTI Include:

- Contamination of catheter upon insertion
- Drainage bag not emptied often enough
- Bacteria from bowel movements getting onto the catheter
- Urine in the drainage bag flowing backward into the bladder
- Catheter not being cleaned regularly or thoroughly enough

Appropriate Indications for Indwelling Urethral Catheter According to the Centers for Disease Control (CDC):



Acute urinary retention or bladder outlet obstruction



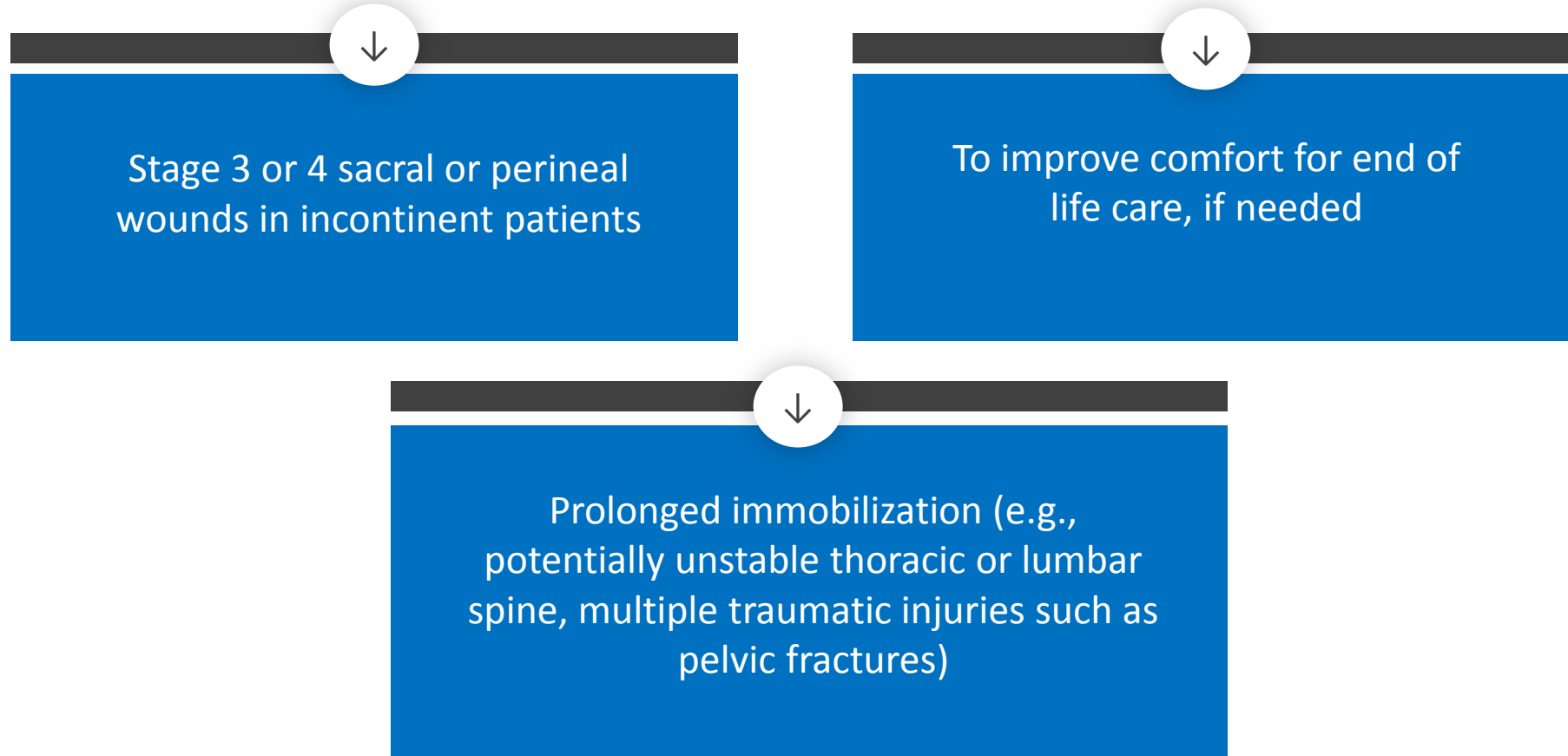
Need for accurate measurements of urinary output



Perioperative use for selected surgical procedures:

- Urological surgery or other surgery the genitourinary tract
- Anticipated prolonged surgery (should be removed in PACU)
- Intraoperative monitoring of urinary output
- Large-volume infusions or diuretics during surgery

Appropriate Indications for Indwelling Urethral Catheter According to the Centers for Disease Control (CDC):



Inappropriate Uses of Indwelling Catheters



Substitute for nursing care of the patient or resident with incontinence



Obtaining urine for culture or other diagnostic tests when the patient can voluntarily void



Used for prolonged postoperative duration without appropriate indications

The background of the slide features a close-up photograph of medical equipment. A clear plastic syringe with a white plunger and a scale marked with numbers 1 and 2 is positioned in the lower right. Several clear plastic catheters with different colored connectors (white, red, green, blue) are arranged across the frame. The text 'Alternatives to IUC' is centered over the image.

