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Feasibility of continuous administration of antimicrobials in hospital: nothing is ever as it seems?

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Background & aim

Continuous infusion of antimicrobials is increasingly applied because of its **pharmacokinetic and practical advantages**, including (1) the rapid achievement of stable target serum concentrations, (2) the easiness of sampling since levels are determined during steady state and (3) the simple interpretation of therapeutic drug monitoring. Our objective was to **assess medication administration practices related to the continuous infusion of antimicrobials**.

Materials/Methods

During a **10-day prospective observational survey** in March 2019, we enrolled all consecutive hospitalized non-ICU patients, who received at least one antimicrobial suitable for continuous infusion (**Table 1**). Catheter type, number of lumens, route of administration, loading- and maintenance dose and pump settings were assessed by comparing the electronic prescription and patient file with the observations. Drug incompatibilities were analyzed using the compatibility information provided in Trissel's 2 Clinical Pharmaceutics Database and categorized as compatible, incompatible, uncertain or none (**Table 2**). Drug incompatibility was defined as an incompatibility or uncertainty about the compatibility between at least 2 simultaneously Y-site administered drugs.

TABEL 1: antimicrobials suitable for continuous infusion

amoxicillin
aztreonam
benzylpenicillin
ceftazidim
flucloxacilline
meropenem
piperacillin-tazobactam
temocillin
vancomycin

TABEL 2: drug incompatibilities categories

Compatible	Data available confirming compatibility through Y-site
Incompatible	(Conflicting) data confirming incompatibility through Y-site
Uncertain	No data about Y-side compatibility
None	Sequential administration assuming correct flushing in between

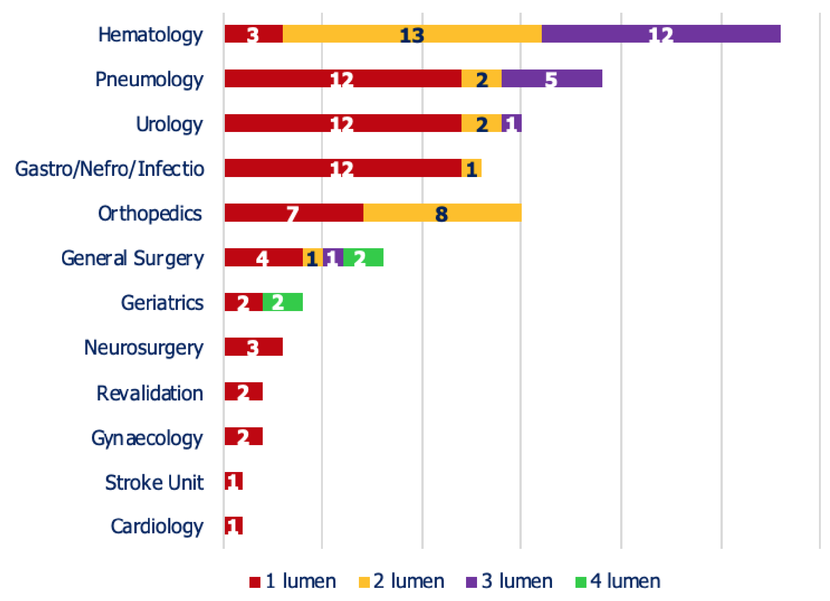


FIGURE 1: number of lumens per nursing unit

Results

107 observations in **86 patients** were performed and **113 antimicrobial prescriptions** were analyzed. Peripheral lines were most commonly used (53%), followed by central venous catheters (35%) and peripherally inserted central catheters (10%). Single, double, triple, quadruple lumen catheters accounted for 56%, 23%, 17%, and 4% respectively (**Figure 1**).

Continuous infusion therapy was prescribed, according to hospital guidelines, in 96% of patients, 93% of which received a loading dose. In 96% of cases a correct maintenance dose was administered. **Only 63%** of the infusion bags or syringes **were labeled appropriately**. In 7% of the observations, the pump settings did not match the prescribed dose, causing both over- and under dosing in six patients (respectively defined as >105% and <95% of the prescribed daily dose).

