Evaluation Of Antibiotic Use In Patients Admitted To The Intensive Care Unit (ICU) With Pneumonia-Sepsis: Retrospective Observational Before-After Study

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Background and importance

Early and adequate empiric antibiotic therapy is essential in the treatment of pneumonia and sepsis, and may influence the clinical outcome.

Aim and objectives

This retrospective before-after study aimed to appraise the impact of local ASP (written guidelines and antibiotic restriction) on antibiotic (AB) use and clinical outcomes in patients requiring intensive care due to pneumonia and sepsis.

Materials and methods

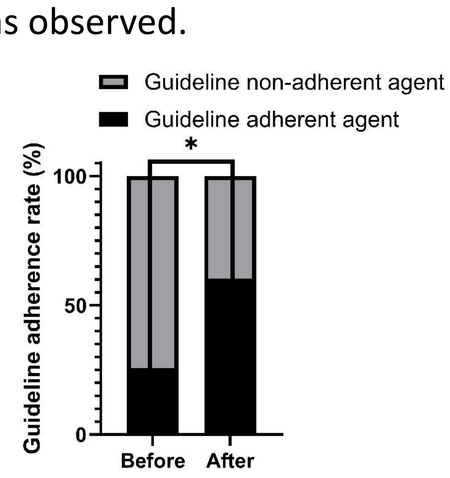
Study period: June 2018 - February 2024
Place: an Intensive Care Unit (ICU) of a tertiary care medical center in Hungary
ASP: available written guidelines and antibiotic restriction
Compared parameters between **before** and **after** period:
- overall guideline adherence: agent selection, route of administration, dose
- antibiotic exposure
- clinical outcomes: LOS-length of stay, 30-day mortality

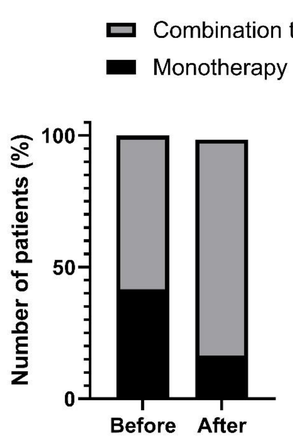
Statistics: Fisher's exact test, t-test, two-way ANOVA (*p<0.05, **p<0.001)

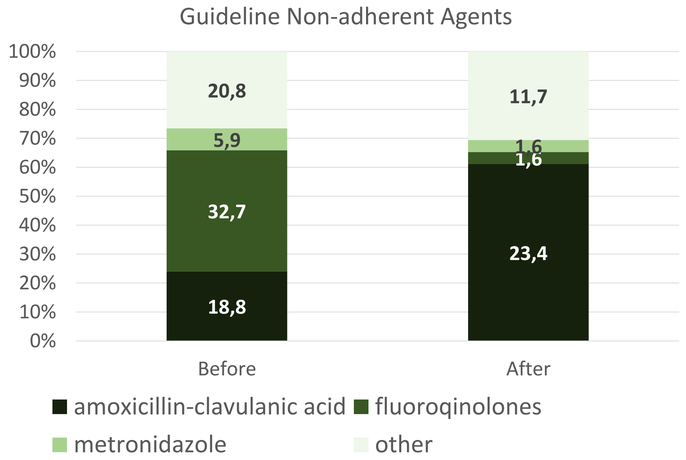
Results

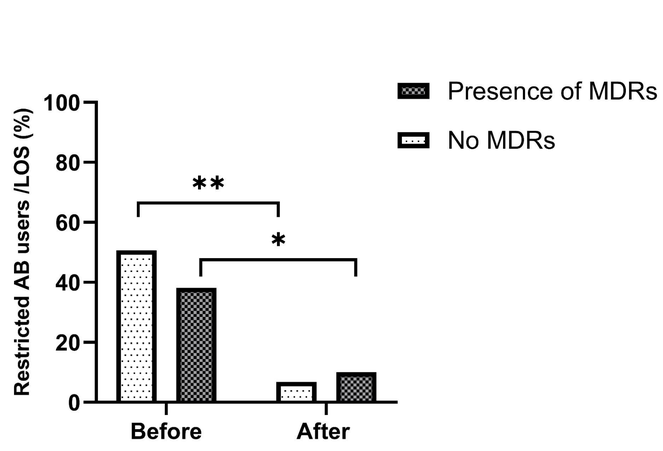
The patients admitted to the ICU with pneumonia and sepsis were mainly men (58/101, 57.4% and 84/128, 65.6%), the need for intensive care increased with age, and most of the patients belonged to 65+ age group in both study phases (68.3% and 58.6%). The majority of the patients had four or more comorbidities (57.4% and 40.6%). In-hospital mortality was relatively high (42.6% and 41.4%), most of the patients losing their lives already in the ICU (33/43, 76.7% and 37/53, 69.8%).

Significant increase in guideline-adherent agent selection (34.5%) and use of combination therapy (23.6%) was observed, while the use of fluoroquinolones decreased significantly (-31.1%). In the after period, a significant decrease in the number of patients using restricted ABs (-53.3%) was observed.

