JAMDA 17 (2016) 173–178

JAMDA

journal homepage: www.jamda.com

In the Trenches

Algorithms Promoting Antimicrobial Stewardship in Long-Term Care

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Antimicrobial stewardship is becoming an increasingly important focus in long-term care settings. The Notice of Proposed Rulemaking, *Medicare and Medicaid Programs: Reform of Requirements for Long-Term Care Facilities* proposes that facilities must establish an infection prevention and control program, which must include, (among other elements), an antibiotic stewardship program with antibiotic use protocols and a system to monitor antibiotic use.[1] Although it is unknown when, or if, the revised requirements will become effective in the proposed format, release of the draft document produced both anxiety and enthusiasm for improving the use of antimicrobial agents in long-term care settings.

Long-term care facilities who desire to be preemptively responsive to these requirements can be guided by the basic tenets of antimicrobial stewardship released by the Centers for Disease Control.[2] This guidance outlines the core elements of antibiotic stewardship: (1) leadership commitment, (2) accountability, (3) drug expertise, (4) action, (5) tracking, (6) reporting, and, (7) education.

While the Centers for Disease Control provides a comprehensive framework to approach improved antibiotic usage, specific tools are needed in order to implement these strategies successfully and reduce inappropriate antibiotic use in the long-term care setting. Inappropriate antibiotic use is well documented in long-term care settings[3] and is likely to increase because of the pressure to reduce unnecessary hospitalizations and hospital readmissions related to changes in Medicare payment strategies. More long-term care patients may be treated in place, and if antibiotic prescription is inappropriate, it could lead to increased side effects, costs, and antibiotic resistance. Minimum criteria for initiation of antibiotics in long-term care have been published for urinary tract infections, skin and soft tissue infections, and respiratory tract infections (including pneumonia).[4] Key strategies to improve the appropriateness of antibiotic use and reduce antibiotic resistance may include protocols or algorithms to promote selection of antimicrobials with a narrower spectrum of activity, guide implementation of duration-limited therapy, and prompt for conversion of intravenous to oral antibiotics, where appropriate. Algorithmic approaches should be informed by evidence and individualized for use to effectively and safely improve antimicrobial stewardship while maintaining or improving the overall quality of care for nursing home residents with infectious diseases. An antimicrobial formulary that is specific to infections common in postacute and long-term care residents is suggested to aid in the selection of antimicrobials that have demonstrated effectiveness and safety in older adults, and that are cost-effective. Such an approach is supported by Omnicare's Geriatric Pharmaceutical Care Guidelines (GPCG).[5]

The GPCG is written by the University of Science in Philadelphia, undergoes external peer review and is endorsed annually by the American Geriatrics Society "as a valuable tool in guiding geriatric patient care (drug therapy) in long-term care and ambulatory settings."[5] The GPCG contains clinical evaluation of drug therapies, recommended dosage ranges for adults with normal and impaired renal function, and relative cost information. In addition to the external review, each of these algorithms is updated annually by the Omnicare Pharmacy and Therapeutics Committee.

For antibiotic prescribers currently in the trenches, we offer 5 algorithms that may be convenient and easy to use. By limiting antibiotic choices to those with the most supportive evidence of effectiveness and safety the management of urinary tract infections (Figure 1), catheter-associated urinary tract infections (Figure 2), upper respiratory tract infections (Figure 3), pneumonia (Figure 4), and uncomplicated skin and soft tissue infections (Figure 5) have proven to be most useful. Each algorithm presents guidance for assessing older adults with signs, symptoms, and objective findings consistent with infection and then directs clinicians to select appropriate empiric therapy prior to the time culture and sensitivity information becomes available for suspected bacterial infections.

By using these quick-reference tools, clinicians can make care more evidence-based, shorter in duration and safer, while helping

Dr. Ouslander is a full-time employee of Florida Atlantic University (FAU) and has received support through FAU for research on Interventions to Reduce Acute Care Transfers (INTERACT) from the National Institutes of Health, the Centers for Medicare and Medicaid Services, The Commonwealth Fund, the Retirement Research Foundation, PointClickCare, Medline Industries, and Think Research. Dr. Ouslander and his wife have ownership interest in INTERACT Training, Education, and Management ("I TEAM") Strategies, LLC, which has a license agreement with FAU for use of INTERACT materials and trademark for training. Work on funded INTERACT research is subject to the terms of Conflict of Interest Management plans developed and approved by the FAU Financial Conflict of Interest Committee. Drs. Tangalos and Zarowitz served on the Advisory Group for the development of the Order Sets.

