



ANTIMICROBIAL STEWARDSHIP IN NORTH AMERICA

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EXECUTIVE SUMMARY

Antimicrobial resistance is one of the top threats to our ability to save lives and deliver high quality health care efficiently. In local hospitals, infections with resistant organisms are simultaneously debilitating or fatal to patients, increase hospital stay, and may add up to \$100,000 per case of increasingly unreimbursed expenses for hospitals.

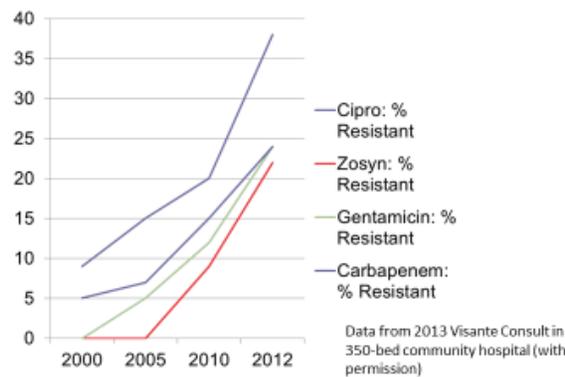
Antimicrobial stewardship programs (ASPs) provide an evidence-based way to properly prescribe and use antimicrobial agents, coordinate infection control efforts, and avoid promoting resistance and treatment failures. As a result of these initiatives, ASPs are well documented to save big money.

Many top performing hospitals have had comprehensive, medical staff approved ASPs for some time, while others are still thinking about it. However, antimicrobial resistance, government mandates and new guidelines are propelling ASPs towards a tipping point where they will be the standard of practice for hospitals and other organized healthcare settings. Included in this white paper are: 1) how ASPs work, 2) how to get started, 3) overcoming barriers, 4) keys to success, 5) additional resources, and 6) a self-assessment tool.

INTRODUCTION

Antimicrobial Resistance - The World Health Organization (WHO), CDC, Accreditation Canada, and many other agencies have come to identify spiraling antimicrobial resistance as one of the major threats to continuing to provide effective care for infected patients and prevent infection during routine procedures. Here is an example of how antimicrobial resistance happens when there is no ASP in place to use antibiotics optimally, or the existing ASP is not performing optimally.

Typically Decreased Sensitivities:
Percent (%) Resistant *Pseudomonas Aeruginosa* in Recent Years



Managing antimicrobial resistance is an imperative for hospitals to survive clinically and financially.¹

Unneeded Expense - On a local level, as payment systems move toward shifting risk for medical complications to providers, the disastrous cost of hospital infections is catching the attention of more and more clinicians and managers. Infections with resistant organisms are simultaneously debilitating or fatal to patients individually, and typically add \$10,000-100,000 per case of increasingly unreimbursed expense for hospitals.²

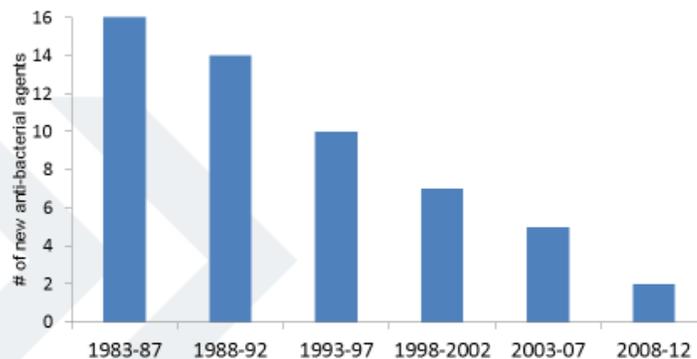
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Even for small facilities with “acceptable” infection rates, the economic difference between excellent antimicrobial management and performance satisfactory to meet minimum regulation requirements is millions of dollars in lost margin. Other fallout may include negative public opinion and increasing exposure to criticism about patient safety with quality data becoming transparent.

