Sepsis Associated with Previous 90 Day Antibiotic Use

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BACKGROUND

Many patients who are hospitalized require some type of antibiotic. An increased amount in the use of antibiotics can increase the risk for patients to develop sepsis according to a previous study by J. Baggs et al. Exposure to high risk antibiotics such as third/fourth-generation cephalosporin, lincosamide, fluoroquinolone, β-lactam/β-lactamase inhibitor, oral vancomycin, and carbapenem are associated with an increased risk of sepsis. Sepsis is a life-threatening condition that can happen when patients are trying to fight an infection. The purpose of this research is to determine if there is a correlation with antibiotic use and subsequent sepsis development by looking at patients who have used antibiotics and developed sepsis within 90 days of an admission to Wood County Hospital in Bowling Green, OH. Should we discover a correlation between antibiotic use and an increased risk of sepsis, this information can improve antibiotic stewardship at Wood County Hospital. Our results can help make appropriate clinical recommendations to other health care providers. Numerous studies support the fact that antibiotics are over utilized and often, people fail to see the consequences associated with this overuse. Ideally, with more concrete evidence, providers will be influenced to be more cognizant of their antibiotic use knowing that its use could be correlated with more

OBJECTIVES

The primary objective: To determine if antibiotic use increases the risk of subsequent sepsis within 90 days of antibiotic exposure in patients being treated with antibiotics at Wood County Hospital in Bowling Green, OH.

METHODS

- Retrospective, observational study of WCH drug database Cerner. Identified patients and reviewed their MAR summary and external fill history to see if the patient was previously exposed to antibiotics within 90 days prior to the positive blood culture.
- **Inclusion Criteria**:
  - Age 18 and older
  - 2 positive blood cultures with an attached culture and sensitivity analysis
  - Must have access to external medication history
- **Exclusion Criteria:**
  - Contaminant blood cultures

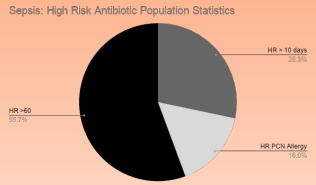
RESULTS

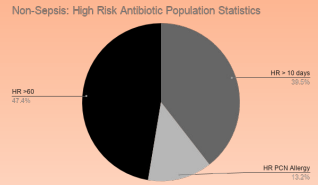
- Of the patient data gathered from those **with** sepsis 81 (26.65%) received high risk antibiotics, 87 (28.6%) received low risk antibiotics, and 136 (44.7%) received no antibiotics in the 90 days preceding their sepsis diagnosis.
- Of those with sepsis taking high risk antibiotics, 30 (37.0%) had 10 days or more days exposure, 17 (21.0%) reported a penicillin allergy, and 59 (72.8%) were 60 years or older.
- Of the patient data gathered from those **without** sepsis 55 (18.1%) received high risk antibiotics, 83 (27.3%) received low risk antibiotics, and 166 (54.6%) received no antibiotics in the 90 days preceding their hospital admission.
- Of those without sepsis taking high risk antibiotics, 30 (54.5%) had 10 days or more exposure, 10 (18.2%) reported a penicillin allergy, and 36 (65.5%) were 60 years or older
- **Statistical analysis**

→ The hazard risk of developing sepsis while on a high risk antibiotic is 1.6444. This is statistically significant given the p-value is less than the alpha value and the CI does not cross 1.

→ The hazard risk of developing sepsis while on either a high risk antibiotic or a low risk antibiotic is 1.4859. This is statistically significant given the p-value is less than the alpha value and the CI does not cross 1.

→ Based on a CI that crosses 1, age, exposure length, and having a penicillin allergy do not significantly impact the risk of developing sepsis while on high risk antibiotics.





Variables	HR/95% CI
HR vs. LR/None	1.6444[1.228-2.202]
HR/LR vs. None	1.4859 [1.186-1.862]
HR w/10 day exposure vs. HR w/out 10 day exposure	0.4902 [0.317-0.759]
HR & >60 YO vs. HR and <60 YO	1.4154[0.895-2.238]
HR w/ PCN allergy vs. HR w/out PCN allergy	1.1953 [0.680-2.102]

Variables	Chi-square *p*-value
HR vs. LR/None	0.011394
HR/LR vs. None	0.014959
HR w/10 day exposure vs. HR w/out 10 day exposure	0.043574
HR & >60 YO vs. HR and <60 YO	0.357019
HR w/ PCN allergy vs. HR w/out PCN allergy	0.687252

** all other tests were found to be not significant.

CONCLUSIONS and DISCUSSION

In this study, we found that there was a significant association between antibiotic use and subsequent sepsis development within 90 days of the antibiotic use. Patients who were taking high risk antibiotics had about a 64% higher chance of developing sepsis within 90 days. Patients taking any type of antibiotic had about a 48% higher chance of developing sepsis within 90 days. The length of use of antibiotics was not significant, meaning that even just a short-term course of an antibiotic can put a patient at a higher risk of sepsis. However, larger sample sizes could prove a duration, age, or allergy association. A previous study by J. Baggs et al. showed similar statistically significant results in a larger population of patients. It is known that widespread use of antibiotics can lead to drug resistance, increases the risk for infection such as *C. difficile*, and possibly can increase the risk for sepsis. This study supports antimicrobial stewardship, and will hopefully shape the way that prescribers are treating patients with antibiotics.

- Limitations:
  - Lack of access to patient's full medication history
  - Small sample size
  - Geographical location
- Future research recommendation:
  - Specifically look at each class of HR/LR antibiotics and compare sepsis exposure amongst them
  - Compare different hospital systems to assess association of HR antibiotics and sepsis
  - Look at other population statistics to determine association such as comorbidities, ethnicity, or economic status

REFERENCES

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