

Introduction

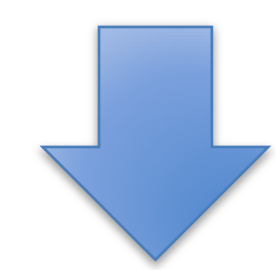
- According to the World Health Organization, carbapenems should be key targets for stewardship programs.¹
- Antimicrobial stewardship programs have been shown to significantly improve use of carbapenems as well as other agents, without resulting in increased harm to patients.²⁻⁴
- This study's focus was to evaluate the efforts of an antimicrobial stewardship program's initiatives on reducing inappropriate carbapenem usage within a tertiary care hospital in tristate area in the Midwest

Objective

- To study impact of ASP interventions on carbapenem use at a tertiary care center in upper Midwest

Methods

- A multifaceted antimicrobial stewardship program (ASP) was implemented in January 2018 at a 160-bed tertiary care center serving the tristate area of Iowa, South Dakota and Nebraska.



ASP interventions included:

- stewardship educational pearls in monthly physician newsletters;
- educational posters in high-traffic provider areas; suppression of carbapenem results on microbiology susceptibility reports;
- distributing monthly carbapenem use data to providers; provider counseling for appropriate ordering;
- creating *carbapenem alternative alert* in order-entry software;
- generating pharmacy decision-support software algorithms to aid in identifying intervention opportunities;
- removing carbapenems from order-sets (where appropriate.)

Methods cont...

Additional ASP pharmacist interventions:

- limiting double antibiotic coverage for pseudomonas/anaerobes;
- de-escalation recommendations.



- Carbapenem use during pre-ASP intervention period (P1: 07/01/2016-12/31/2017) was compared with ASP-intervention period (P2: 01/01/2018-06/30/2019).

Results

❖ Carbapenem use declined significantly from a mean of 64.81 days of therapy (DOT) per 1000 patient days during P1 to 8.91 DOT per 1000 patient days in P2 ($p < 0.001$).

❖ All hospital units showed a significant decrease in carbapenem use, with

- intensive care (ICU) step-down unit noting 85.7% reduction ($p < 0.00001$);
- floors (medicine, pediatric, surgery) with 61.6% reduction ($p < 0.00001$);
- and intensive care units (ICUs) with 52% reduction ($p < 0.00001$) during P2 compared to P1 (**Figure 1**).

❖ Defined daily doses per 1000 patient days decreased from 314.9 in P1 to 93.4 in P2 ($p < 0.00001$).

❖ During P2, 58.3% (132/228) of carbapenem orders were found to be appropriate compared to 37.5% (190/506) in P1 ($p < 0.00001$) as shown in **Figure 2**.

❖ Sensitivity profile for *Pseudomonas aeruginosa* improved from 86% carbapenem sensitivity during P1 to 89% in P2.

❖ No *Carbapenem-Resistant Enterobacteriaceae* isolates were identified.

❖ Cost savings of \$643 per 1000 patient days were recognized in P2 as a result of reduced carbapenem use.

❖ Though slightly reduced, 30-day mortality did not change significantly for pneumonia or sepsis patients

Figure 1. Hospital Units showing significant decline in Carbapenem use during intervention period

