Kentucky Antimicrobial Stewardship Innovation Consortium

Educational Pearl

Know Your Antibiotics: Silent Sodium

Antimicrobials are life-saving medications with significant benefits when used appropriately. They are often perceived as generally safe with low risk for harm; however, this is a misperception. One underrecognized harm is the sodium content in intravenous (IV) antibiotics, particularly when administered to vulnerable populations such as patients with heart failure.[1] What are some things to know when it comes to sodium in IV antibiotics?

How much sodium is in antibiotics?
Many IV antibiotics are formulated with sodium in vials for reconstitution or ready-to-use containers. Additionally, after reconstitution, carrier fluids can also contain sodium (e.g. normal saline, lactated ringer's). A helpful table summarizing the total daily sodium per day of therapy with common IV antibiotics was published in Open Forum Infectious Diseases.[2]

What are the harms with sodium in antibiotics?
In one retrospective study of patients who were admitted to the hospital for heart failure exacerbations at low risk for infection, patients who received IV antibiotics and who did not receive IV antibiotics were examined.[3] Patients who received IV antibiotics received an average additional 230 mL/day of additional fluid and 1381 mg/day of additional sodium. Mean total dose of furosemide was 930 mg and 320 mg ($p < 0.001$) and length of stay was 6.6 days and 3.0 days ($p < 0.001$) in the IV antibiotic and non-IV antibiotic groups, respectively. All-cause 30-day readmissions occurred in 22.2% (14/56) and 10.1% (9/88) of patients in the IV antibiotics and non-IV antibiotic groups, respectively ($p = 0.043$).

In another retrospective study, higher average non-dietary sodium was associated with longer lengths of hospital stay in patients admitted to a cardiac ICU with heart failure exacerbations.[4] An average sodium load of 1.2 g/day was associated with hospital lengths of stay up to 5 days and an average of 2.6 g/day was associated with lengths up to 10 days.

What are the antimicrobial stewardship considerations?

1. Set a high threshold to start antibiotics when alternative diagnosis is likely (e.g. heart failure exacerbation vs. pneumonia, bilateral "cellulitis" vs stasis dermatitis)
2. Stop empiric antibiotics as soon as possible when infectious syndromes are determined to be less likely[5]
3. Transition from IV to PO as soon as possible
4. Consider alternative antibiotics with a lower sodium/fluid burden in addition to spectrum considerations, *C. difficile* risk, and patient specific characteristics (e.g. use lower sodium/fluid alternative in severely fluid overloaded patient requiring aggressive diuresis)

Key Takeaway: Sodium load in IV antibiotics can be clinically significant and potentially harmful to patients. Judicious antimicrobial use can prevent harm.

References:

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