IMPORTANCE OF THE PERIODIC KNOWLEDGE OF LOCAL BACTERIAL FLORA IN A PERITONEAL DIALYSIS UNIT FOR TREATING PERITONEAL CATHETER EXIT SITE INFECTIONS AND PERITONITIS

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INTRODUTION

• The peritoneal catheter is a foreign body that favors infections and serves as a bacterial reservoir in both the outflow and subcutaneous tunnel.

•There are numerous factors that influence and facilitate infection of the peritoneal access, many of them related to the type of microorganisms, especially with the local pattern of resistance or sensitivity to antibiotics.

• Peritoneal dialysis infections are a common cause of patient morbimortality and transfer to haemodialysis.

• These infections have been treated with multiple antibiotic treatment regimens, different routes of administration and changing treatment periods.

• The most effective initial empiric treatment is still unclear, many times because the susceptibility of local bacteria to antimicrobial agents can not be predicted.

RISK FACTORS → **Type of microorganisms and local pattern of resistance or susceptible to antibiotics.**

IMPORTANT! Speed is key in finding the right antibiotic treatment and setting a treatment.

INTRODUTION

• The objective of the analysis of antibiograms is to follow the evolution of the individual sensitivity of each pathogen to antibiotics, to study bacterial resistance, to adapt empirical antibiotics, to choose the appropriate agent (the most active against the pathogen, the least toxic for the host, with the appropriate pharmacological characteristics, the most economical), all with the purpose of providing greater possibilities of efficiency and success in the treatment.

BACTERIAL RESISTANCE TO ANTIBIOTICS

1. Quick development of bacterial resistances to antibiotics, becoming a **PUBLIC HEALTH ISSUE** both at a hospital and ambulatory level.
2. Generation of strains resistant to their effect and the need to use broad spectrum antibiotics.
3. Increase of hospital infections arising from pathogenic and opportunistic bacteria (low level of susceptibility to current antibiotics.)
4. Before a new antibiotic, bacteria develop defence mechanisms in only two-four years, which is why we need to check our local flora in our environment with this frequency.
5. Antibiogram double aime: guide individual therapeutica decisions and resistance follow-up in order to be able to adjust empiric antibiotic therapy, review clinical spectra of antibiotics and setting prevention programs.
6. All too often, initial empiric treatments fail because the susceptibility of local bacteria to antimicrobial agents is unknown.

IT IS THEREFORE NECESSARY to carry out protocols adapted to each centre considering germs and antibiotic susceptibilities.

RECOMMENDATIONS DEPENDING ON CLINICAL GUIDELINES

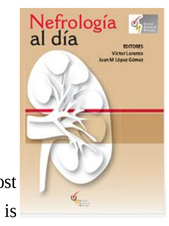
1. PERITONEAL CATHETER EXIT SIDE INFECTIONS

1. Topical treatment with saline 0.9% or hypertonic saline at 20%, chlorhexidine, hydrogen peroxide or betadine.
2. Increasing the frequency of local care from one to three times a day.
3. Topical treatments with **mupirocin, neomycin or gentamicin.**
4. Acute infections:
   Gram + → **1st generation cephalosporins.**
   Gram - → **quinolones.**
5. Antifungal prophylaxis → **fluconazole.**

RECOMMENDATIOS DEPENDING ON CLINICAL GUIDELINES

2. PERITONITIS

- A. INITIAL EMPIRIC TREATMENT
  - **Gram +** → **1ST GENERATION CEPHALOSPORIN (CEFAZOLIN OR CEFALOTIN) O VANCOMYCIN.**
  - **Gram -** → **3RD GENERATION CEPHALOSPORIN (CEFTAZIDIME) OR AMINOGLYCOSIDE.**
- B. MAINTENANCE TREATMENT → choosing the most suitable and most susceptible antibiotic, as proven by the antibiogram. The intraperitoneal route is preferred to that of the endovenous. Treatment duration: 2-3 weeks.



Our protocol at the HUC for peritonitis:
- **VANCOMYCIN + CEFTAZIDIME INTRAPERITONEAL + ORAL FLUCONAZOLE**

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OBJECTIVE

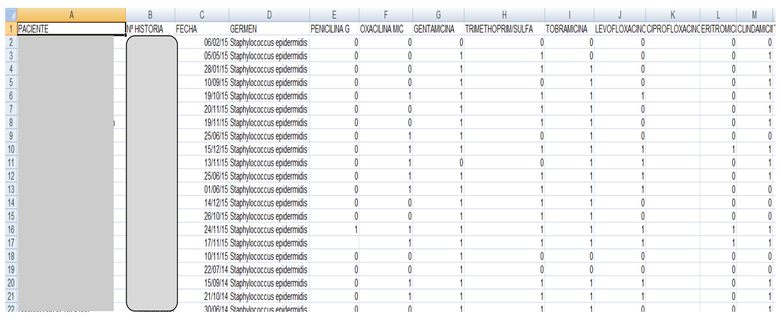
1. Studying the cultures of our patients with exit site infections or peritonitis.
2. Testing the sensitivity of each pathogen to antibiotics.
3. Adapting the empirical antibiotic therapy to our health environment to obtain better results in terms of effectiveness and efficiency in treatment.

