A national survey to determine current practice regarding antimicrobial dosing in patients with sepsis-induced acute kidney injury (AKI)

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Background

There are no validated guidelines for dosing of antimicrobials in patients with sepsis-induced acute kidney injury (AKI)[1]. Pathophysiological changes in sepsis lead to altered antimicrobial pharmacokinetics[2]. Sepsis increases capillary permeability, resulting in increased volume of distribution of hydrophilic antimicrobials[3]. Inadequate antimicrobial dosing in this state contributes to poorer patient outcome, with underdosing leading to treatment failure as well as contributing to antimicrobial resistance[2]. Current guidelines regarding antimicrobial dosing are obtained from pharmacokinetic studies in patient populations with normal kidney function or chronic kidney disease (CKD)[4]. These patient populations have stable kidney function and hence do not reflect the acute changes in kidney function occurring in AKI patients. We aimed to survey current practice regarding antimicrobial dosing in patients with sepsis-induced AKI in the United Kingdom and determine the resources commonly used to guide dosing.

Method

A questionnaire was developed via the online SurveyMonkey® platform and sent to the infection, renal and critical care networks of the United Kingdom Clinical Pharmacy Association (UKCPA) in March 2018 to determine whether trusts had local guidelines for antimicrobial dosing in patients with varying kidney function. A clinical vignette of a septic patient with AKI was used to assess pharmacists' recommendations for dosing of intravenous co-amoxiclav, meropenem, gentamicin and ciprofloxacin for the first 48 hours of therapy.

Results

A total of 73 pharmacists from 51 separate trusts responded. The respondents were from the following departments: intensive care (42%), microbiology/laboratory/infectious diseases (29%), renal medicine (18%), acute or specialist medicine (7%), surgery (1%) and other (3%).

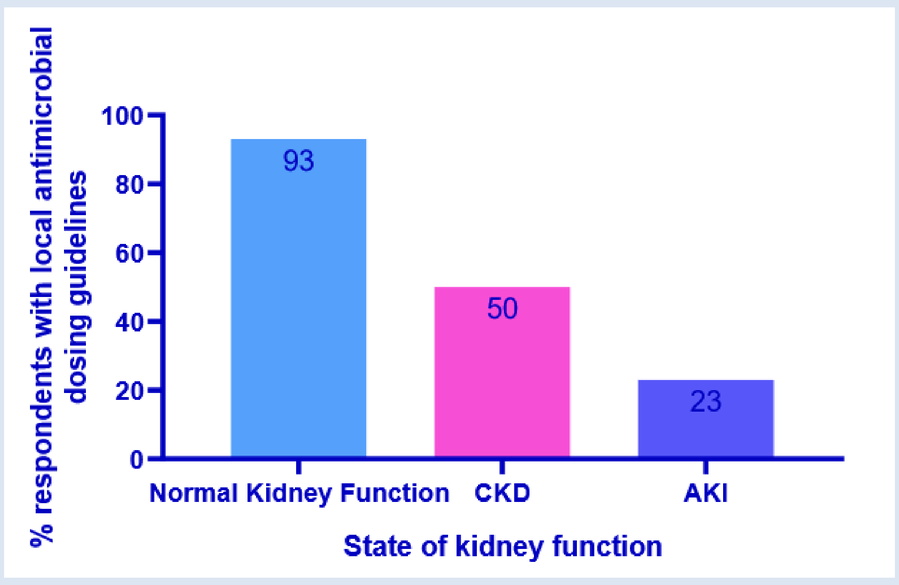

Figure 1- Bar chart showing the percentage of respondents with local antimicrobial guidelines for patients with normal kidney function, CKD and AKI (n=73)

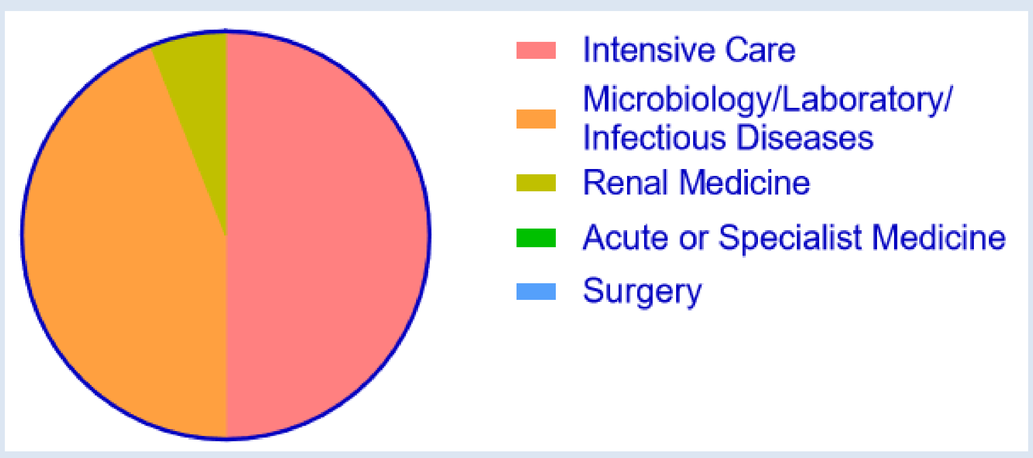

Figure 2- Pie chart showing the proportion of respondents with local trust guidelines for antimicrobial dosing in AKI patients, separated by department (n=16)