Misuse - The terminology of “*stewardship*” has evolved because in the short-term, there is consensus that about 50% of antibiotics are either unnecessary, or given in the wrong clinical situation with suboptimal dosing or improper duration (found to be 30% longer, on average, than needed). There are many short-term opportunities through stewardship to reduce direct hospital antibiotic costs by at least 22-36%, as detailed below, besides decreasing ICU/hospital bed days, readmission rates, and repeat surgeries for infectious complications.³

Lack of New Antibiotics - A strategic impetus for establishing *antimicrobial stewardship* is there are so few new antibiotics in the 10-yearlong pipeline to *government* approval, as pharmaceutical manufacturers are seeing improved *return on investment (ROI)* on drugs developed for ongoing use in chronic illness. Although starting to improve, it is still far from what is needed to make a significant impact.


 Number of New antibiotics approved by FDA...
 Not looking good



Infectious Diseases Society of America (IDSA)
 Clin Infect Dis. 2011;52:S397-S426
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There are only one or two effective antibiotics remaining to treat increasingly common infections, and these are expensive [e.g., carbapenems for extended spectrum beta-lactamase (ESBL) organisms].

Without “stewardship” of antibiotic use that ensures patients’ receiving the right drug/right time/right dose/right duration, physicians may need to have pre-antibiotic discussion with patients that -- “I’m sorry, but your infection is untreatable...”, and administrators explaining to the press why patients are dying or having amputations because their institution cannot treat infections effectively.

In summary, the primary benefits of an effective ASPs are:

- **For Patients:** Decreased risk of complicated, painful, debilitating or fatal illness, with its attendant financial and family impact, decreased hospital stay, and improved quality of life.
- **For Hospitals:** Short-term – decreased direct antibiotic costs/unreimbursed ICU/hospital bed days, and longer-term - avoid intensified regulatory review and negative public data and press regarding patient safety
- **Implications for Communities and Public Health:** An increasing percentage of multi-resistant bacteria are now carried by citizens in the community making managing future infections even more challenging and costly, unless effective ASPs are instituted.

ANTIMICROBIAL STEWARDSHIP

Definition - Antimicrobial stewardship (AMS) is defined as a rational, systematic approach to the use of antimicrobial agents to achieve optimal outcomes.³ This means using the correct agent, at the correct dose, with the correct route of administration, for the appropriate duration to cure or prevent infection, while minimizing toxicity and emerging resistance. Although costs are important, this goal is overshadowed by the need to prevent therapeutic failure and antimicrobial resistance.

Brief History - In the 1970s, clinical pharmacy services were established in North American hospitals, and some clinical pharmacists set about assessing the use of antibiotics as they were seeing increased microorganism resistance. Evidence-based treatment guidelines and regulation of antibiotic use started to surface through hospital pharmacy and therapeutics committees.

The term AMS was coined in 1996 by two internists at Emory University School of Medicine, John McGowan and Dale Gerding, a specialist on *C. difficile*.⁴ Ten years later, in 2007, bacterial, antiviral and antifungal resistance had risen to such a degree the CDC

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rang the alarm, as did Accreditation Canada. The same year, the Infectious Disease Society of America (IDSA) and the Society for Healthcare Epidemiology of America (SHEA) published guidelines for developing an ASP.⁵

STATUS OF AMS in NORTH AMERICA

Status in North America – Most comprehensive activity surrounding ASPs has been in large academic medical centers and some large community hospitals. Most hospitals are aware of ASPs, and many would like to start a program. However, many hospital C-Suites, already under intense financial pressure, have been reluctant to provide the necessary support and resources to make it happen. Some pharmacy departments are trying to do AMS within their own resources, but often with limited medical staff collaboration or C-suite “buy-in.”