Alternatives to IUC



Consider Using Alternatives to IUC When Appropriate

- 1 Consider external catheters in cooperative male patients without urinary retention or bladder outlet obstruction
- 2 Consider intermittent catheterization in spinal cord injury patients
- 3 Intermittent catheterization is preferable to indwelling urethral or suprapubic catheters in patients with bladder emptying dysfunction
- 4 Consider intermittent catheterization in children with myelomeningocele and neurogenic bladder to reduce the risk of urinary tract deterioration

Best Practices for the Indwelling Urinary Catheter

1

Place **ONLY** when necessary & remove as quickly as possible

2

Inserted by trained person using sterile technique

3

Clean skin around meatus

4

18 Fr or larger can increase erosion of bladder neck

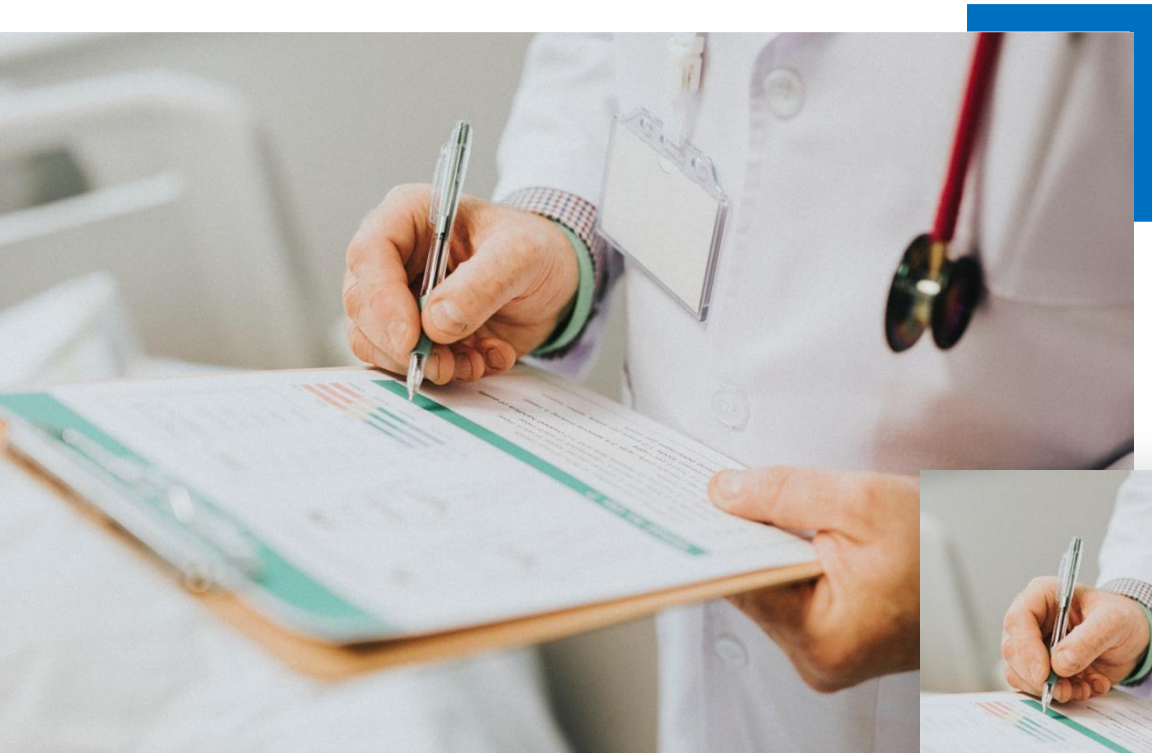
5

30 mL balloons **NOT** recommended

6

Consider other methods to drain urine:

- External catheters (men)
- Intermittent urethral catheterization



Indwelling Urinary Catheter Placement

- 1 Streamlined Evidence-Based RN Tool: Catheter Associated Urinary Tract Infection (CAUTI) Prevention
- 2 **Prior to Insertion:**
 - Appropriate per CDC Guidelines?
 - Select smallest appropriate catheter
 - 14 FR, 5ml or 10ml balloon
 - Obtain assistance PRN
 - Perform hand hygiene

Does Patient Meet CDC Criteria?

Yes

Insert IUC per Tool Checklist *(next slide)*

- Assess daily for meeting CDC Criteria for IUC (Follow nurse-driven removal protocol, if approved by the facility)
- Prevent CAUTI after IUC Insertion *(See CDC IUC Maintenance Bullets, next slide)*
- Assess for/report signs/symptoms of CAUTI *(See facility protocol/procedure)*

Does patient meet CDC (2009) Criteria for IUC?

No

Remove IUC, assess bladder emptying

Yes

Prevent CAUTI

No

Do Not Insert IUC

Assess urination and bladder emptying

Has Patient Urinated?

No

Prompt patient to urinate and evaluate results

Yes

Assess bladder emptying

Patient has urinary incontinence?

