An effective antibiotic protocol for Gram negative peritonitis in Peritoneal Dialysis patients: risk stratification based on severity at presentation– a single centre experience

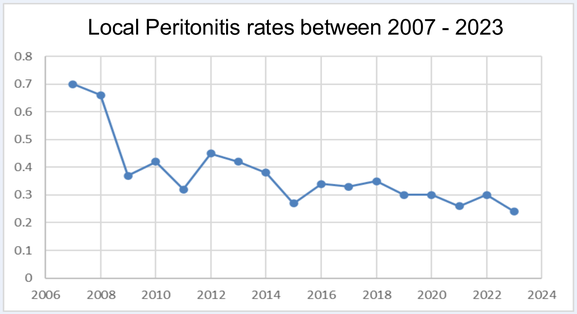
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Background

- Peritonitis is a serious complication of peritoneal dialysis (PD) that is associated with significant morbidity, leading to catheter loss, transfer to haemodialysis and occasionally death.
- Gram positive organisms are the leading cause of PD peritonitis; however, literature suggests Gram-negative PD peritonitis are more likely to cause adverse outcomes.
- It is also well recognised that drug resistance amongst Gram negative bacteria is increasing worldwide.
- In 2022, our institution (UHB) introduced a differential treatment protocol based on severity at presentation with escalation of treatment from oral ciprofloxacin to intraperitoneal (IP) gentamicin with addition of intravenous (IV) meropenem in severe cases. Given the lack of similar protocols in current literature, this audit aimed to evaluate the effectiveness of our approach.

Objectives

- Identifying rate of gram-negative PD peritonitis and review causative organism
- To assess the outcomes of gram-negative infection
- To evaluate the effectiveness of our differential treatment protocol based on severity of presentation
- To monitor resistance to Ciprofloxacin and Gentamicin



Differential Treatment Protocol 2022

Gram Positive Cover		
All patients	Intraperitoneal	Vancomycin If allergic to vancomycin - Teicoplanin
Gram Negative Cover		
Stable patients (mild symptoms –potentially going home)	Oral	Oral Ciprofloxacin 250 mg BD
Toxic patients (moderate symptoms - need hospital admission)	Intraperitoneal (IP)	Oral Ciprofloxacin 250 mg BD + IP Gentamicin 0.6mg/kg OD
Hemodynamically unstable patients - severe infections	Intravenous (IV)	IV Meropenem 1 gm IV OD + IP Gentamicin 0.6mg/kg OD

Methods

Study Setting

Gram-negative PD peritonitis cases identified from hospital electronic records and dedicated peritonitis database.

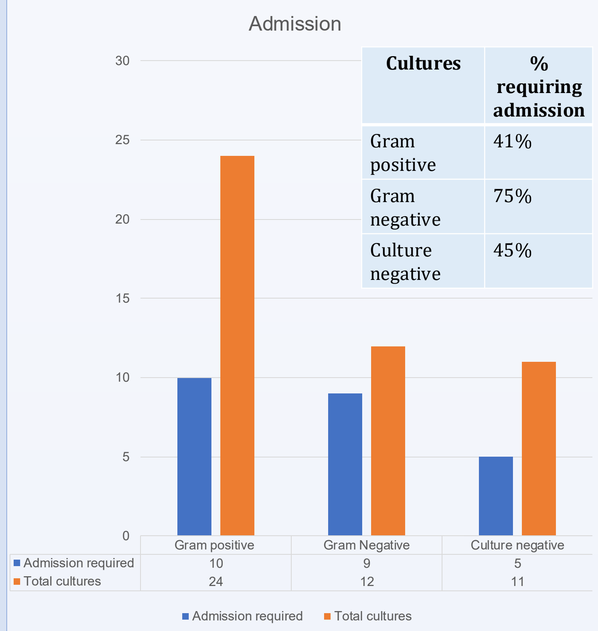
Data Collection

Prospective data collected from Hospital database (PICS and Portal) and dedicated renal patient registry (MARS_II).

Data Analysis

Microsoft excel was used for analyzing the acquired data.

Findings



Cultures	% requiring admission
Gram positive	41%
Gram negative	75%
Culture negative	45%

Hospital admissions were more frequently associated with gram-negative peritonitis

Organism	Number of cultures	Removal	Death	Relapse
Klebsiella	4	1 (ESBL)	1 (ESBL)	1 (ESBL)
Pseudomonas	4	1		
Leclercia	1			
E.coli	2	1	1 (ESBL)	
Enterobacter	1			

- **Three** ESBL-producing isolates demonstrated resistance to both ciprofloxacin and gentamicin.
- **One** relapse was reported following an ESBL-related infection.

Results

- Overall peritonitis rate of **0.24** episodes per patient-year.
- Gram-negative organisms caused **25% (**12/49) of total peritonitis cases, with *Pseudomonas sp.*, *Klebsiella sp.*, and *E. coli* being the most common pathogens.
- Among these cases, 75% required **hospital admission,** and 25% necessitated **PD catheter removal.**
- **Relapse** was observed in only one case post-treatment.
- Two **deaths** occurred during the study period; however, both patients were frail, bedridden, and had multiple comorbidities, with infection serving as a terminal event.
- Resistance to ciprofloxacin and gentamicin was noted in Extended Spectrum Beta-Lactamase (ESBL)-positive organisms (*E. coli* and *Klebsiella sp.*).

Conclusion

➢**Differential antibiotic treatment based on severity at presentation** is safe and effective in managing Gram-negative PD peritonitis.

➢In **patients with known ESBL colonisation**, it is advisable to **consider a suitable empiric antibiotic such as IV meropenem at presentation** whilst waiting for the culture and sensitivity results.

➢We suggest that **monitoring emergence of antibiotic resistance** should be part of the rolling audits in peritoneal dialysis units.

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