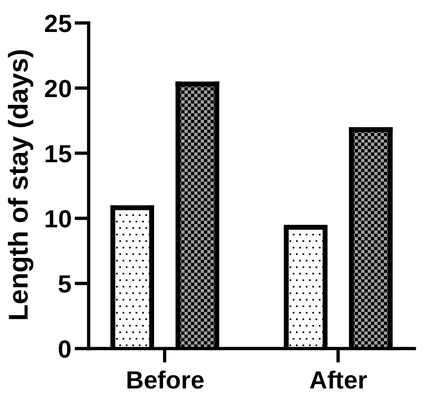


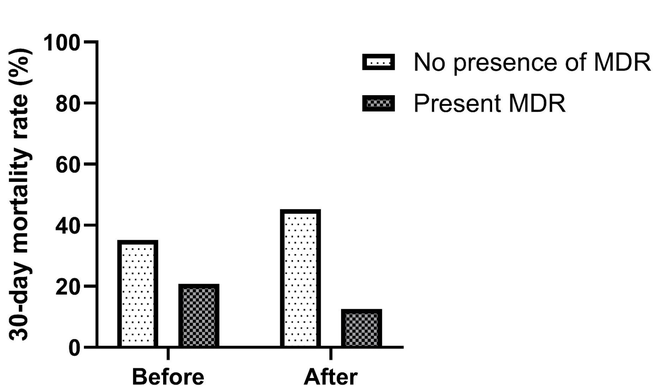


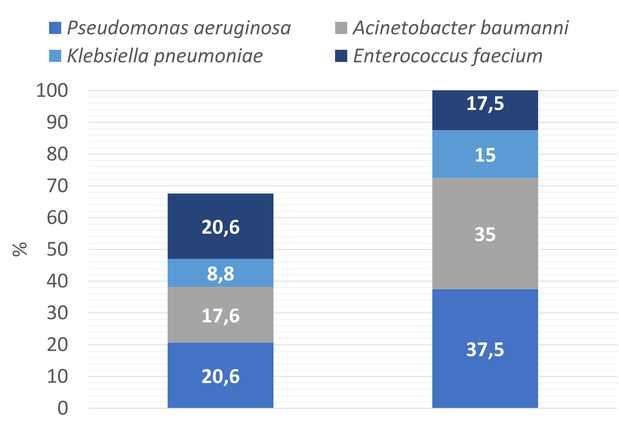




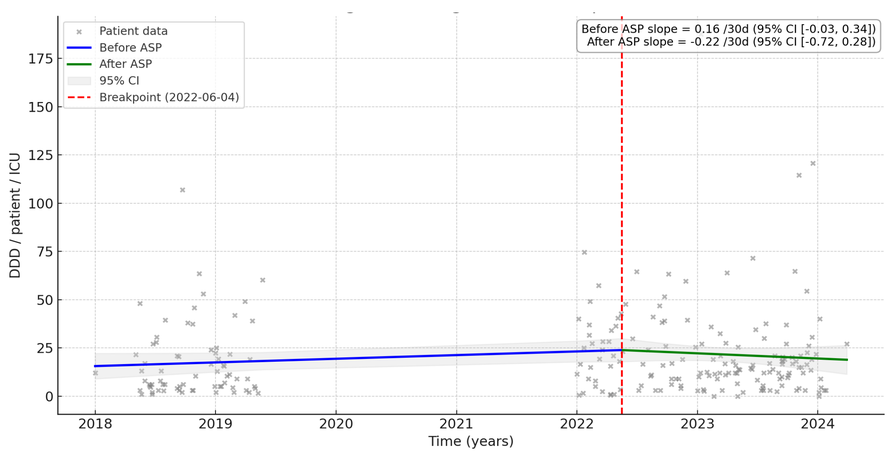
In one-third of these cases (10/34, 29.4% and 16/40, 40%) 2-4 MDR pathogens were detected simultaneously, resulting in a significant increase in direct costs (10.5%) in the ICU. The inappropriate AB therapy was relatively low in the presence of MDRs in both phases (5.9% and 15%). In the ASP period, guideline adherence was associated with slightly better clinical outcomes (30-day mortality: -0.8% and LOS: -22.6%) in pneumonia and sepsis.

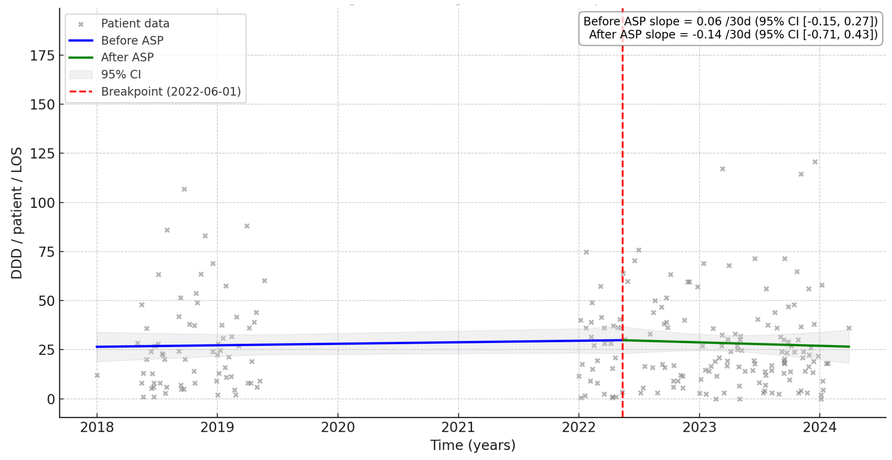






At the same time, the ITS analysis indicates a decrease in the trend of AB use both for ICU (from 0.16 /30 days to -0.22 /30 days) and LOS (from 0.06 /30 days to -0.14 /30 days), suggesting that the ASP may have a sustained long-term effect.





Conclusions

ASP implementation in the ICU resulted in a significant improvement in the appropriate use of ABs, and guideline adherence led to slightly better clinical outcomes. Our results suggest that ASP may hold the promise to improve AMR with a sustained long-term effect.