MATERIAL AND METHODS

• We retrospectively studied all cultures and antibiograms of peritoneal exit side exudates and peritoneal fluid from our patients in the last four years, to determine which antibiotic or antibiotic combination is most suitable to cover the germ spectrum in our environment before knowing the results of the cultures (first 48-72 hours).

• The main condition was that these antibiotics had to be tested in at least 80% of the cultures and that 80% of the germs were sensitive to those antibiotics.

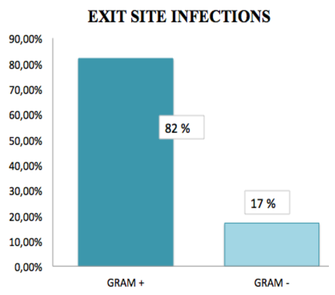
• Subsequently, once the antibiogram is available, we describe the susceptibilities of the germs most frequently isolated in the samples.

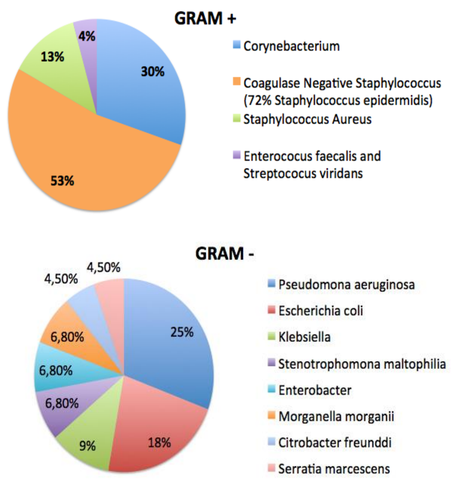


	A	B	C	D	E	F	G	H	I	J	K	L	M
1	PACIENTE	Nº HISTORIA	FECHA	GERMEN	PENICILINA G	OXACILINA MIC	GENTAMICINA	TRIMETHOPRIM/SULFA	TOBRAMICINA	LEVOFLOXACINO	CIPROFLOXACINO	ERITROMICI	CLINDAMICIN
2			06/02/15	Staphylococcus epidermidis	0	0	0	0	0	0	0	0	0
3			05/05/15	Staphylococcus epidermidis	0	0	1	1	0	0	0	0	1
4			28/01/15	Staphylococcus epidermidis	0	0	1	1	1	0	0	0	1
5			10/09/15	Staphylococcus epidermidis	0	0	1	0	1	0	0	0	1
6			19/10/15	Staphylococcus epidermidis	0	1	1	1	1	1	0	0	1
7			20/11/15	Staphylococcus epidermidis	0	0	1	1	1	0	0	0	1
8			19/11/15	Staphylococcus epidermidis	0	0	1	1	1	0	0	0	1
9			25/06/15	Staphylococcus epidermidis	0	1	1	0	1	0	0	0	0
10			15/12/15	Staphylococcus epidermidis	0	1	1	1	1	1	1	1	1
11			13/11/15	Staphylococcus epidermidis	0	1	0	0	1	1	1	0	1
12			25/08/15	Staphylococcus epidermidis	0	1	1	1	1	1	1	0	1
13			01/08/15	Staphylococcus epidermidis	0	1	1	1	1	1	1	0	0
14			14/12/15	Staphylococcus epidermidis	0	0	1	1	1	1	0	0	0
15			26/10/15	Staphylococcus epidermidis	0	0	1	1	1	1	0	0	0
16			24/11/15	Staphylococcus epidermidis	1	1	1	1	1	1	1	1	1
17			17/11/15	Staphylococcus epidermidis		1	1	1	1	1	1	1	1
18			10/11/15	Staphylococcus epidermidis	0	0	1	0	0	0	0	0	0
19			22/07/14	Staphylococcus epidermidis	0	0	1	0	0	0	0	0	0
20			15/09/14	Staphylococcus epidermidis	0	1	1	1	1	1	0	0	1
21			21/10/14	Staphylococcus epidermidis	0	1	1	1	1	1	0	0	1
22			30/06/14	Staphylococcus epidermidis	0	0	1	1	1	0	0	0	1

RESULTS: EXIT SITE INFECTIONS

During the period 2013-2016, we analyzed 256 cultures of peritoneal catheter exudate from 74 patients who showed acute infection of the orifice.





RESULTS: EXIT SITE INFECTIONS

GRAM +

CORYNEBACTERIUM
- 90% sensitive to gentamycin + trimethoprim sulfamethoxazole combination.
- 100% sensitive to vancomycin and teicoplanin.
- 63% ciprofloxacin resistant.
- Fosfomycin is not tested.