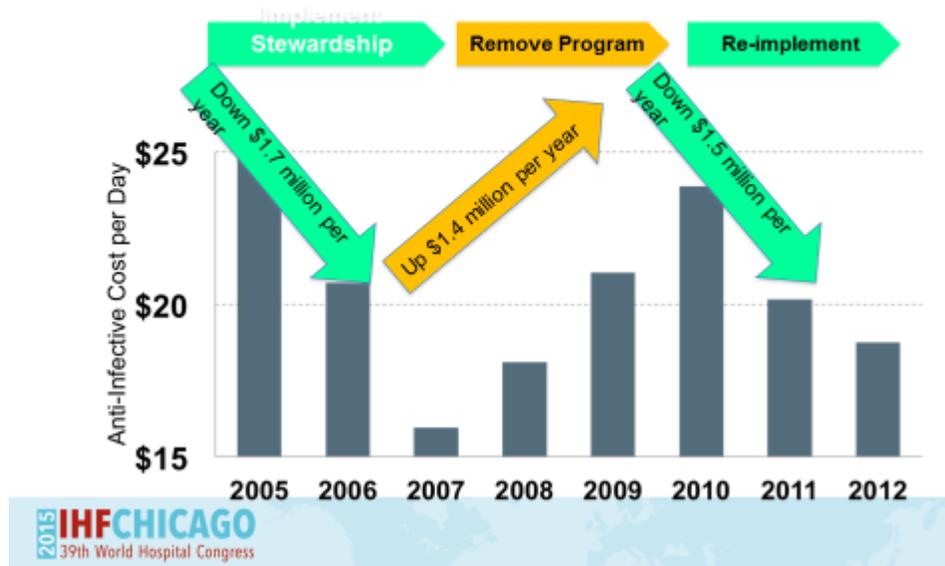
EVIDENCE FOR AMS

Evidence – Mark R. Chassin, President and CEO of the Joint Commission is noted as saying “the Joint Commission knows that AMS is a proven method of reducing the inappropriate use of antibiotics and improving patient safety.”⁶

Although it seems intuitive that ASPs work, the documentation for antimicrobial stewardship effectiveness so far is limited. There are eight systematic reviews (none just looking at randomized controlled trials - RCTs) and only three RCTs. A definitive, evidence-based study on AMS is yet to be published. However, studies conducted and published that evaluate AMS initiative(s) during clinical care are robust. For example, the CDC has authored a document titled “Impact of Antibiotic Stewardship Program Interventions and Cost” that lists findings from 15 published manuscripts that are supportive and helpful in implementing an ASP.⁷

As for the impact on direct pharmacy cost and decreasing, *C. difficile* infection rates are shown as an example below. An effective ASP was developed, then defunded when success was noted, only to find that antibiotic cost rose to baseline costs after the ASP was stopped. *C. difficile* rates skyrocketed. However, on reinstatement, antibiotic use was again more efficient.⁸

You Can't Quit After 2-3 years!!
The Importance of Consistent, Persistent Antimicrobial Stewardship



A 2013 study showed the impact of a clinical pharmacist’s temporary absence from a hospital’s ASP.⁹ About the period of active pharmacist involvement in antimicrobial stewardship, rates of inappropriate use of imipenem–cilastatin, linezolid, and micafungin during the pharmacist’s absence were deemed to have increased by 27, 39, and 35 percentage points, respectively, with corresponding increases in the average duration of therapy of 0.7, 4.0, and 3.2 days. In addition, the number of cases of *Clostridium difficile* infection increased more than threefold (from 8 to 25) during the pharmacist’s absence.

RECENT EVENTS

Several recent high profile events are propelling ASPs towards the tipping point:¹⁰

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California – “California is the first and remains the only state to enact antimicrobial stewardship legislation. Since 2008, California law required that general acute care hospitals develop a process for monitoring the judicious use of antibiotics and the results are monitored by quality improvement committee(s). In September 2014, California Senate Bill 1311 was signed into law, further requiring hospitals to adopt and implement an antimicrobial stewardship policy under guidelines established by federal government and professional organizations, and to establish a physician-supervised multidisciplinary antimicrobial stewardship committee with at least one physician or pharmacist who has undergone specific training related to stewardship.”¹¹

USA - A US Presidential Executive Order -- *Combatting Antibiotic-Resistant Bacteria* -- also issued in September 2014, requires federal agencies to review existing regulations and propose new regulations or other actions to *require* hospitals to implement robust ASPs that adhere to best practices; agencies will also be required to define, promulgate and implement ASPs in other settings such as long-term care facilities and outpatient settings.¹²

CDC - In 2014, the CDC recommended that all US hospitals have an ASP.¹³

Canada – Since 2013, Accreditation Canada mandates that all acute care facilities have an ASP.¹⁴

Although these mandates are unfunded, they move ASP closer to a tipping point.¹⁰

The following discussion summarizes experience on how to develop, implement, and recharge an ASP to effectively help patients and reduce antimicrobial resistance and cost.