The authors declare no conflicts of interest.

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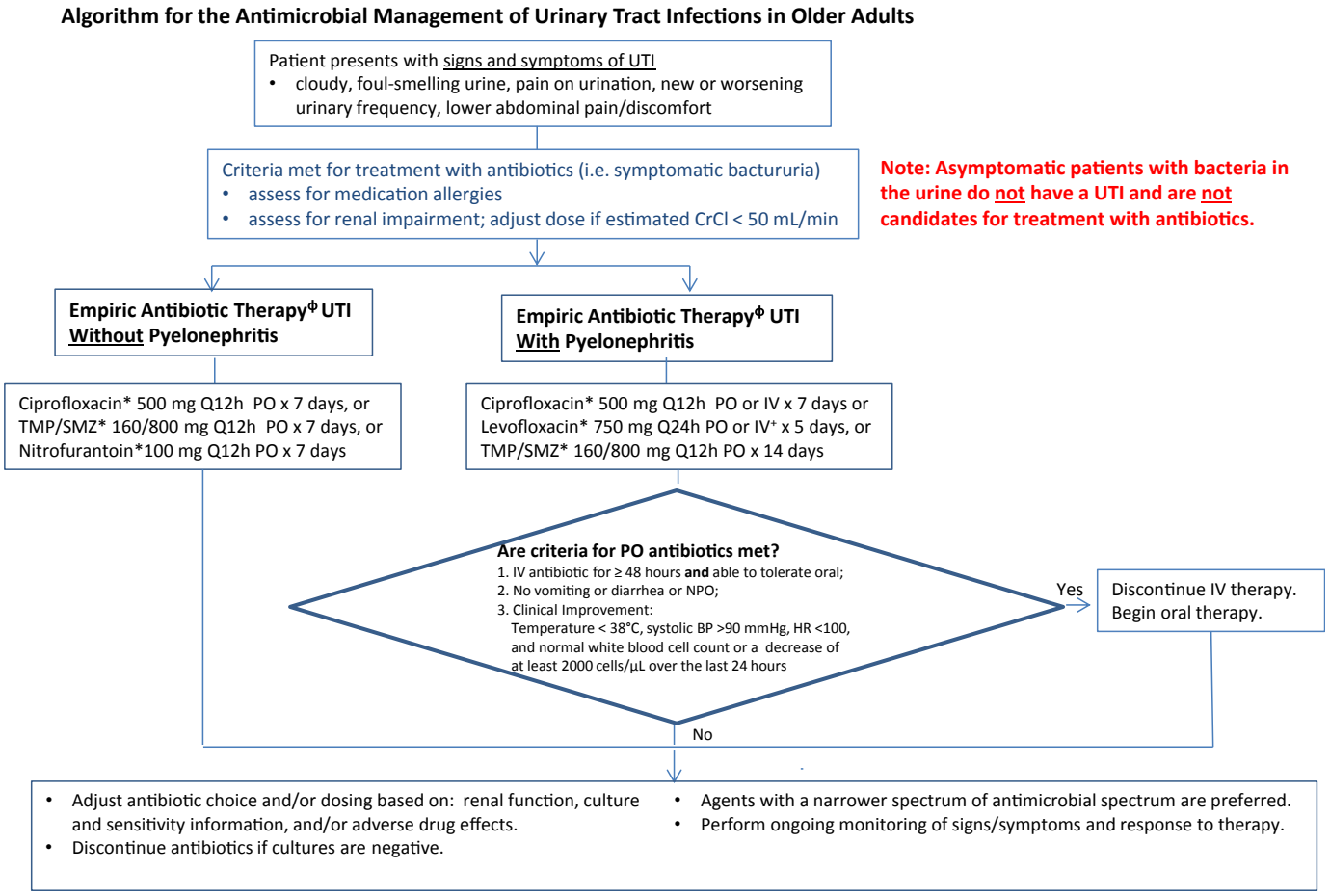
http://dx.doi.org/10.1016/j.jamda.2015.11.017



Where: IV=intravenous, Qxh=every x hours, PO=oral SC=subcutaneous, Scr=serum creatinine, TMP/SMZ=trimethoprim/ sulfamethoxazole, UTI=urinary tract infection
ϕ UTI in older persons and males are considered complicated with or without pylenephritis.
†IV use should be reserved for those who cannot tolerate PO therapy.
*Requires dosage adjustment in renal impairment. Antibiotics should be ordered with a duration –limited stop date to avoid overuse.

