Applying A Difference-in-Difference Analysis to Asses Effects of Antimicrobial Stewardship Strategies on Changes in Antimicrobial Use

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BACKGROUND

- About 30-50% of inpatient antimicrobial use in the US is suboptimal.
- In response to inappropriate antimicrobial use and the increase in antimicrobial resistance as a result, the US Centers for Disease Control and Prevention, Infectious Diseases Society of America, Society for Healthcare Epidemiology of America, and other professional societies have recommended the implementation of various antimicrobial stewardship (AS) strategies. These strategies aim to promote appropriate prescription, with the goal of optimizing clinical outcomes, and improving patient safety and cost-effectiveness of antimicrobial use.

STEWARDSHIP IN VA

- In 2011, the VA established an Antimicrobial Stewardship Task Force (ASTF), staffed by individuals from infectious disease (ID), pharmacy, surgical care, internal medicine, primary care, nursing, pathology and laboratory medicine, infection prevention and control, public health, and operations. ASTF was tasked to optimize the care of Veterans by developing, deploying, and monitoring a national-level strategic plan for improvements in antimicrobial therapy management.
- In 2014, the U.S. Undersecretary for Health issued a Veterans Health Administration Directive that all VA facilities establish or augment existing AS programs.

OBJECTIVE

This study examined the impact of changes in AS strategies on antimicrobial use over time.

DATA

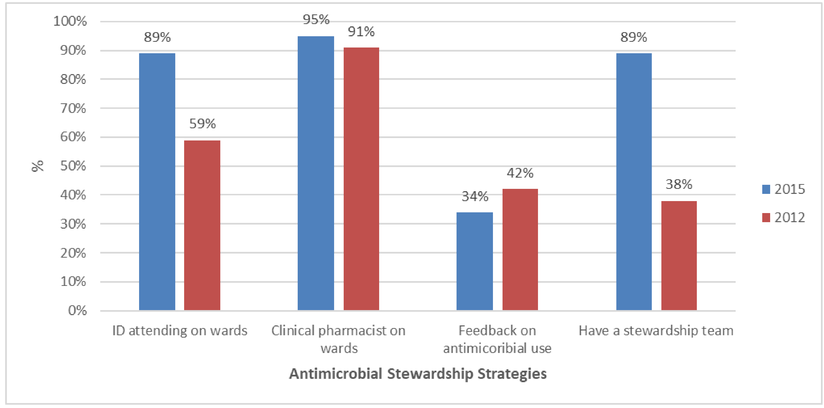
- The Veterans Affairs (VA) Healthcare Analysis & Informatics Group (HAIG) AS survey, administered at 130 VA facilities in 2012 and 2015
- Antimicrobial utilization from VA Corporate Data Warehouse

METHODS

- Measures:
  - Four AS strategies were examined: having an AS team, feedback mechanism on antimicrobial use, ID attending physicians on wards, and clinical pharmacist assigned to teams/wards. Change in AS strategies were computed by taking the difference in the presence of a given strategy in a facility between 2012-2015. Change categories include: negative change indicates that the strategy was implemented in 2012 but was no longer present in 2015; positive change indicates the strategy was absent in 2012 but implemented in 2015; no change indicates that the strategy was present in 2012 and 2015; and strategy not implemented either in 2012 or 2015
  - The outcome was the difference between antimicrobial use per 1000 patient days in 2012-2013 and 2015-2016.
- Using a multiple regression model, changes in antimicrobial use was estimated as a function of changes in AS strategies, controlling for ID human resources and organizational complexity.

AS STRATEGIES IN 2012 AND 2015

Figure. Percent facilities implemented AS strategies in 2012 and 2015



RESULTS

- Only change in availability of AS teams had a significant impact on antimicrobial use.
  - Compared to facilities with no AS teams at both time points, antimicrobial use decreased by 63.9 uses per 1000 patient days in facilities that did not have a AS team in 2012 but implemented one in 2015 (p=0.0183).
  - Facilities that had an AS team at both time points decreased antimicrobial use by 62.2 per 1000 patient days (p=0.0324).

Stewardship Strategies (Implemented in 2012 and 2015)	Estimate (Standard Error)
ID Attending on wards (negative change)	1.81 (60.95)
ID Attending on wards (no change)	34.41 (18.49)†
Feedback on antimicrobial use patterns (positive change)	-10.93 (21.18)
Feedback on antimicrobial use patterns (negative change)	1.44 (23.75)
Feedback on antimicrobial use patterns (no change)	-32.73 (20.23)
Clinical pharmacist assigned to teams/wards (positive change)	-44.03 (70.76)
Clinical pharmacist assigned to teams/wards (negative change)	-51.30 (55.84)
Clinical pharmacist assigned to teams/wards (no change)	-44.72 (50.58)
ID Attending on ward (positive change)	-63.91 (26.69)*
ID Attending on ward (no change)	-62.27 (28.73)*

* p≤0.05 † p≤0.10

CONCLUSION

- The findings showed that AS teams reduced inpatient antimicrobial use over time.
- While changes in having feedback on antimicrobial use and clinical pharmacist assigned to teams/wards showed reduced antimicrobial use between 2012-2015, the differences were not statistically significant.
- In further development of stewardship programs within healthcare organizations, the association between AS teams and antimicrobial use should inform program design and implementation.

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