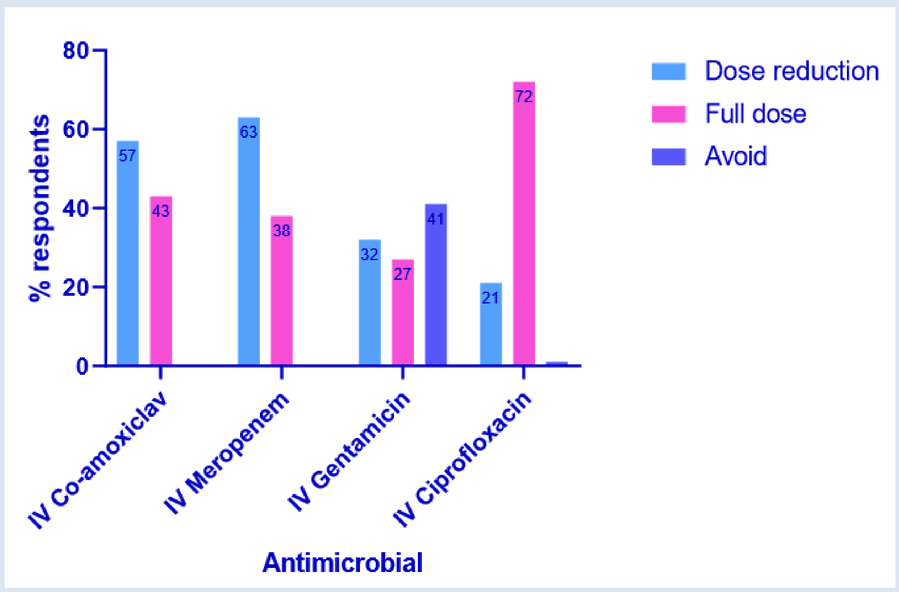

Figure 3- Bar chart showing the proportion of respondents who recommended reduced dose, full dose or avoidance of antimicrobial before 48 hour review based on the clinical vignette of a patient with sepsis-induced AKI

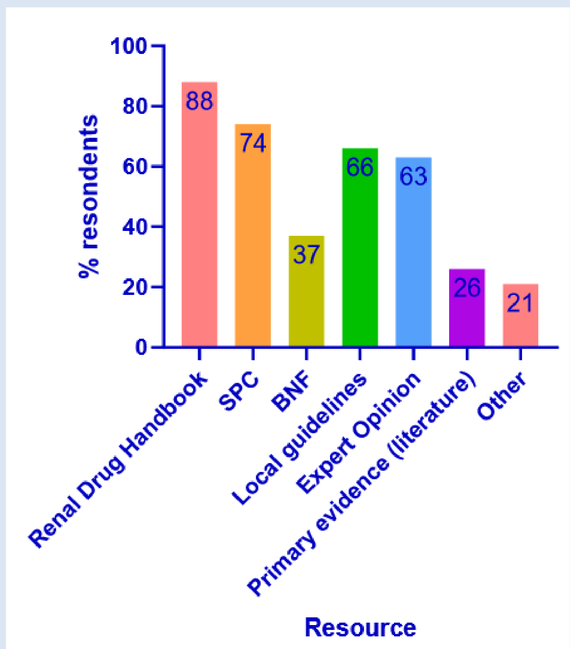

Figure 4- Bar chart showing the resources used by respondents to guide antimicrobial dosing (n=73)

Conclusions

- Less than 25% of respondents are part of trusts with local guidelines for antimicrobial dosing in patients with AKI.
- Majority of respondents with local trust guidelines for antimicrobial dosing in AKI patients were from the intensive care or microbiology/laboratory/infectious diseases departments.
- There is wide variability in current practice regarding antimicrobial dosing in septic patients with AKI.
- Respondents were more likely to recommend a reduced dose of co-amoxiclav, meropenem and gentamicin compared to full dose in patients with evidence of sepsis-induced AKI.
- Resources commonly used to guide antimicrobial dose adjustments are based on creatinine clearance or estimated glomerular filtration rate (eGFR) values which do not accurately measure function in AKI.
- There is a need for national guidelines to standardise antimicrobial dosing in critically ill patients and optimise dosing to prevent antimicrobial resistance and treatment failure.

References

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4. González de Molina, Francisco Javier, Ferrer R. Appropriate antibiotic dosing in severe sepsis and acute renal failure: factors to consider. *Critical care (London, England).* 2011; 15 (4): 175

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