No

Develop individualized toileting plan with interdisciplinary input (e.g. prompted voiding, use of commode, use of anatomy-appropriate urinals) to regain continence.

- Use anatomy-appropriate collection device (e.g. external catheter, penile pouch/sheath (male) or urinary pouch (female) or absorbent products) to manage incontinence and maintain skin integrity

Yes

Tool Checklist: Assess for Adequate Bladder Emptying

A If Patient HAS urinated (voided) within 4-6 hours follow these guidelines:

- If minimum urinated volume ≤ 180 ml in 4-6 hours or urinary incontinence present, confirm bladder emptying
- Prompt patient to urinate/check for spontaneous urination within 2 hours if post-void residual (PVR) < 300 -500 ml - Recheck PVR within 2 hours*
- Perform straight catheterization for PVR per scan ≥ 300 -500 ml
 - Repeat scan within 4-6 hours and determine need for straight catheterization
 - Report to provider if retention persists ≥ 300 -500ml
 - Perform ongoing straight catheterization per facility protocol to prevent bladder overdistension and renal dysfunction (CDC, 2009), usually every 4-6 hours
- If urinated >180 ml in 4-6 hours (adequate bladder emptying), use individual plan to promote/maintain normal urination pattern

B If Patient HAS NOT urinated within 4-6 hours and/or complains of bladder fullness, then determine presence of incomplete bladder emptying:

- Prompt patient to urinate. If urination volume ≤ 180 ml, perform bladder scan.*
 - *Perform bladder scan (CDC, 2009) to determine PVR. If no scanner is available, perform straight catheterization.
- On the form from ANA, it then has the checklist to follow for insertion and maintenance of the catheter.

Proper Techniques For Urinary Catheter Insertion

Patient preparation:

- 1) Perform hand hygiene
- 2) Perform peri-care
- 3) Re-perform hand hygiene
- 4) Maintain strict aseptic technique
- 5) Re-perform hand hygiene upon completion
- 6) Insert catheter to appropriate length and check urine flow before balloon inflation
- 7) Inflate balloon correctly (5-10 cc)

Proper Techniques for Urinary Catheter Insertion—per Guidelines from CDC

1

Perform hand hygiene

2

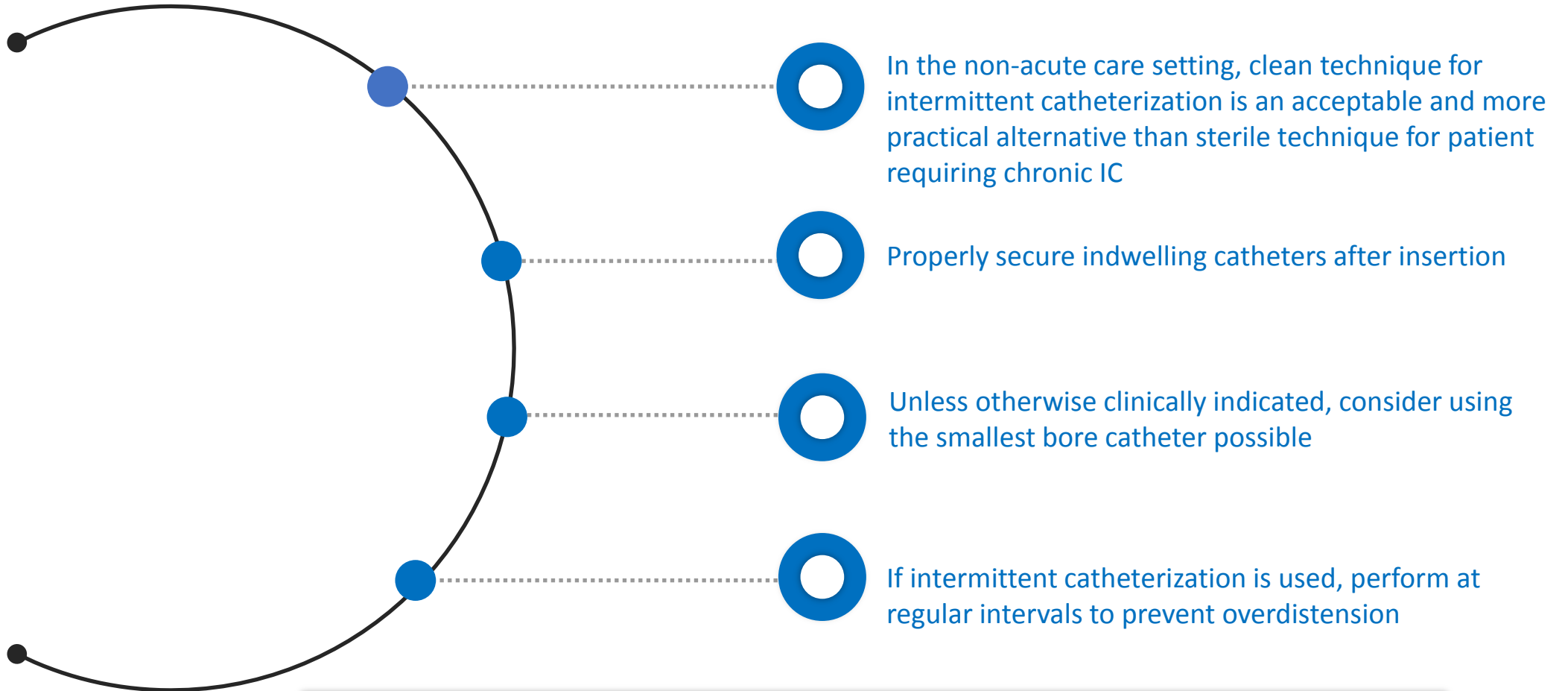
Ensure that only properly trained persons who know the correct technique of aseptic catheter insertion and maintenance are given this responsibility

