Antibiotic Stewardship Important in Reducing Bacterial Resistance in UTIs

BY CHRISTINE KILGORE

Almost 1,000 urine tests a year for a 435-bed facility. This figure rattled Ken Brubaker, MD, medical director of the Masonic Village in Elizabeth-town, PA, when he saw it several years ago.

Dr. Brubaker subsequently oversaw a reduction of that total to about 360 tests a year by educating front-line staff and physicians about the high prevalence of chronic asymptomatic bacteriuria in nursing homes — up to 50% — and about the growing consensus that a diagnosis of urinary tract infection (UTI) requires the presence of localized genitourinary symptoms or specific infectious symptoms. Nonspecific signs alone don’t cut it, he taught.

UTI has long been one of the most commonly treated infections in nursing homes. In recent years, however, UTI has acquired the unenviable reputation as one of the largest causes of antimicrobial overuse in older adults.

With a national priority being placed on antibiotic stewardship, UTI is under the microscope. It is one of five priority areas in the Department of Health and Human Service’s 2013 plan to reduce health care–associated infections in nursing homes, for instance. The Agency for Healthcare Research and Quality (AHRQ) is also acting to address the appropriateness of UTI diagnoses, as are AMDA and other medical associations.

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Raising the Bar

Deciding when to culture, how and when to diagnose UTI, and when to initiate antibiotic therapy are among the most challenging decisions made in the long-term care setting, sources told Caring for the Ages.

About 2.6 million people in long-term care facilities in the US have UTI each year. UTI is the most common infectious diagnosis in nursing homes, and in the last 10 years there has been a 9% increase in antimicrobial-resistant UTI in long-term care facilities.

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**Antibiotics in UTIs**

*from page 1*

**Hosp Epidemiol** 2012;33:965-77), are designed for surveillance and benchmarking purposes. The updated criteria are commonly known as the Stone criteria and have been incorporated into the Society for Healthcare Epidemiology of America’s guidance for nursing homes and long-term care facilities for tracking and monitoring health care–associated infections.

The Loeb criteria were first developed in 2001 and represent minimal criteria for the initiation of therapy (Infect Control Hosp Epidemiol 2001;22:120-4). Unlike the original and updated McGeer criteria, the Loeb criteria are designed for making treatment decisions in real time. There have been variations published of both sets of criteria as well.

The Stone and Loeb criteria are both widely accepted among infection control experts, but the extent to which nursing homes are using these criteria and heeding calls for more careful diagnosis and judicious antimicrobial treatment is unclear.

David Nace, MD, MPH, CMD, chair of AMDA’s Infection Control Advisory Committee, said there is still much confusion about what constitutes symptomatic UTI in older adults. He and his colleagues at AMDA recently received funding from the AHRQ for a project that aims to improve UTI management in nursing homes, partly by updating the Loeb criteria to make them more fully applicable to nursing home residents and partly by educating long-term caregivers about how to use both main sets of criteria.

Ultimately “we all need to use an acceptable practice” in both practice and in research, said Dr. Nace, director of the long-term care and influenza programs at the University of Pittsburgh. “In the meantime, we have to step back and acknowledge that we know what is not a UTI.”

The Loeb criteria and any Limited-Associated UTI no longer include a change in the character of urine, for instance, or a worsening of mental or functional status — a shift that Nimalie Stone, MD, medical epidemiologist for long-term care at the Centers for Disease Control and Prevention and lead author of the 2012 revised McGeer surveillance criteria for UTI, calls highly significant.

“We did such a good job of teaching people [years ago] that changes in the characteristics of urine should prompt consideration of UTI and that any change in mental status in a frail elderly adult is a likely UTI,” she said, “that now we’re having to work really hard to pull back on this clinical paradigm so that many of us grew up with.

**Current Thinking**

The presence of localized genitourinary symptoms such as dysuria is a common element of the Stone and Loeb criteria and a main message of AMDA’s Choosing Wisely campaign item relating to UTI. (The campaign is part of the broader Choosing Wisely initiative organized by the American Board of Internal Medicine Foundation to reduce overuse of tests and procedures.) AMDA’s campaign item about UTI instructs physicians and patients not to obtain a urine culture “unless there are clear signs and symptoms that localize to the urinary tract.” It states that

> the presence of bacteria in the urine, of any quantity, without any localizing signs or symptoms. Bacterial colonization is common in older adults, as bladder functionality and urinary tract anatomy change with age and as a result of clinical conditions such as diabetes and stroke, Dr. Stone said.

Multiple studies have shown that urine tests drive treatment decisions; when urine tests are ordered, there is a high likelihood that results will be positive and that residents will receive antibiotic treatment, regardless of whether a UTI is present (J Am Med Dir Assoc 2014;15:133-9).