Fig. 1. Algorithm for the antimicrobial management of urinary tract infections (UTI) in older adults.

long-term care facilities reduce unnecessary health care costs. The algorithms can be used in conjunction with other tools that address management of changes in condition in long-term care settings, such as AMDA Clinical Practice Guidelines, the Interventions to Reduce Acute Care Transfers (INTERACT) care paths,[6] and evidence-based, expert consensus derived clinician order sets.[7] Together, these tools can improve antibiotic utilization and reduce the likelihood that antibiotic resistance will continue to rise in the future.

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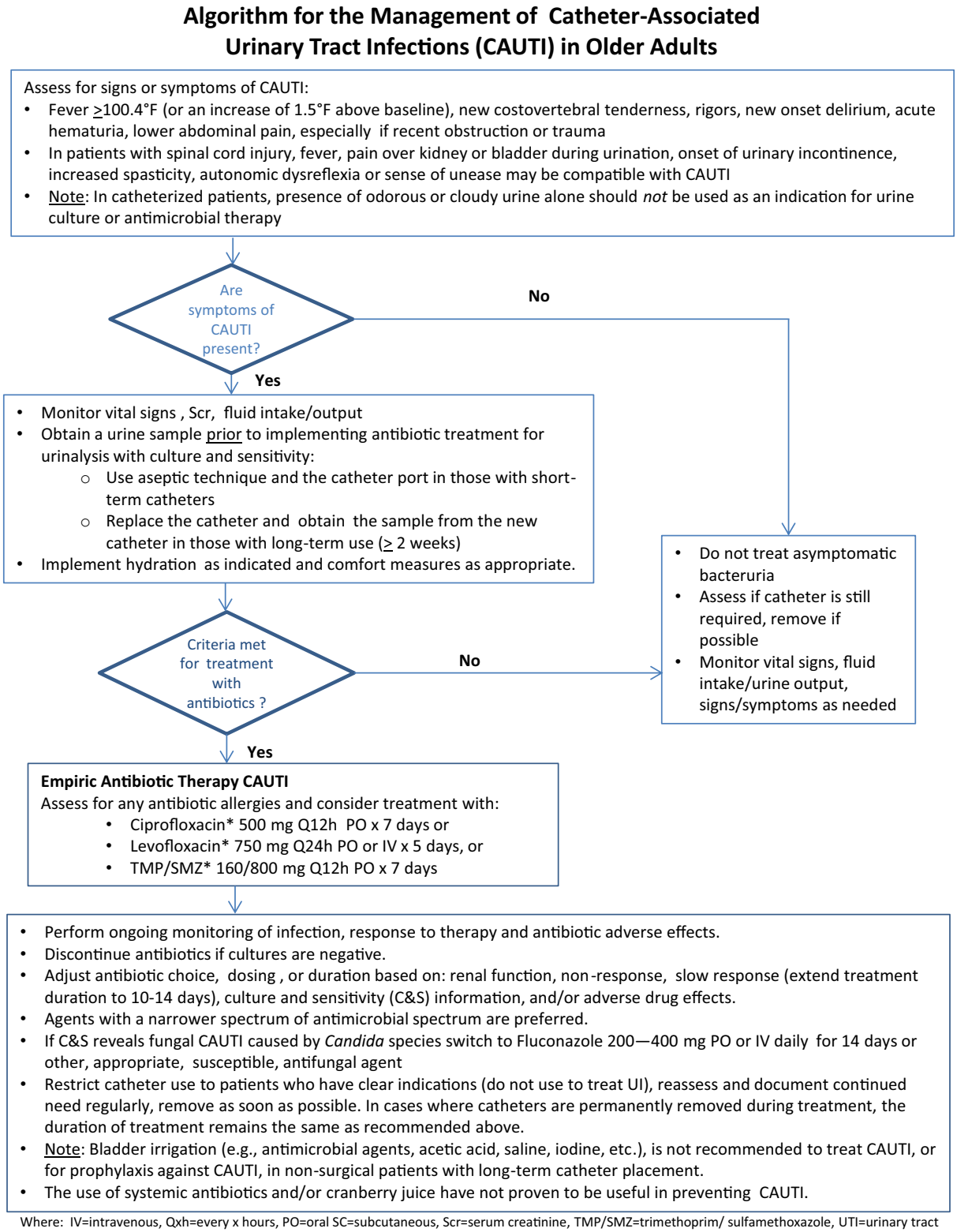
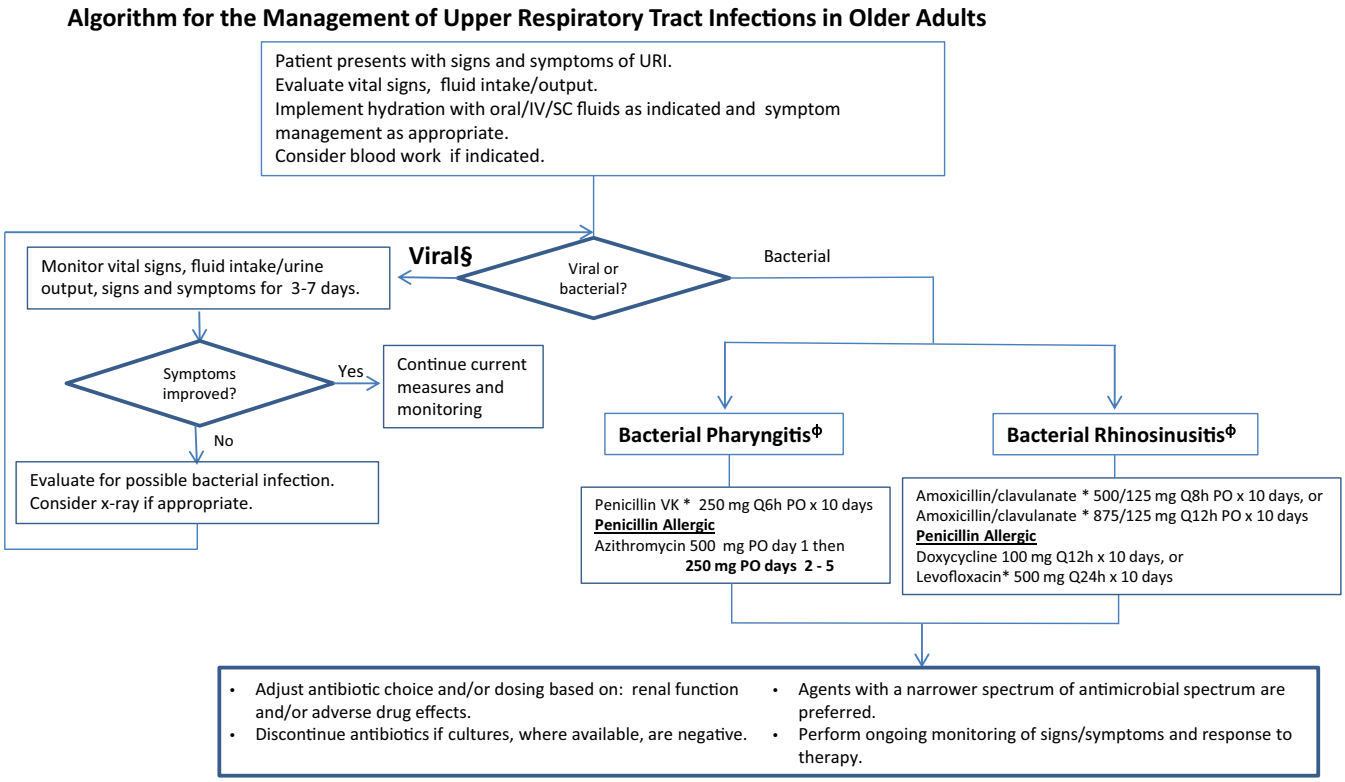
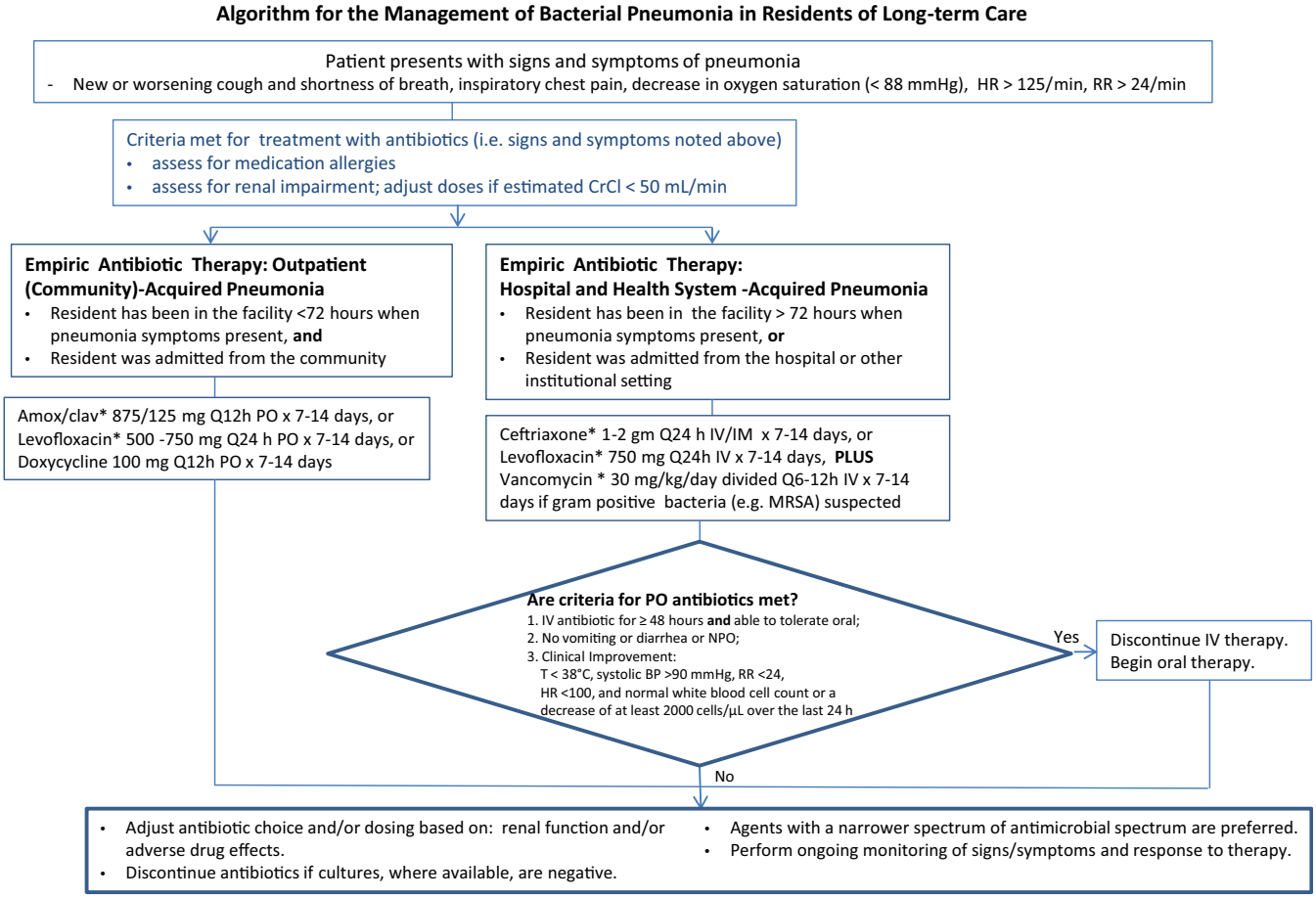