3

In acute care hospital, use aseptic technique with sterile equipment

** Use sterile gloves, drape, sponges, an appropriate antiseptic or sterile solution for periurethral cleaning and single use packet of lubricant jelly for insertion*

Proper Techniques for Urinary Catheter Insertion—per Guidelines from CDC



Consider using a portable ultrasound device to assess urine volume in patients undergoing intermittent catheterization to assess urine volume and reduce unnecessary catheter insertions

** If ultrasound bladder scanners are used, ensure that indications for use are clearly stated, nursing staff are trained in their use, and equipment is adequately cleaned and disinfected in between patients. (Category IB)*

Indwelling Urinary Catheter Placement

After catheter insertion:

- Perform Triple Action for IUC/Drainage System:
 - ✓ Secure catheter to prevent urethral irritation
 - ✓ Position drainage bag below the bladder (not on the floor)
 - ✓ Check system for closed connections and ensure no obstructions or kinks



Proper Techniques for Urinary Catheter Maintenance

- Maintain a closed drainage system
- If breaks in aseptic technique, disconnection, or leakage occur, replace the catheter and collecting system
- Consider using preconnected, sealed catheter-tubing junctions
- Maintain unobstructed urine flow
- Avoid twisting or kinking tubing
- Keep the collecting bag below the level of the bladder at all times
- Do not rest the bag on the floor
- Empty the collecting bag regularly
- Prevent contact of the drainage spigot with the nonsterile collecting container



Proper Techniques for Urinary Catheter Maintenance

- Unless clinical indications exist (e.g., bacteriuria post urologic surgery), do not use systemic antimicrobials routinely to prevent CAUTI
- Do not clean the periurethral area with antiseptics to prevent CAUTI while the catheter is in place
 - Routine hygiene (e.g., cleansing of the meatal surface during daily bathing or showering) is appropriate
- Unless obstruction is anticipated bladder irrigation is not recommended



Proper Techniques for Urinary Catheter Maintenance

- Use standard precautions during any manipulation of the catheter or collecting system
- Changing indwelling catheters or drainage bags at routine, fixed intervals is not recommended
- Change catheters and drainage bags based on clinical indications such as infection, obstruction, or when the closed system is compromised
- Unless clinical indications exist (e.g., in patients with bacteriuria upon catheter removal post urologic surgery), do not use systemic antimicrobials routinely to prevent CAUTI in patients requiring either short or long-term catheterization



Proper Techniques for Urinary Catheter Maintenance

- If obstruction is anticipated, closed continuous irrigation is suggested to prevent obstruction
- Routine irrigation of the bladder with antimicrobials is not recommended
- Routine instillation of antiseptic or antimicrobial solutions into urinary drainage bags is not recommended
- Clamping indwelling catheters prior to removal is not necessary



Management of Obstruction

- If obstruction occurs and it is likely that the catheter material is contributing to obstruction, change the catheter
- Further research is needed on the benefit of irrigating the catheter with acidifying solutions or use of oral urease inhibitors in long-term catheterized patients who have frequent catheter obstruction (no recommendation/unresolved issue)



Management of Obstruction

- Further research is needed on the use of a portable ultrasound device to evaluate for obstruction in patients with indwelling catheters and low urine output (no recommendation/unresolved issue)
- Further research is needed on the use of methenamine to prevent encrustation in patients requiring chronic indwelling catheters who are at high risk for obstruction (no recommendation/unresolved issue)



Catheter Materials

- If the CAUTI rate is not decreasing after implementing a comprehensive strategy, consider using antimicrobial/antiseptic-impregnated catheters
- The comprehensive strategy should include the high-priority recommendations for urinary catheter use, aseptic insertion, and maintenance
- Hydrophilic catheters might be preferable to standard catheters for patients requiring intermittent catheterization
- Silicone might be preferable to other catheter materials to reduce the risk of encrustation in long-term catheterized patients who have frequent obstruction



Education and Training

- Periodic in-service training regarding techniques and procedures for urinary catheter insertion, maintenance, and removal must be provided
- Provide education about CAUTI, other complications of urinary catheterization and alternatives to indwelling catheters
- Consider providing performance feedback to personnel on what proportion of catheters they have placed meet facility-based criteria and other aspects related to catheter care and maintenance.



