Effectiveness of a Stewardship Program in Reducing Antimicrobial Use in two Tertiary Care Hospital ICUs in Southern Ontario

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Background

While the benefits of antimicrobial stewardship programs (ASP) in reducing antimicrobial utilization in the intensive care unit (ICU) setting are suggested in the literature, few data exist regarding its effectiveness at the individual intensivist level, and how the effect on individual intensivists contributes to the overall utilization. This study sought to assess the impact of an ASP among intensivists working in the ICUs at two large tertiary care hospital sites. Also, we aimed to determine which factors may influence the efficacy of an ASP by comparing two ICUs with different ASP maturity and approaches to stewardship rounds.

Methods

This study used a quasi-experimental design to compare antimicrobial utilization at the unit as well as at the individual intensivist level. Antimicrobial utilization was measured in defined daily doses (DDD) per 1000 patient days. The two observed units were ICUs at different hospital sites that are both part of a large tertiary hospital group in Hamilton, Ontario, Canada. Data were collected among intensivists working on 1-week rotations in either of these units (5 and 10 intensivists in Unit 1 and 2, respectively). On unit 1, weekly ICU stewardship rounds were held at baseline (pre phase: weeks 0-105). From week 106 on, rounds took place twice weekly, were more formalized, and were supported by teaching sessions (post phase). Stewardship rounds were led by the Infectious Disease (ID) attending on call in a given week and an ID pharmacist.

On unit 2, no antimicrobial stewardship initiatives were in place in the pre phase, and thrice weekly ASP rounds were implemented starting in week 106. Stewardship rounds were led by one dedicated ID attending and an ID pharmacist.

Average DDD were compared using segmented regression/time series analysis for each unit. Only those intensivists who worked regularly works in Unit 1, but did not reach statistical significance, most likely due to lack of power at the individual intensivist level (Type 2 error). Whereas the reduction in Unit 1 was abrupt (coinciding with the introduction of a more formalized program and more frequent rounds), the change in the slope of antimicrobial utilization by week on unit 2 indicates that there will be likely a change in average eventually as well. This observation may be explained by the fact that it was a new introduction of ASP on unit 1, and trust needed to be built prior to seeing an effect, while this was not necessary on unit 1, where there was no reduction in the average DDD/1000 patient days for Unit 2; however, there was a significant change in the slope in the post phase (Figure 2a), indicating a trend towards reduced antimicrobial utilization over time (change in slope: -9.2, 95%CI: -15.9 to -2.6, p=0.007). While intensivist 2 intensivists also showed a trend towards a reduction in antimicrobial utilization, the pre post difference in the average utilization was modest compared to Unit 1 (change in average utilization p>0.05 for each intensivist, one intensivist with a significant change in slope) (Figure 2b).

Results

An ASP consisting of formal twice weekly rounds supported by teaching sessions was associated with a significant reduction in antimicrobial utilization. This reduction was observed for each intensivist who regularly works in Unit 1, but did not reach statistical significance, most likely due to lack of power at the individual intensivist level (Type 2 error). Whereas the reduction in Unit 1 was abrupt (coinciding with the introduction of a more formalized program and more frequent rounds), the change in the slope of antimicrobial utilization by week on unit 2 indicates that there will be likely a change in average eventually as well. This observation may be explained by the fact that it was a new introduction of ASP on unit 1, and trust needed to be built prior to seeing an effect, while this was not necessary on unit 1, where stewardship rounds were originally implemented in 2011. However, the fact that there was a significant reduction in the post phase utilization for unit 1 indicates that more frequent and formalized rounds coupled with teaching sessions for residents can improve the efficacy of an already established ASP.

Discussion

While increasing the frequency of stewardship rounds and adding teaching sessions was successful in immediately improving the effect of an established ASP in one ICU, introduction of a new ASP in another ICU required more time to have an effect on antimicrobial utilization.

Conclusions

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