GUIDELINES

Comprehensive guidelines for developing an institutional program to enhance antimicrobial stewardship have been developed jointly by the IDSA and the SHEA.⁵ These guidelines are for patients in acute care hospitals, but may soon include patients in long-term care facilities. The high-ranking evidence-based guidelines include:

1. *Antimicrobial Stewardship (AMS)* is considered a medical staff function because it is an important component of patient safety. It takes a team, however, with C-Suite support to make an AMS program possible. Core members of the AMS team should include: an infectious disease physician and a clinical pharmacist trained in infectious diseases who should be compensated for their time; a microbiologist, an information specialist, an infection prevention professional, and a hospital epidemiologist.

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2. Collaboration between the AMS team and the *Hospital Infection Control* and the *Pharmacy & Therapeutics Committees* or their equivalents is essential.
3. The support and collaboration of hospital administration, medical staff leadership, local providers, and pharmacists in the development and maintenance of ASPs is essential. It is desirable that ASPs function under the auspices of quality assurance and patient safety.
4. An infectious disease physician and the Director or Vice President for Pharmacy, as appropriate, should negotiate with hospital administration to obtain adequate authority, compensation, and expected outcomes for the program.
5. Hospital administrative support for the necessary infrastructure to measure antimicrobial use and to track use is essential.
6. There are two key strategies supported in the literature that provide the foundation for an ASP.¹⁵ These strategies are not mutually exclusive.
 - **Prospective audit with intervention and feedback** – Prospective audit of antimicrobial use with direct interaction and feedback to the prescriber, performed by either an infectious disease physician or a clinical pharmacist with infectious disease training, can result in reduced inappropriate use of antimicrobials.
 - **Formulary restriction and preauthorization** – Formulary restriction and preauthorization requirements can lead to immediate and significant reductions in antimicrobial use and cost, and may be beneficial as part of a multifaceted response to a *nosocomial* outbreak of infection. The use of preauthorization requirements as a means of controlling antimicrobial resistance is less clear, because a long-term beneficial impact on resistance has not been established, and in some circumstances, use may simply shift to an alternative agent with resulting increased resistance.

In institutions that use preauthorization to limit the use of selected antimicrobials, monitoring overall trends in antimicrobial use is necessary to assess and respond to such shifts in use. Finally, heavy reliance on preauthorization is cumbersome, impractical in smaller institutions, and can lead to strained relationships between AMS team leaders and providers.
7. The following elements are less proven for the short term, but should be considered and prioritized as supplements to the core active antimicrobial stewardship strategies based on local practice patterns and resources. Using combinations of these

elements with the two key strategies provides the best results.

- A. **Education** – Education is an essential element of any program designed to influence prescribing behavior and can provide a foundation of knowledge that will enhance and increase accepting stewardship strategies. However, education alone, without incorporation of active intervention, is only slightly effective in changing antimicrobial prescribing practices and has not demonstrated a sustained impact.
- B. **Guidelines and clinical pathways** – Multidisciplinary development of *evidence-based practice guidelines* incorporating local microbiology and resistance patterns can improve antimicrobial utilization. Guideline implementation can be facilitated through provider education and feedback on antimicrobial use and patient outcomes.
- C. **Antimicrobial cycling** – There is insufficient data to recommend the routine use of antimicrobial cycling as a means of preventing or reducing *antimicrobial resistance* over a prolonged period-of-time. Substituting one antimicrobial for another may transiently decrease selection pressure and reduce resistance to the restricted agent. Unless the resistance determinant has been eliminated from the bacterial population, reintroduction of the original antimicrobial is again likely to select for expressing the resistance determinant in the exposed bacterial population.
- D. **Antimicrobial order forms** – Antimicrobial order forms can be an effective component of antimicrobial stewardship and can facilitate implementation of practice guidelines.
- E. **Combination therapy** – There are insufficient data to recommend the routine use of combination therapy to prevent the emergence of resistance. Combination therapy has a role in certain clinical contexts, including use for empirical therapy for critically ill patients at risk of infection with multidrug-resistant pathogens, to increase the breadth of coverage and the likelihood of satisfactory initial therapy.
- F. **Streamlining or de-escalation of therapy** – *Streamlining* or *de-escalation* of empirical antimicrobial therapy based on culture results and elimination of redundant combination therapy can more effectively target the causative pathogen, resulting in decreased antimicrobial exposure and substantial cost savings.¹⁶
- G. **Dose optimization** – Optimization of antimicrobial dosing based on individual patient characteristics, causative organism,

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site of infection, and pharmacokinetic and pharmacodynamic characteristics of the drug is an important part of *antimicrobial stewardship*.