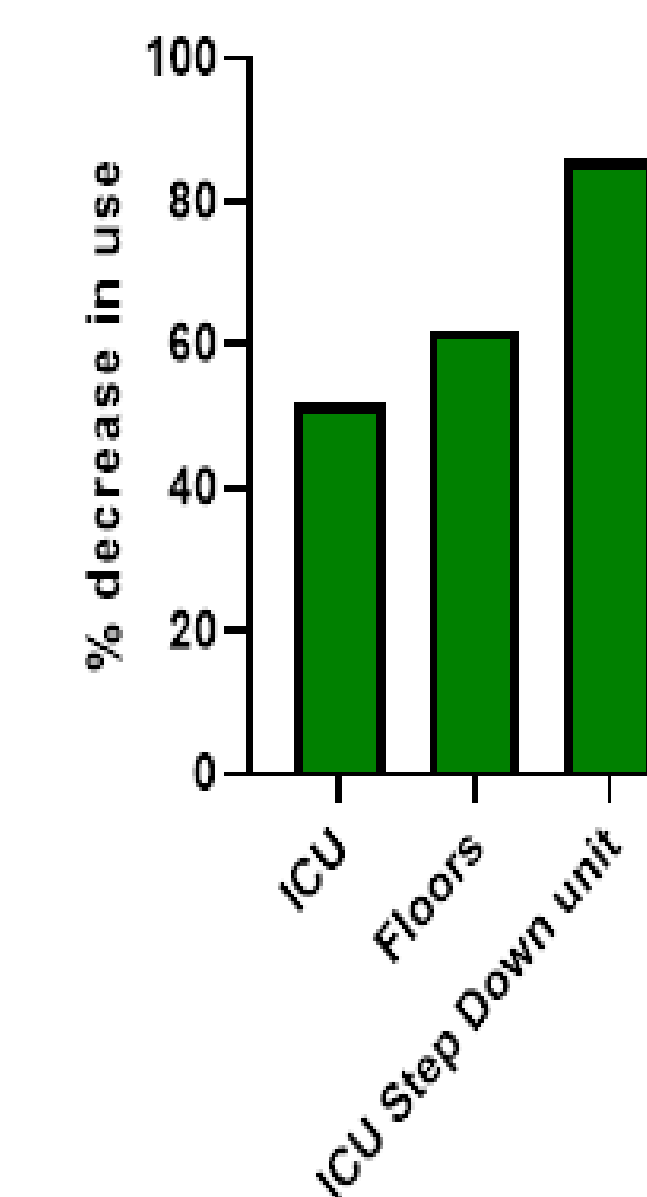
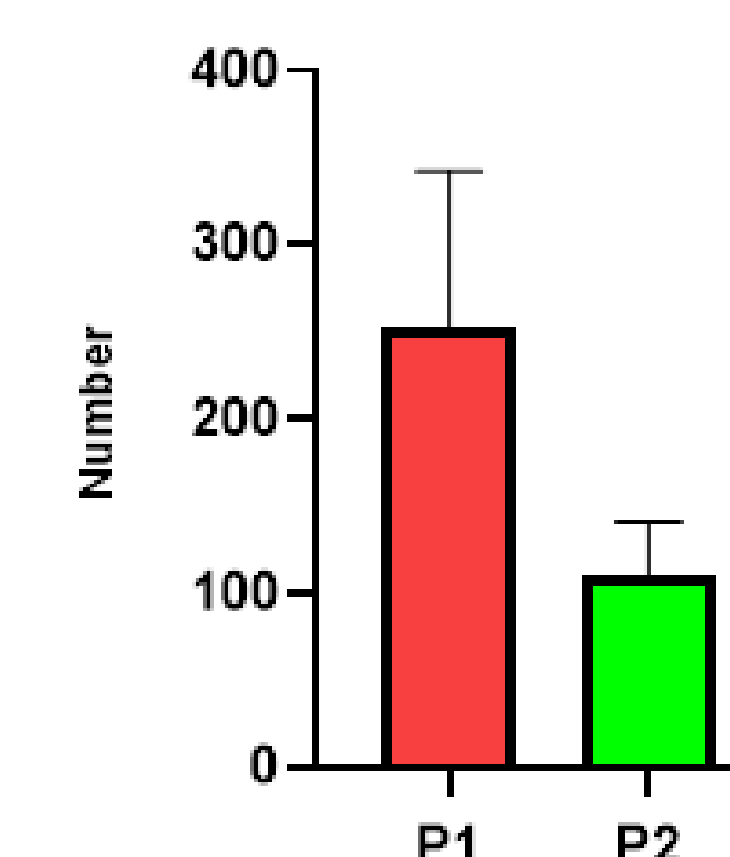


Figure 2. Inappropriate orders declined significantly



Conclusions

- This multi-faceted, multi-disciplined Antimicrobial stewardship program was effective in decreasing total carbapenem utilization.
- The interventions were effective in significantly increasing appropriate use of carbapenems and decreasing inappropriate use.
- Significant cost savings were realized as a result of the interventions completed to reduce carbapenem prescribing.
- A trend for increased carbapenem susceptibility in *pseudomonas* isolates was seen.

References

1. World Health Organization. WHO Model List of essential Medicines. 2017
2. Hagiwara D, Sato K, Miyazaki M, et al. The impact of earlier intervention by antimicrobial stewardship team for specific antimicrobials in a single weekly intervention. *Int J Infect Dis.* 2018; 77: 34-39.
3. Sea XF, Ong YL, Tan SW, et al. Impact of antimicrobial stewardship program on the use of carbapenems in a tertiary women's and children's hospital, Singapore. *Pharmacotherapy.* 2014; 34(11): 1141-50
4. Garcia-rodriguez JF, Bardan-garcia B, Pená-rodriguez MF, Álvarez-díaz H, Mariño Callejo A. Meropenem antimicrobial stewardship program: clinical, economic, and antibiotic resistance impact. *Eur J Clin Microbiol Infect Dis.* 2019; 38(1): 161-170.