10th World Congress and Exhibition on

Antibiotics and Antibiotic Resistance

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Webinar

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Optimising antibiotic therapy for inpatient and outpatient settings

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Background: Not only have antibiotics saved countless patients' lives but they have also played a crucial role in supporting major advances in modern medicine. However, precipitously emerging resistant bacterial strains jeopardise the remarkable advances achieved with antibiotics. In the past, the development of new antibiotics was an effective strategy to combat resistant bacteria. However, with the discovery of new antibiotics diminishing, optimising the administration of currently available antibiotics has become a necessity. A strategy of particular interest involves applying <u>pharmacokinetic</u> and pharmacodynamics concepts to optimize time-dependent antibiotics dosing regimens. The latter is a growing area of interest for reducing the development of antibiotic resistance and it involves differential dosing regimens such as prolonged or continuous infusions of beta lactam antibiotics.

Aim: The overarching aim of this research is to optimize <u>antibiotic therapy</u> for inpatient and outpatient use. This thesis consists of literature-based, practice-based and laboratory-based research.

Literature-based: The aim of the literature-based research category was to review existing literature to compare the clinical outcomes of continuous vs. intermittent infusion beta-lactam antibiotics and appraise the strengths and the weaknesses of current evidence. Overall, literature-based research demonstrated a wealth of studies in terms of systematic reviews, meta-analysis as well as primary studies. Despite the literature exhibiting favourable outcomes towards prolonged/continuous infusions, the literature review and systematic reviews conducted support the need for better conducted, definitive trials and systematic reviews given the variability in scope of the available studies.

Practice-based: The aim of the practice-based research category was to provide a snapshot of beta-lactam antibiotic use in clinical practice. The first study was single-center retrospective cohort practice review conducted to investigate the prescribing patterns of beta lactam antibiotics in critical care wards. The second study was a cross sectional survey investigating nurse's knowledge, perceptions and experiences regarding differential antibiotic dosing. Findings show that prolonged/continuous infusions as dosing strategies are implemented in practice to improve patient outcomes; however, healthcare XII professionals implementing this practice have not received sufficient training to support the administration of differential antibiotic dosing. This was evident from both studies that disclose beta-lactam antibiotics are not used to their full potential or are inaccurately used. There is a need for tailored education and training to improve health care professional's knowledge of prolonged/continuous infusions.

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Laboratory-based: Despite the advantages that prolonged/continuous infusions beta-lactam antibiotics offer, to use these dosing regimens efficiently, infusion solutions should remain stable for the preparation, storage and infusion time. Concerns regarding stability present a challenge in practice as most stability information is based on administration via bolus injection or an intermittent infusion. Therefore, the aim of the laboratory-based research category was to determine the feasibility of prolonged/continuous infusion beta lactam antibiotics for hospital and outpatient settings. Findings from the conducted studies aid in ameliorating current dosing regimens to optimize antibiotic efficacy. Results obtained from stability studies assist in resolving challenges experienced in practice in terms of preparation, storage and administration as they indicate the effects of temperature, diluent and pre-preparation of infusion solutions. Studies demonstrated that stability data generated in all studies are an improvement to the stability data presented in the British, American and European pharmacopoeias.

Conclusion: Findings of this PhD research are supportive of the beneficial role of differential antibiotic dosing. Overall, the gathered data indicate that prolonged/continuous infusions are feasible, advantageous and could potentially improve patient clinical outcomes.

Biography

Sarah Fawaz is a recent pharmaceutical/analytical chemistry PhD graduate. Her doctoral and postdoctoral research conducted at Kingston University focused on optimising dosing regimens of <u>antibiotics</u>. Previously we have been able to outpace bacterial mutations by replacing increasingly ineffective antibiotics with new agents. However, with the discovery of new antibiotics diminishing, optimising the administration of broad-spectrum antibiotics has become a necessity. By utilising the bench-to-bedside approach, she has been addressing the clinical challenges reported in the literature and experienced on hospital wards by healthcare professionals in the laboratory.

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