H. **Parenteral to oral conversion** – A systematic plan for parenteral to oral conversion of antimicrobials with excellent bioavailability, when the patient’s condition allows, can decrease the length of hospital stay and health care costs. Development of clinical criteria and guidelines to allow switch to use of oral agents can facilitate implementation institutionally.

8. Healthcare information technology (HIT) in the form of *electronic medical records (EMRs)*, computerized prescriber order entry (CPOE), and clinical decision support can improve antimicrobial decisions through incorporating data on patient-specific microbiology cultures and susceptibilities, hepatic and renal function, drug-drug interactions, allergies, and cost. However, implementation of these techniques has been slow, and conformation of the technology to the clinical environment remains a challenge.
9. Computer-based surveillance can facilitate good stewardship by more efficient targeting of antimicrobial interventions, tracking of antimicrobial resistance patterns, and identification of nosocomial infections and adverse drug events.¹⁷
10. The clinical microbiology laboratory plays a critical role in antimicrobial stewardship as it provides patient-specific culture and susceptibility data to optimize individual antimicrobial management and by assisting infection control efforts in the surveillance of resistant organisms and in the molecular epidemiologic investigation of outbreaks.
11. Both process measures (did the intervention result in the desired change in antimicrobial use?) and outcome measures (did the process implemented reduce or prevent resistance or other unintended consequences of antimicrobial use?) are useful in discovering the impact of antimicrobial stewardship on antimicrobial use and resistance patterns.

How ASPs Work

There are two major varieties of ASPs:

1. *Prior approval programs*, where authorization precedes release of restricted antimicrobials, and
2. *Prospective audit with feedback*, where prescribed and released antimicrobials are reviewed for appropriate dose, route, duration of therapy, streamlining, and de-escalation, or discontinuation.¹⁸

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A case study on implementing an AMS team is available.¹⁹ In general, AMS teams develop protocols to maximize the appropriate use of antimicrobials through continuous monitoring and high-level education. The specific functions of one AMS team are:

Functions of the CASE Team¹⁹

1. Use real-time data to facilitate optimal antimicrobial therapy that is individualized to the patient.
2. Minimize excessive use of broad-spectrum antibiotics or prolonged lengths of therapy.
3. Ensure that antimicrobial dosing is based on patient-specific characteristics, the causative pathogen, the infection site, and *pharmacokinetic* and *pharmacodynamic* principles.
4. Reduce adverse drug reactions by identifying individual patient factors (e.g., decreased renal and hepatic function, allergies, etc.).
5. Perform continuous surveillance of antimicrobial resistance patterns, nosocomial infections, and adverse drug events and analyze all relevant findings.
6. Provide education about antimicrobial stewardship based on specific data through one-on-one collaboration with physicians, via committees, and through written communications.
7. Ensure appropriate formulary management with consideration of SLEH's specific needs. All decisions should consider clinical implications and *pharmacoeconomic* issues, including morbidity, mortality, the length of hospital stay, adverse events, and drug costs.
8. Conduct research related to antimicrobial use and infectious diseases practices within SLEH.

CASE = Center for Antimicrobial Stewardship and Epidemiology, SLEH = St. Luke's Episcopal Hospital.

MORE ASP EVIDENCE FOR C-SUITES AND MEDICAL STAFF LEADERSHIP

Data from well-controlled studies examining the effect of AMS programs on controlling antimicrobial use, resistance, and cost are rapidly expanding and increasingly convincing. A 30-page evidence table is available.⁵

- **Reduced Use** - Comprehensive programs have consistently demonstrated decreases in antimicrobial use (22-36%).⁵

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- **Reduced Antimicrobial Resistance** - Reduction in resistance rates have consistently been shown.⁶ For example:

