Effects of Policy and Resources on Antimicrobial Stewardship Implementation in VA: Applying a Transaction Cost Economics Framework

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BACKGROUND

- Up to half of all antimicrobial use in the US is inappropriate, leading to increases in antimicrobial resistance, adverse events, and costs.
- Recognizing the crisis of antimicrobial resistance, the US Centers for Disease Control and Prevention, Infectious Diseases Society of America, Society for Healthcare Epidemiology of America, and other professional societies have strongly encouraged the implementation of antimicrobial stewardship (AS) programs.
- AS programs are designed to promote appropriate prescription, with the goal of optimizing clinical outcomes, minimizing unintended consequences of antimicrobial therapy, improving patient safety and cost-effectiveness of antibiotic use through multidisciplinary approach.
- However, implementing new practices can be difficult. It requires changes in organizational structure and culture, creating uncertainties.

VA EFFORTS IN STEWARDSHIP

- In May 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 January 2014, the U.S. Undersecretary for Health issued a Veterans Health Administration Directive that all VA facilities establish or augment existing AS programs.

OBJECTIVE

To examine how organizational policy and resources are associated with AS interventions and perceived barriers to AS implementation, using a transaction cost economics (TCE) framework

TRANSACTION COST ECONOMICS

- AS requires coordination among staff and tasks. To achieve efficiency and improve outcomes, the TCE perspective suggests that organizations choose structures to minimize production and transaction costs, which may affect the extent of AS interventions uptake.
- Williamson (1981) identified three dimensions in transaction costs:

  (1) Uncertainty emerges as organizations establish new exchange relationships; **(2) Frequency with which transactions recur** may be mostly immutable. However, it can be argued that optimizing antimicrobial use may lead to reduced patient visits and therefore, a decrease in the number of transactions; **(3) Asset specificity** of fixed investments are specialized to a particular transaction. Asset specificity can arise from site specificity, physical asset, and human asset.

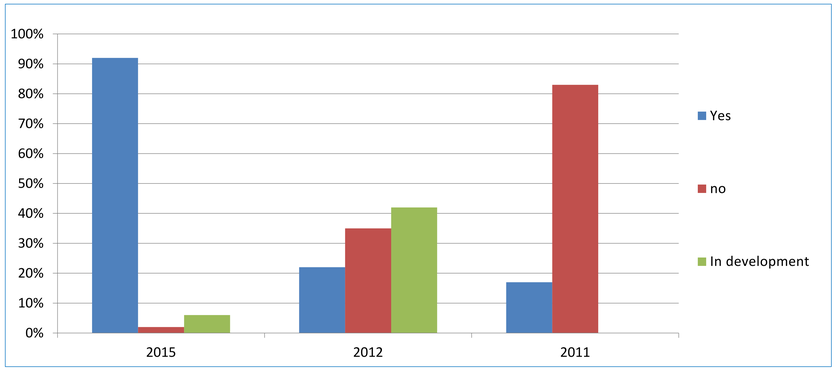
FRAMEWORK

- Transaction costs arise from provider-patient interactions. The complexity in service delivery within a VA facility, including coordination among various departments, can consume resources and incur higher transaction costs.
- Under these conditions, AS interventions are expected as means to reduce costs by optimizing antimicrobial prescribing and improving patient safety, but also lower transaction costs by ensuring efficient coordination among staff. Therefore, standardizing AS activities should decrease labor intensity and professional time expended by the staff.

METHODS

- ASTF partnered with the VA Healthcare Analysis & Informatics Group (HAIG) to develop and administer a survey on AS activities across VA facilities nationwide. The 2015 **HAIG survey** was administered to Regional Director or Chief Medical Officer in all 140 medical centers and integrated facilities in the VA system, using the Inquisite® survey software.
- **Outcomes examined**: (1) facility tracking none, 1-2, or 3+ AS interventions (e.g., parenteral to oral antibiotics conversion, avoidance of double anaerobic coverage, de-escalation of vancomycin, reviews/ approval of discharge duration of therapy following admission for pneumonia, action to improve *S. aureus* management); (2) barriers to optimal antimicrobial use (e.g., limited ID physician support, pharmacy support, leadership support, provider buy-in, IT/data tools, education, guideline implementation and microbiology resources)
- **Independent variables**: (1) AS policies as proxies for uncertainty (e.g., avoid use of non-essential antibiotics, use clinical pathways/guidelines, etc.); (2) Asset specificity: site specificity (e.g., on-site microbiology lab); physical assets (e.g., data tools); personnel (e.g., ID physician assigned to wards/units, clinical pharmacist available)
- Multinomial logistic regression analysis with the Least Absolute Shrinkage and Selection Operator (LASSO) approach was used to identify the subset of variables and generate odds ratios across e TCE dimensions that inform AS intervention uptake and ameliorating barriers.