Home Catheter Care

The RN should teach patient the proper methods of:

- Cleaning the catheter
- Changing the drainage bag
- Caring for the leg bag
- Caring for the night bag
- Cleaning the drainage bags
- Preventing Infection



Teach Patient to Call Their Doctor or Nurse Immediately If:

- Your catheter comes out. Do not try to replace it yourself.
- You have a temperature of 101 °F (38.3 °C) or higher.
- You are making less urine than usual.
- You have foul-smelling urine.
- You have bright red blood or large blood clots in your urine.
- You have abdominal pain and no urine in your catheter bag.

Clean Intermittent Catheterization

- In the **non-acute** care setting, **clean technique** for intermittent catheterization is an acceptable and more practical alternative to sterile technique for patients requiring chronic intermittent catheterization
- Further research is needed on optimal cleaning and storage methods for catheters used for clean intermittent catheterization
- If intermittent catheterization is used, perform it at regular intervals to prevent bladder overdistension

Clean Intermittent Catheterization (CIC) Considerations



- Portable ultrasound device to assess urine volume and reduce unnecessary catheter insertions
- If ultrasound bladder scanners are used, ensure that indications for use are clearly stated, nursing staff are trained in their use, and equipment is adequately cleaned and disinfected in between patients

Bladder Management in the Context of Atypical Neurological Function

This includes most diagnoses affecting neurological function, including:

- Spinal cord injury (SCI)
- Parkinson's disease
- Multiple sclerosis
- Muscular dystrophy
- Stroke
- Neurogenic bladder
- Neurogenic lower urinary tract dysfunction

Example: Bladder Management in the Context of Spinal Cord Injury

These dysfunctions result in the following symptoms:

- Urgency
 - Increased daytime and nighttime frequency
 - Urinary retention
 - UTI

Frequent UTI in the SCI population is 3 or more UTI per year

- Intermittent Catheterization is gold standard for treating neurogenic bladder
- Clean Intermittent Catheterization (CIC) contributed to increased life expectancy of people with SCI

UTI in Spinal Cord Injury Population

UTI protocols for treatment and follow-up are different with neurogenic bladder

- Decreased pain sensation
- Other potential sources of infection

Asymptomatic bacteriuria is not a disease

- **Presence of bacteria in urine is not unusual in the CIC user:**
 - May be a sign of poor hydration or infrequent catheterizing
 - Can be addressed by changing hydration and bladder management routines

Treatable Level of Infection in SCI Patients

- 
- Fever
 - Rigors
 - Altered mental status
 - Malaise
 - Lethargy
 - Acute hematuria
 - Pelvic discomfort

- Discomfort or pain over kidney or bladder
- Increased incontinence
- Increased frequency of catheterization/voiding
- Increased spasticity
- Autonomic dysreflexia
- Sense of unease



Colonization

1

60% of individuals using CIC are chronically colonized

2

Without the physical symptoms accompanying positive UA, they are considered “asymptomatic” and are not candidates for antibiotics

3

Bacteria or pyuria are important in diagnosing, when symptoms are present

Treatment of UTI in the SCI Population

1

Antibiotics are used with positive urine culture, and sensitivity, AND presence of clinical symptoms as described

2

Treatment of asymptomatic colonization with antibiotics does not benefit the patient except in patient with urea-splitting bacteria, such as proteus, which can help to prevent bladder calculi

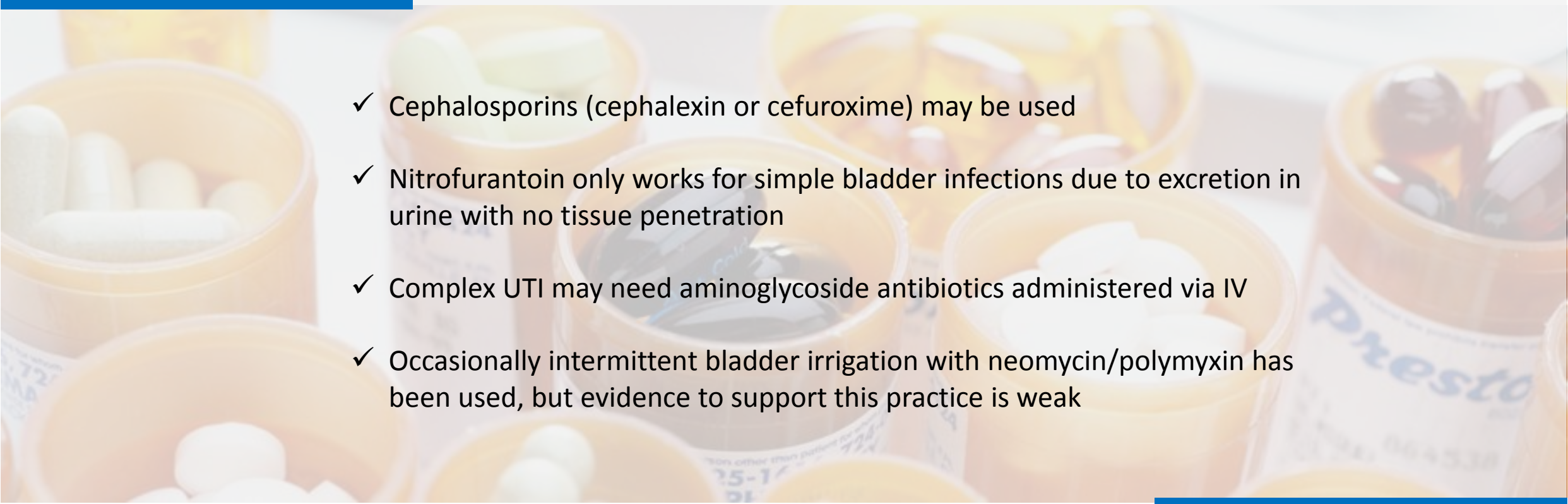
Which Antibiotics Should be Considered?