Fig. 2. Algorithm for the management of catheter-associated urinary tract infections (CAUTI) in older adults.



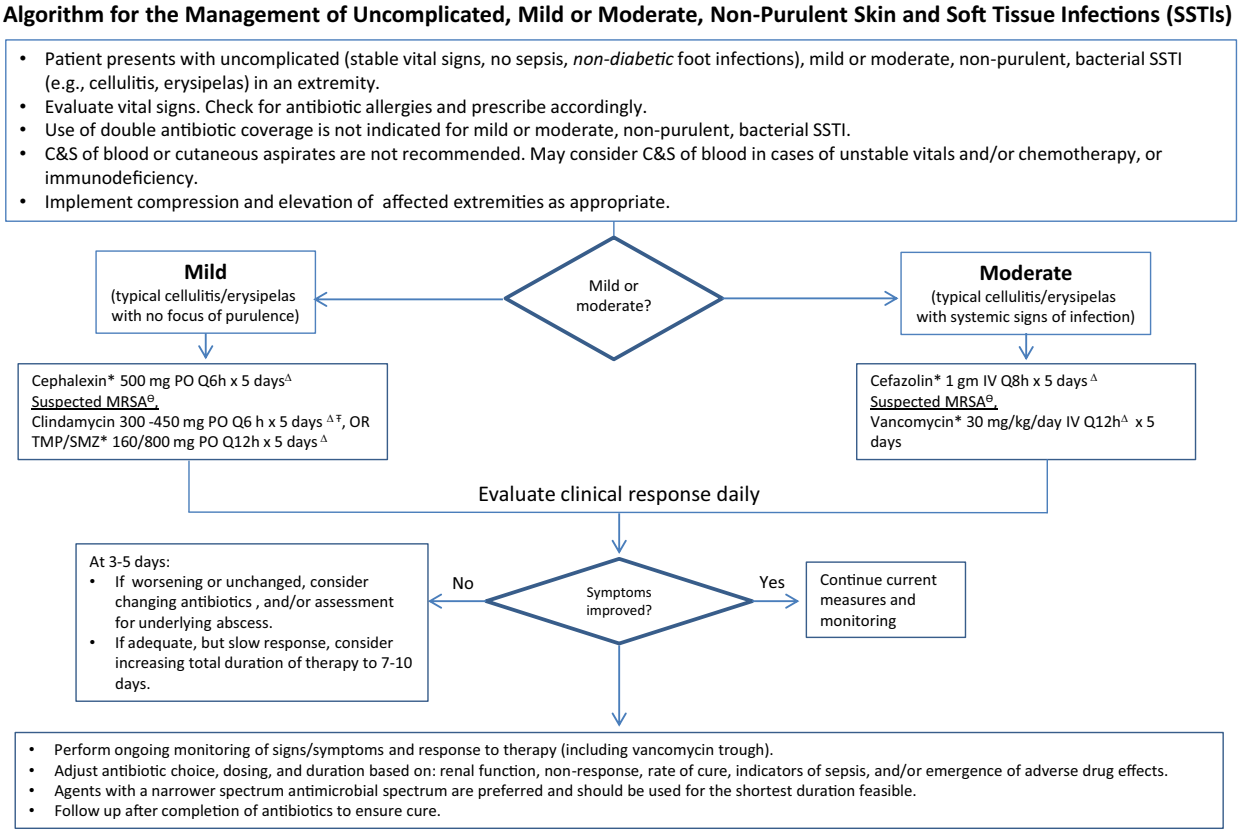
Where: IV=intravenous, Qxh=every x hours, PO=oral SC=subcutaneous
§The vast majority of upper respiratory tract infections are viral and should be treated with supportive measures.
$^{\Phi}$Differentiate bacterial infection from sore throat/laryngitis secondary to seasonal allergies
*Requires dosage adjustment in renal impairment. Antibiotics should be ordered with a duration –limited stop date to avoid overuse

Fig. 3. Algorithm for the management of upper respiratory tract infections (URIs) in older adults.



Where: Amox/clav=amoxicillin/clavulanate, BP=blood pressure, HR=heart rate, IV=intravenous, gm=grams, MRSA=methicillin resistant *Staphylococcus aureus,* NPO=nothing by mouth, PO=oral, Qxh=every x hours, RR=respiratory rate, SC=subcutaneous., T=temperature. *Requires adjustment in renal impairment. Antibiotics should be ordered with a duration-limited stop date to avoid overuse.

Fig. 4. Algorithm for the management of bacterial pneumonia in residents of long-term care.



Where: Qxh=every x hours, C&S = culture and sensitivity, gm = gram, PO = oral, IV = intravenous, MRSA = methicillin-resistant *Staphylococcus aureus*, TMP/SMZ trimethoprim/sulfamethoxazole
*Requires dosage adjustment in renal impairment. Antibiotics should be ordered with a duration-limited stop date to avoid overuse
Δ Acceptable choices in penicillin-allergic patients (Cephalexin and Cefazolin should not be used in those with immediate hypersensitivity reactions)
Θ Suspected MRSA: nasal colonization with MRSA or evidence of MRSA infection elsewhere, prior MRSA infection, recent hospitalization, recent antibiotic use
∓ Clindamycin has demonstrated resistance in some geographic areas, an alternative is: Doxycycline 100 mg PO Q12h x 5 days

Fig. 5. Algorithm for the management of uncomplicated, mild or moderate, nonpurulent skin and soft tissue infections (SSTIs).