As Dr. Brubaker has emphasized in his facility, it’s better not to order urine tests in the first place — unless there are compelling reasons to do so. He told Caring he had had to look more closely at his facility’s volume of urine testing when he noticed a high number of acquired UTIs per Minimum Data Set quality measures.

“I don’t have data yet from our facility (on antibiotics), but there’s no question that when we order fewer urine tests, we’re going to order fewer antibiotics,” he said.

In a cluster randomized controlled trial published in 2005, Mark Loeb, MD, (the author of the Loeb criteria) and his coinvestigators reported a 31% reduction in prescriptions without any increase in hospitalizations or mortality when a diagnosis and treatment algorithm based on the Loeb criteria was implemented in 12 nursing homes.

The trial compared outcomes in these nursing homes with outcomes in 12 other nursing homes assigned to usual care, and the algorithm included minimal criteria for ordering a urine culture in addition to the minimal criteria for initiating antimicrobials published in 2001 (BMJ 2005;331:669).

**The Value of Monitoring**

There is no evidence that treating asymptomatic bacteriuria in older adults affects morbidity or mortality, the prevalence of bacteriuria, the frequency of falls, or the frequency of symptomatic urinary infections. There is ample evidence, on the other hand, that the treatment of asymptomatic bacteriuria is potentially harmful — for the LTC resident and for other facility residents.

A study of two Rhode Island nursing homes showed that residents with asymptomatic bacteriuria who were treated with antibiotics were 8.5 times more likely to develop Clostridium difficile colitis within 3 months of treatment, for example (Arch Intern Med 2011;171:438-43).

It also is well documented that high rates of antibiotic use give rise to methicillin-resistant *Staphylococcus aureus*, vancomycin-resistant enterococci, fluoroquinolone-resistant strains of a variety of bacteria, and various multidrug-resistant organisms. Nursing homes clearly are a hot spot.

In a “UTI Communication Toolkit” — part of a recently published set of forms, handouts, and training templates designed to help nursing homes optimize antibiotic use — Dr. Brubaker says that

> “nursing homes serve as one of our most fertile breeding grounds for antibiotic-resistant strains of bacteria” (www.ahrq.gov/professionals/quality-patient-safety/patient-safety-resources/resources/nhsappodule/index.html).

To make a UTI diagnosis even more complicated, nursing home staff often care for residents who have advanced dementia and are nonverbal. In such cases, according to AMDA’s Choosing Wisely campaign, it is “reasonable to obtain a urine culture if there are signs
Nursing homes are more frequently removing indwelling urinary catheters soon after admittance. This is a significant advancement because residents with indwelling devices have a higher risk of developing UTIs and a higher prevalence of multi-drug resistant organisms (MDROs).

“It’s a success story for nursing homes. We’re good at removing the catheters,” said Lona Mody, MD, associate chief of the division of geriatric and palliative care medicine at the University of Michigan Medical School, Ann Arbor, at AMDA’s 2015 Annual Conference held in March.

Ongoing research shows that while about 10% of nursing home residents are admitted with a urinary catheter, the prevalence goes down to 5%-6% shortly after admittance, Dr. Mody explained in an interview. Research in the 1990s and 2000s showed a 10%-15% prevalence of urinary catheters in nursing homes.

She and other experts are now hoping for a broader success story. A national collaborative, involving the Centers for Disease Control and Prevention, AMDA, the University of Michigan, and other organizations, is implementing a project funded by the Agency for Health Care Research and Quality to engage more than 500 nursing homes across all 50 states in preventing catheter-associated UTI (CAUTI). At the AMDA meeting, Dr. Mody reported that almost 225 facilities had been recruited.

The program will merge team building and “socio-adaptive” principles with technical/clinical interventions, such as training on catheter care and maintenance, CAUTI surveillance definitions, interpretation of urine diagnostics, and judicious use of antimicrobials.

The program incorporates lessons learned from a recently published randomized clinical trial involving 12 community-based nursing homes. Facilities assigned to the intervention cohort followed a multimodal infection prevention protocol involving preemptive barrier precautions, active surveillance for MDROs and infections, and staff education.

Over 3 years, the prevalence of all MDROs (i.e., the primary outcome of the study) was reduced by 23% in the intervention group, which enrolled 203 nursing home residents with urinary catheters, feeding tubes, or both. Participants with urinary catheters showed reduced colonization with methicillin-resistant Staphylococcus aureus and ceftazidime-resistant gram-negative bacilli, and there was a significant reduction in clinically defined CAUTIs and antibiotic intervention use in nursing homes (JAMA Intern Med 2015;175:714-23).