Ciprofloxacin or Ofloxacin, 3 or 7 day treatment regimen

In clinical practice, 7 day course is often used due to the complex and recurrent nature of UTI in those with neurogenic lower urinary tract dysfunction



If Unable to Use the Quinolone Drugs (resistant or allergies)

- 
- ✓ Cephalosporins (cephalexin or cefuroxime) may be used
 - ✓ Nitrofurantoin only works for simple bladder infections due to excretion in urine with no tissue penetration
 - ✓ Complex UTI may need aminoglycoside antibiotics administered via IV
 - ✓ Occasionally intermittent bladder irrigation with neomycin/polymyxin has been used, but evidence to support this practice is weak

Diagnosis and Complications of CAUTI



Urinalysis

If untreated, can lead to kidney infection



Urine culture

May cause further immune system stress, making patient more vulnerable to future infections

Current Treatment for Recurring Bladder Infections in Individuals with Neurogenic Bladder

- Cranberry, vitamin C
- Oral antibiotics and other medications
- Anticholinergic medications (ditropan, detrol, vesicare)
- Onabotulinum toxin
- Bacterial interference
- Sterile intermittent catheterization
- Sterile pre-lubricated hydrophilic catheter
- Sterile closed system catheter
- Foley catheter



Current Treatment for Recurring Bladder Infections in Individuals with Neurogenic Bladder



Mitrofanoff procedure



Bladder augmentation



Ileal conduit urinary diversion



Cystectomy

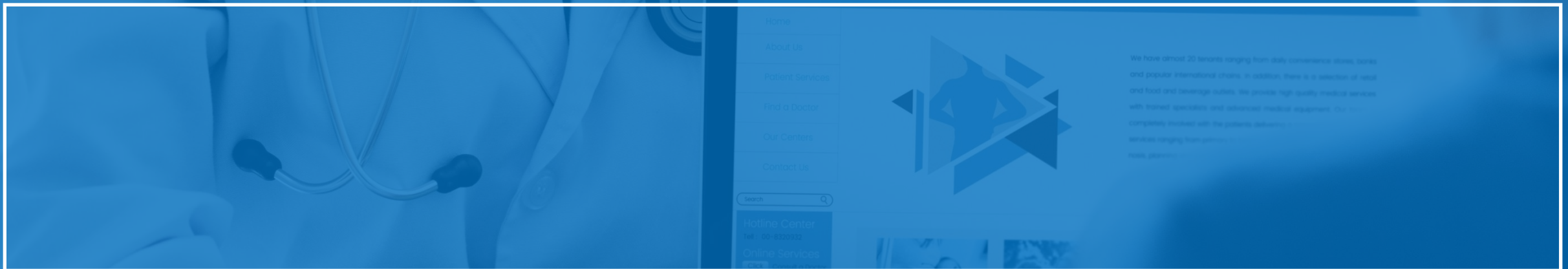
Persistent UTI

>500ml bladder volumes—can adjust fluid intake or increase frequency of CIC

- In the NLUTD population, CIC with 12-14 Fr is needed 4-6 x daily
 - Less frequently causes increased bladder storage volumes and increases risk of UTI
- If UIEs persist and above is not possible, condom catheter with external collection device or indwelling urethral FC or suprapubic catheter may be necessary

Conclusions Regarding the SCI Patient

- Most SCI patients have asymptomatic bacteriuria or colonization
- No symptoms---no treatment
- If UTIs persist after treatment, refer to urologist to f/o bladder pathology
- Annual monitoring of structure and function if urinary tract is recommended
- CIC is preferred method of emptying
- Limited research to support types of catheters or multiusers/singleuser
- No definitive evidence on ideal method of cleaning or storage



Common Problems Among Children with Spina Bifida

- UTI
- Vesico-ureteral reflux
- Hydronephrosis
- Incontinence

Why?