Figure 1. Number of AS Programs over time



RESULTS

Table 1. Factors Associated with AS Intervention Uptake

Factors	Estimate	t-value
SITE SPECIFICITY		
Facility offers inpatient ID consult (low)	0.88	0.9069
Facility offers inpatient ID consult (high)	0.71	0.6634
Facility has onsite microbiology lab (low)	-0.63	-0.4849
Facility has onsite microbiology lab (high)	0.09	0.0489
HUMAN ASSETS		
ID physician assigned to med wards (low)	0.16	0.2185
ID physician assigned to med wards (high)	1.25	1.4731
Number of ID physicians (low)	0.16	0.8653
Number of ID physicians (high)	0.23	1.2008
Pharmacist assigned to teams (low)	-0.38	-1.4451
Pharmacist assigned to teams (high)	-0.89	-3.038
PHYSICAL ASSETS		
Tools: Population management +VistA (low)	0.88	1.2631
Tools: Population management +VistA (high)	2.82	2.5912
Tools: Pathfinder + Theradoc (low)	0.78	0.9318
Tools: Pathfinder + Theradoc (high)	0.54	0.5889
Tools: VISN data (low)	1.16	1.7778
Tools: VISN data (high)	-0.61	-0.7611
Tools: CDC antimicrobial use option (low)	-1.47	-1.687
Tools: CDC antimicrobial use option (high)	-0.76	-0.8621
POLICIES		
Policy establishing AS program (low)	2.20	1.6303
Policy establishing AS program (high)	1.65	1.1983
Auto stop for antimicrobial duration (low)	0.22	0.2622
Auto stop for antimicrobial duration (high)	0.13	0.1558
Require EMR documentation (low)	-0.41	-0.5791
Require EMR documentation (high)	1.46	1.8158
Use pathways/guidelines (low)	0.70	0.8607
Use pathways/guidelines (high)	1.33	1.3861
Parenteral to oral antibiotic conversion (low)	-0.59	-0.8032
Parenteral to oral antibiotic conversion (high)	-2.15	-2.3599
Double anaerobic antibiotic coverage (low)	1.155	1.5625
Double anaerobic antibiotic coverage (high)	2.81	3.1117
Evaluate discharge duration of therapy (low)	0.47	0.6729
Evaluate discharge duration of therapy (high)	0.57	0.7258
Manage S. aureus (low)	-0.40	-0.6207
Manage S. aureus (high)	1.20	1.6459

- Variables from each TCE dimension were selected into the model as those that influence the AS intervention tracking. Personnel (ID attendings and pharmacists), using electronic tools, and various AS policies were associated with greater AS Intervention uptake.
- Similar variables also decreased the likelihood of facilities experiencing barriers to AS implementation. Better ID physician support and provider buy-in were observed in facilities that offer on-site ID consult. Policies related to order entry documentation were associated with improved provider buy-in and microbiology resources.

CONCLUSION

- Overall, human resources, physical assets, and policies affected AS intervention uptake and ameliorated barriers to stewardship and optimal antimicrobial use.
- The implementation of AS interventions in VA facilities represents a complex change, requiring a system-wide response. These variables represent mechanisms that improved efficiencies of coordination and provided resources to achieve intended stewardship goals.
- The TCE framework is useful to inform facilities in their strategies to adopt new ways of organizing in order to manage emerging demands that include changing work tasks of clinicians, coordinating across units and departments, and developing new tools for optimizing antimicrobial use.

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