“Of all the interventions, it’s hard to say what worked the best,” Dr. Mody, the study’s lead author, told Caregiving for the Ages. “We think that the preemptive barrier precautions led to reduced MDROs and that more education and emphasizing use of the right definitions [for CAUTIs] helped reduce the infection rate.”

Education was interactive and multifaceted, she emphasized in her presentation at the conference. Nurses, nurses’ aides, and physicians, and all other caregivers received pocket cards on infection recognition, for instance, and multiple in-services were provided to achieve high attendance. “We saw that when the director of nursing attends, you’ll get a lot more staff coming,” Dr. Mody noted.

In a sample educational session given at the AMDA meeting, Nimalie Stone, MD, medical epidemiologist for long-term care at the CDC, described the case of an 86-year-old resident who had an indwelling catheter for the past 3 weeks to assist with the healing of a sacral ulcer acquired during hospitalization. Her urine became cloudy, dark, and odorous one day, and she seemed tired and decided to skip breakfast to stay in bed.

Lona Mody, MD, described a 23% decrease in multidrug resistant organisms resulting from an infection prevention protocol involving preemptive barrier precautions and staff education.

Paul Y. Takahashi, MD, professor of medicine at the Mayo Clinic College of Medicine in Rochester, considers marked changes in urinary patterns, sudden changes in continence, and major changes in clinical status such as fever or new hemodynamic instability, as clues for possible UTI. In patients with dementia, “there’s [more of] a gray zone, and [decisions are] often very individualized,” he said.

“Increasingly, Dr. Takahashi said, ‘we’re doing more with hydration and trying to push more fluids, which is always a good answer, no matter what the illness is. We give things a little time.’

Caregivers at other institutions similarly mention increased attention to hydration status. “We often push fluids to manage a suspected UTI cranberry juice, water, whatever the resident likes. And we’ll monitor” with repeated vital signs and physical assessments, said Evelyn Nolan, RN, BSN, a nurse at Roland Park Place, a retirement community in Baltimore, MD, that includes a skilled nursing unit.

“[We] explain to families that we’re holding off on antibiotics for now, and we keep them in the loop,” she said.

Theresa L. Rowe, DO, an instructor in internal medicine and geriatrics at the Northwestern University Feinberg School of Medicine in Chicago and a nursing home attending physician, said educating families about diagnostic criteria, observation protocols, and antibiotic stewardship is key. “Our situation [with UTIs] now is similar to how it used to be with otitis media in the pediatric population. People expect treatment.”

**Dipstick Diagnosis**

Dr. Rowe takes a slightly different approach to diagnosis, often starting with a urinary dipstick to evaluate for evidence of leukocyte esterase and nitrite.

“This has a good negative predictive value. If symptoms don’t quite fit and the dipstick is negative (for leukocyte esterase), we increase hydration, think about other causes, and readdress the situation if symptoms don’t go away,” she said.

She and Manisha Juthani-Mehta, MD, of Yale University School of Medicine, recently published a proposed diagnostic algorithm for UTI in older adults that is based on the Stone criteria and includes the urinary dipstick (Infect Dis Clin North Am 2014;28:75-89). Other clinicians discourage the use of dipstick testing because dipsticks will often be positive for other findings—outcomes that may compel staff to unnecessarily or prematurely request full urinalyses and cultures.

For observation, decision-support tools such as the SBAR form (Situation, Background, Assessment, Response), a standardized communication form for tracking changes in a resident’s condition, can be helpful for UTI diagnosis, Dr. Stone and several other sources said. AHRQ, for instance, recently created a UTI SBAR to facilitate nurse-to-clinician communication and manage potential UTIs; the UTI SBAR form is included in the AHRQ’s “UTI Communication Toolkit”

The CDC is hoping, in the meantime, that nursing homes will increasingly use its national infection surveillance infrastructure—the National Healthcare Safety Network (NHSN)—to monitor and track UTIs; the UTI SBAR form is included in the AHRQ’s “UTI Communication Toolkit.”

More than 200 LTC facilities have enrolled and are eligible to report, even though many fewer have opted thus far to actively report on UTI, Dr. Stone said. “Given the fact that this is a voluntary system, it’s encouraging to us that this many facilities have explored the system and enrolled,” she said.

Nursing homes will need to collect and report UTI data “in order for us to really make improvements,” said Dr. Nace. “You need data to drive change.”

The fact that his state, Pennsylvania, has successfully required nursing homes to report health care–associated infections to a statewide authority since 2009 shows that “meaningful reporting can be accomplished in nursing homes,” he said, “even without the use of electronic medical records and with limited staffing.”

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