- Nerve damage
- Bladder and sphincter muscle may not work properly

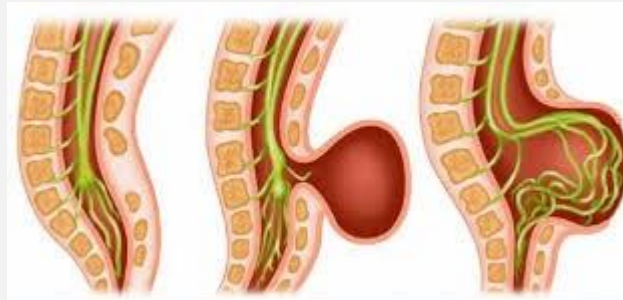
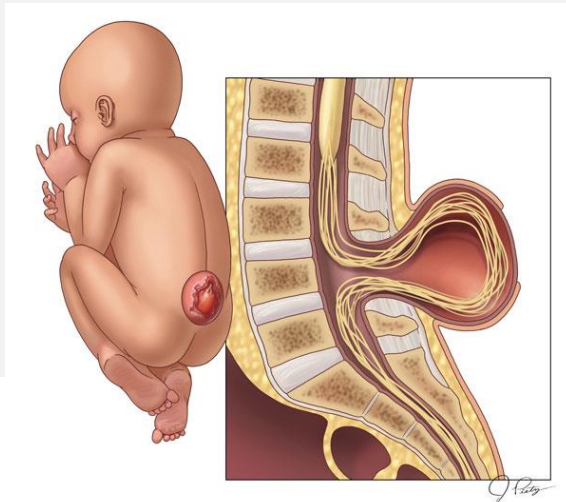


Image courtesy of CDC: Daily's Story

Prevention of CAUTI in Individuals with Spina Bifida

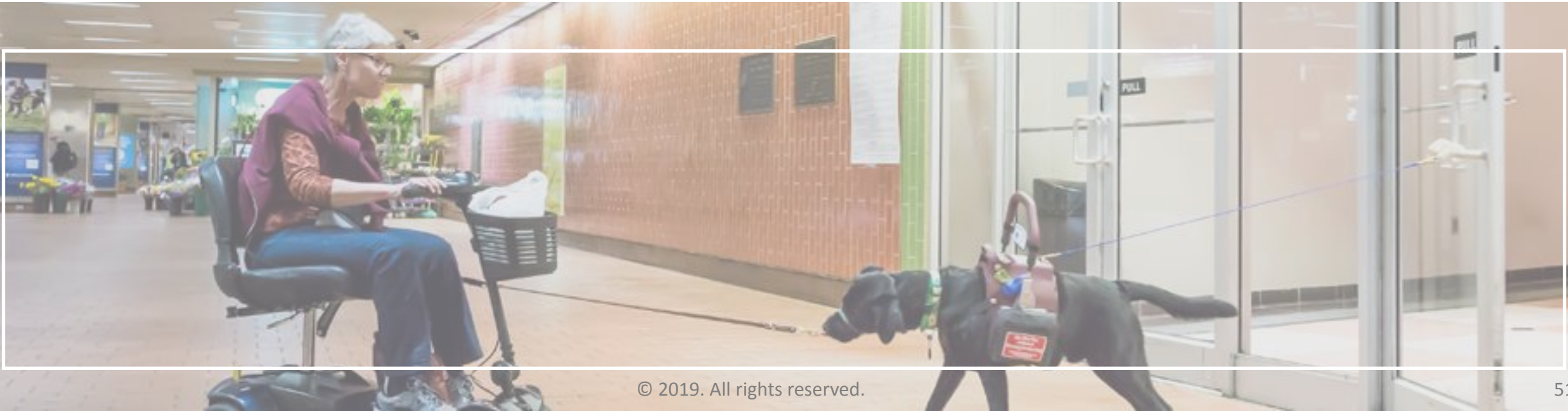


- Only 5% of children with spina bifida are able to empty their bladders without help
- Most children with spina bifida have a neurogenic bladder
- Goals of urological management:
 - Make sure kidneys are working well and prevent damage
 - Help child to empty bladder
 - Help child to stay dry
- Ongoing assessment and monitoring:
 - Urinalysis and cultures
 - Creatinine and BUN to check kidney function
 - Renal/Bladder ultrasound
 - Voiding cystourethrogram (VCUG)
 - Urodynamic Studies
 - Renal Scans

Images courtesy of CDC

Infections and Multiple Sclerosis (MS)

- Infections are thought to be involved in MS pathogenesis
- Infections may influence disease susceptibility and clinical course
- Most common infections are the upper respiratory and urinary tract infections
- At risk period of relapse of MS is thought to be 2 weeks preceding and 5 weeks following the onset of an infection
- Exacerbations of disease activity during the at risk period were more likely and led to more severe and sustained relapses



Bladder Dysfunction in Multiple Sclerosis (MS)

Detrusor hyperreflexia (50-90% of patient with MS)

- Frequency, urgency and incontinence
- Unable to inhibit detrusor contractions
- Voiding at low bladder volumes

50% develop detrusor-sphincter dyssynergia

- Failure of urethral sphincter relaxation on detrusor contraction
- Results in high micturition pressures

Progression of MS and Bladder Dysfunction

- Often requires Pelvic floor exercises, intermittent self catheterization (ISC) or indwelling permanent catheter
- Increased susceptibility to recurrent UTIs
- Can lead to systemic infection and sepsis
- Infections associated with pyrexia may alter the conduction properties of demyelinated axons
- Appropriate management in MS patients is essential



Best to “Be Prepared”

Diagnosis UTI during assessment of presumed MS relapse:

- Assess for presence of concurrent UTI
- Culture and Sensitivity

Infection detected:

- Delay steroid treatment until results of C&S are available
- Treat with antibiotics before starting steroid treatment if single microbial species if found
- Current practice considers cultures yielding mixed growth as not pathological, but rather contaminated and therefore, not clinically significant.