S. EPIDERMIDIS
- 86% sensitive to gentamycin + trimethoprim sulfamethoxazole.
- 98,7% fosfomycin + gentamycin.
- 100% sensitive to vancomycin and teicoplanin.
- 74% oxacilin resistant.
- 71% levofloxacin resistant.

S. AUREUS
- 100% sensitive to gentamycin, trimethoprim sulfamethoxazole, fosfomycin and ciprofloxacin.
- 85% oxacillin sensitive.
- 100% sensitive to vancomycin and teicoplanin.
- 85% sensitive to clindamycin.
- 89% sensitive to rifampicin.
- 25% levofloxacin resistent.

GRAM -

GRAM -
- 97% sensitive to gentamycin.
- 83% sensitive to ciprofloxacin.
- 95% to others aminoglycosides.
- 94% ceftazidime, imipenem and cefepime.

PSEUDOMONA AERUGINOSA
- 100% sensitive to ceftazidime.
- 92,3% to gentamycin.
- 85% to ciprofloxacin and carbapenem.

RESULTS: EXIT SITE INFECTIONS

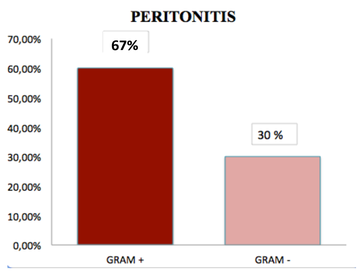
	Gentamycin	Fosfomycin	Trime -sulfa	Vancomycin	Teicoplanin	Ciprofloxaci	Levofloxa cin	Oxacilin	Ceftazidim	Gentamyc + Trim- sulfa	Gentamyc + Fosfomyci
CORYNEBACTERIUM	85%	★	79%	100%	100%	66% resistant	★			90%	
S. AUREUS	100%	100%	100%	100%	100%	100%	25% resistant	85%		100%	100%
S. EPIDERMIDIS	78%	88,6%	58%	100%	100%	★	71% resistant	74% resistant		86%	98,7%
GRAM -	97%	★	60%	★	★	83%			94%	95,5%	
PSEUDOMONA	92,3%	★		★	★	85%			100%		

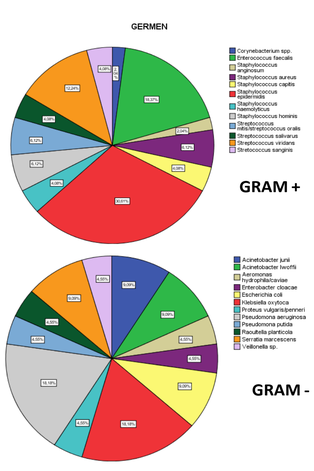
★ Not tested.

Overall, the initial oral and topical combination that best covered both Gram groups and which was tested on at least 80% of the germs samples was:
- **Gentamicin + trimethoprim sulfamethoxazole** (coverage 88.3%)
- **Fosfomycin + gentamicin** (coverage 92.5%), but not tested in corynebacterium
- **Ciprofloxacin + gentamicin** (coverage 87.8%) but corynebacterium 66% resistant
- Rest had coverage less than 80% or was not tested in at least 80% of the sample.

RESULTS: PERITONITIS

During the period 2013-2016, we analyzed 73 cultures of peritoneal fluid from 37 patients.





RESULTS: PERITONITIS

GRAM +
- 100% sensitive to vancomycin.
- 97% sensitive to teicoplanin.
- 65% sensitive to clindamycin.
- 15% levofloxacin resistant.
- The three S. Aureus peritonitis were all sensitive to oxacillin.
- However, only 50% of coagulase-negative staphylococco peritonitis was sensitive to oxacillin, but all were sensitive to vancomycin.

GRAM -
- 100% sensitive to aminoglycosides, cefepime and carbapenem.
- 90% sensitive to ceftazidime and quinolones.

Our initial empiric protocol **(intraperitoneal VANCOMYCIN and CEFTACIDIME)** → was proven effective in 88% of cases and could increase to 94% when adding ciprofloxacin.

CONCLUSIONS

• The most effective initial empirical treatment to treat any peritoneal exit site catheter infection in our setting, with effective coverage for Gram + and Gram - including pseudomonas aeruginosa, corynebacteria, staphylococcus epidermidis and staphylococcus aureus, while waiting the results of the cultures, is topical gentamicin with oral trimethoprim sulfamethoxazole. Neither cefazolin nor quinolones fulfilled the adequate profile to be used as initial empirical treatment of peritoneal exit site catheter infection.

- Our initial empiric treatment protocol for peritonitis with **vancomycin and ceftacidima** is very suitable.
- Periodic analysis of these data provides useful information to optimize the management of these complications in our environment and is also useful to compare with other populations in this therapeutic modality.

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