Organisms with Reduced susceptibility	Antimicrobial Strategy
<ul style="list-style-type: none"> • <i>P. aeruginosa</i> • <i>K. pneumonia</i> • <i>E. cloacae</i> • <i>A. baumannii</i> • <i>E. coli</i> 	Piperacillin
<ul style="list-style-type: none"> • <i>E. cloacae</i> • <i>P. mirabilis</i> 	Increased use of cefepime and less use of 3 rd generation cephalosporins
<ul style="list-style-type: none"> • <i>E. cloacae</i> • Methicillin-resistant <i>S. aureus</i> (MRSA) 	Increased use of ampicillin-sulbactam and less use of 3 rd generation cephalosporins
<ul style="list-style-type: none"> • Carbapenem-resistant <i>P. aeruginosa</i> 	Reduction in carbapenem use
<ul style="list-style-type: none"> • <i>C. Difficile</i> • Resistant <i>enterobacteriaceae</i> 	Reduction in parenteral broad-spectrum antibiotic use and sustained reduction in ceftazidime use

- **Reduced Cost** - Effective ASPs are consistently financially self-supporting and improve patient outcomes. Comprehensive programs have routinely demonstrated decreases in antimicrobial use (22-36%), “with annual savings of \$200,000-900,000 in both larger academic hospitals and smaller community hospitals.”⁵ Other evidence supports the following strategies:⁵
 - Having an infectious disease physician and a pharmacist with infectious disease experience
 - Use of prospective audits with intervention and feedback

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- Formulary restrictions and preauthorization
- Guidelines and clinical pathways
- Combination therapy for critically ill patients at risk of infection with multi-resistant pathogens
- Streamlining or de-escalation of therapy
- Dose optimization
- Parenteral to oral conversion

- Measurement of impact on clinical success, reduction of resistance, and reduction in antibiotic and total hospital cost attendant to a lower resistance and antibiotic use rate.

It is important for clinicians to note when working with the “C-Suite” that cost reductions can only be seen by department in traditional accounting systems. Cost accounting individual patients with specific diagnoses (such as infection by *C. difficile*) has been largely invisible, so “C-suite” individuals have had little exposure to data reflecting total cost by diagnosis, or diagnosis with complications such as margin loss currently being incurred by infection with resistant organisms.

KEYS TO SUCCESS

AMS programs are a medical staff function, which means they should be approved by the medical staff's *Pharmacy and Therapeutics* and Infection Control committees. A vision and goals and objectives need to be clearly defined and supported by the medical staff, the pharmacy, the laboratory, and hospital administration. The program's scope and the necessary resources need to be defined and budgeted. Short and long term goals need to be in writing. There should be continuous feedback to prescribers and those working within, and those supporting the program. The ASP should be intimately teamed with the infection control program.

The *Centers for Disease Control and Prevention (CDC)* has a roadmap for success with AMS programs.²⁰

- A physician champion
- Leadership support

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- Tailoring interventions to local problems
- Measurement of outcome

The latest (April 16, 2016) IDSA and SHEA joint guidelines outlining the implementation of AMS are also available.²¹

GETTING STARTED

To get started, there must be a multidisciplinary approach, consensus building, and support of hospital administration and the medical staff.

The CDC's key recommendations for getting started are:²⁰

- Review blood cultures that grow organisms
- Review key “never” combinations of antimicrobial agents (like using two agents to cover anaerobic pathogens).
- Align the formulary with local susceptibility data

ADDITIONAL RESOURCES

1. Society for Healthcare Epidemiology of America: <http://www.shea-online.org/GuidelinesResources/FeaturedTopicsHAIPrevention/AntimicrobialStewardship.aspx>.
2. Centers for Disease Control (CDC):
 - A. Get Smart for Health: <http://www.cdc.gov/getsmart/healthcare>
 - B. Why Inpatient Stewardship: <http://www.cdc.gov/getsmart/healthcare/improve-efforts/index.html>
 - C. Evidence to Support Stewardship: <http://www.cdc.gov/getsmart/healthcare/support-efforts/index.html>

CONCLUSION

The continuous march of antimicrobial resistance and emerging “superbugs” are serious threats to patients and the clinical and financial success for hospitals. AMS programs, whose goal is to improve the use of antimicrobials, infection prevention and rapid patient management at the institution level, have been successful, both clinically and economically. Two dominant strategies exist for these programs – prior approval and concurrent review and feedback. Many issues, including leadership, institutional support, measuring outcomes, barriers, funding, and personnel, must be properly identified up-front, before starting a program.