Cerebral Palsy Studies

- 91% of children achieve complete bladder control by age of 6
- Children with IQ >65 and diplegia or hemiplegia is 3.6-4.1 years
- Children with IQ <65 and tetraplegia is 10-13 years
- Studies report that lower urinary tract symptoms are common in children with CP
- Urinary Incontinence is most common—about 35-45%
- Urinary urgency and frequency average in children with CP is 38-22.5%
- Nocturia is 8.3% of children and 62.5% of adults with CP



Cerebral Palsy Studies (continued)

- One study involving adults with CP reported 23% require intermittent Catheterization for retention, hydronephrosis, and refractory lower urinary tract symptoms
- Children with CP are not found to be at risk of nephropathy

Protection of the Child's Urinary Tract

CIC—

- Helps to prevent infections
- Reduces bladder pressures
- Helps the child to become dry

Medications

- Prevent and treat infections
- Relax bladder so it may hold more urine at low pressures (anticholinergics like Ditropan)

Surgery

- Treat reflux
- Enlarge bladder
- Improve sphincter function or suprapubic/urostomy

Catheterization in CP patients

- Children with CP often cannot tolerate Intermittent urethral catheterization.
- Indwelling suprapubic catheter is recommended
- There is not a lot of information or studies of the complications with CAUTIs in this population



Can UTI During Pregnancy Cause CP?

- Yes!
- Standards of care need to be followed or it is negligence
- If negligence leads to injury in the baby, it is medical malpractice

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About Catheters Urological Health Videos

Welcome to the Urological Community! Explore our library of helpful resources to help you learn more about how to catheterize, keep a healthy urinary tract and more. Our goal is to provide current, accessible and accurate information about a variety of urology issues you may experience. We look forward to answering any questions you may have.



Navigating Childhood and Learning How to Self-Cath

If your child requires self-catheterization at school and is developmentally ready, it can be helpful for him or her to begin learning at an early age, possibly even as early as kindergarten.

Sarah Herrera



5 Tips for Preventing Kidney Stones

Kidney stones are extremely common, even affecting young children and teens. Kidney stones are small, pebble-like deposits composed of minerals and salts.

Cassandra Bursma, RD



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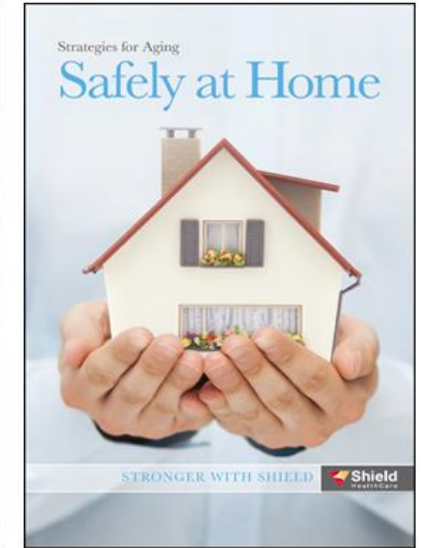
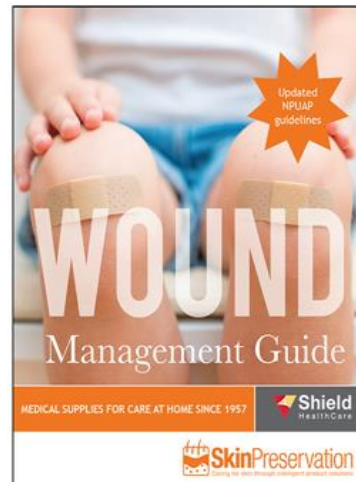
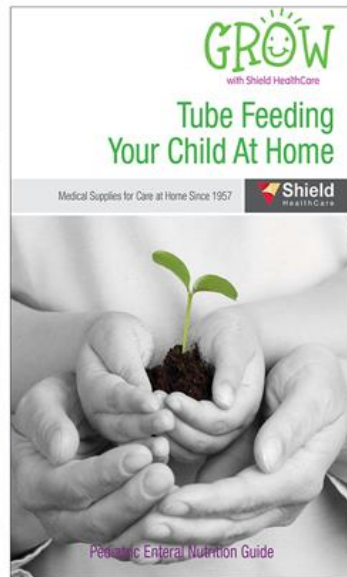
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FOR MORE INFORMATION, OR TO ASK QUESTIONS ABOUT
THE PRESENTATION, CONTACT:

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QUESTIONS?