We observed **drug incompatibilities in 28%** (30/107) of cases, mostly with **single-lumen catheters** (63%), and in **hematological** patients (37%) (**Figure 2**). Moreover, change from continuous infusion to **intermittent infusion** was **the only solution to overcome drug incompatibility in 73%** of these cases.

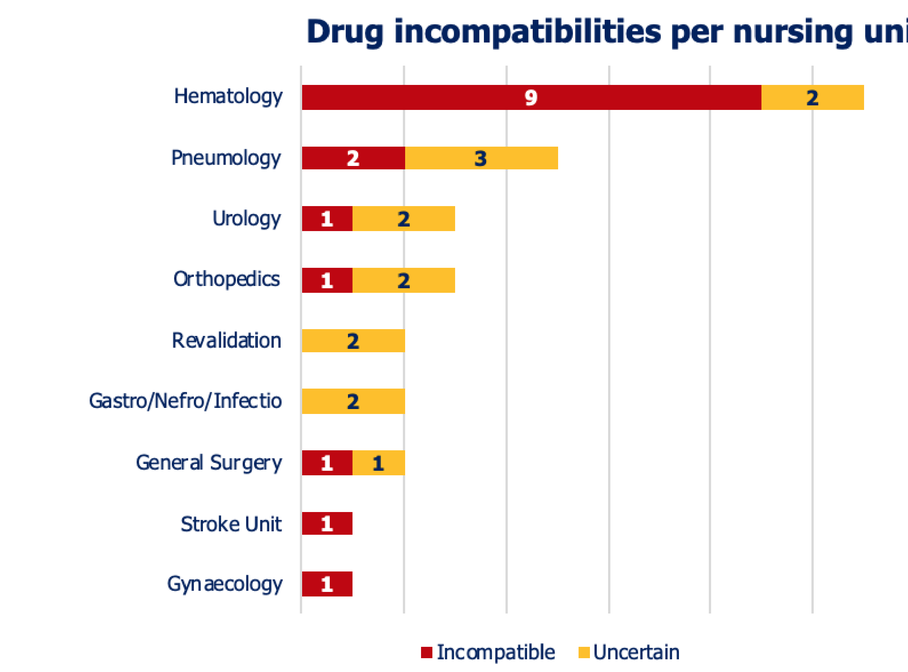
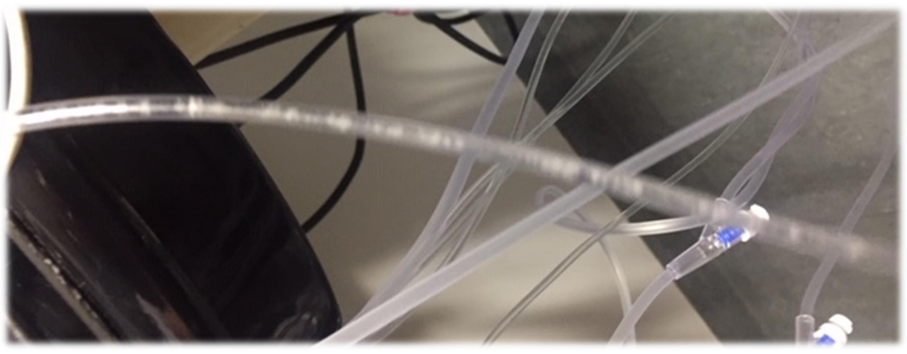


FIGURE 2: number of drug incompatibilities per nursing unit



Example of drug incompatibility: meropenem + ondansetron

Discussion/Conclusion

Matters related to the administration of the antibiotic were common in continuous infusion of antimicrobials. In response, we started with:

- **educational sessions**,
- the **hospital policy** was slightly **adapted** including the allowance of intermittent infusion in case of drug incompatibility and
- a **prescribing alert** that can be used by nurses or physicians to request for a drug incompatibility check by the clinical pharmacist, was implemented.

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