DO YOU NEED AN ASP? HOW IS YOUR ASP PERFORMING?

If you would like to discover how you stack up with antimicrobial resistance, use, and cost, complete the assessment located in the appendix, and we will let you know.

VISANTE VALUE STATEMENT

Visante® consultants and partners have vast experience in assessing and benchmarking antimicrobial resistance, use, and cost, and in implementing and helping AMS programs that improve antimicrobial use, reduce morbidity and mortality, and improve safety, which means you achieve improved quality care and save money.

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APPENDIX

Visante’s Antimicrobial Self-Assessment Tool

The results of this self-assessment tool will provide an estimate on the strength of your organization’s antimicrobial stewardship (AMS) efforts, and highlight areas that may need improvement. Please answer all questions.

<u>Question</u>	<u>Answer</u>		<u>Your Numbers</u>
1. Has the medical staff formally committed to a hospital-wide antimicrobial stewardship effort?	Y	N	
2. Is the organization’s senior leadership devoting the necessary human, financial, and	Y	N	
3. Y N			
4. Do you have a formal AMS or antibiotic use committee that meets regularly?	Y	N	
Is AMS using monitoring and alerting software:			
5. In place?	Y	N	
6. Used <u>daily</u> to help provide appropriate antimicrobial therapy?	Y	N	
7. Do you how many people are using the software routinely?	Y	N	
Do you have automated alerts to detect:			
8. Opportunity for de-escalation for directed therapy?	Y	N	
9. Suspected adverse drug event from antibiotic therapy?	Y	N	
10. Drug prescribed resistance to a pathogen?	Y	N	
11. If yes, have you responded to such an alert to alter therapy within the last week?	Y	N	
12. Are antimicrobial prescribing and antibiotic resistance patterns routinely monitored?	Y	N	
13. Is benchmarking and feedback provided routinely to the medical staff on their prescribing of antimicrobial agents?	Y	N	
14. Do you know your 30-day readmission rates for pneumonia and surgical site infections? _____ % SSIs	Y	N	_____ % pneumonia
15. Do you have an established policy on antibiotic de-escalation?	Y	N	
16. If so, do you know what percent of your de-escalation recommendations are accepted?	Y	N	_____ hours
17. Do all antibiotic orders have the dose and expected duration of therapy?	Y	N	

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|-------------------------------------------------------------------------------------------------|---|---|------------------------------------|
| 18. Is antibiotic therapy routinely reassessed within 48 hours? | Y | N | |
| 19. Are consumption metrics (like daily defined dose or DDD) used to assess antibiotic usage? | Y | N | |
| 20. Do physicians, as a group, accept ≥80% of pharmacist recommendations on antibiotic therapy? | Y | N | _____ % |
| 21. Do you know your C. difficile, MRSA, VRE, and ESBL infection rates/1000 patient days? | Y | N | _____ MRSA
_____ VRE _____ ESBL |
| 22. Do you know your institution's average duration of antibiotic therapy? | Y | N | _____ days |
| 23. Do you know your institution's antibiotic cost/patient day? | Y | N | \$_____/patient day |
| 24. Do you know what proportion of your patients are on antibiotics? | Y | N | _____ % |
| 25. Do you know what proportion of your patients on antibiotic therapy are using the IV route? | Y | N | _____ % |
| 26. Has your AMS program been benchmarked versus other facilities of similar size and type? | Y | N | |

BONUS Points

27. If you can name (off the top of your head), the three most over (or inappropriately) used antibiotics at your facility. _____ I don't know

1. _____ 2. _____ 3. _____

28. If you can name (off the top of your head), the three most expensive (by total cost per year) antibiotics at your facility. _____ I don't know

1. _____ 2. _____ 3. _____

Thank you. Please send to wkelly@visanteinc.com. Your results will be returned via email. Please watch for it.

Hospital Name: _____ City: _____ State: _____ Bed Size: _____

Contact: _____ Email: _____ Phone: _____

For further help in learning how Visante can help you start, evaluate, or accelerate your antimicrobial stewardship program, go to: www.visanteinc.com or call 866.388.7583.