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The Society for Healthcare Epidemiology of America (SHEA) submits this full proposal in response to Pfizer's Request for Proposals for Bacterial Infections, issued June 28, 2012.

SHEA Antimicrobial Stewardship Education Map: Transforming Practice, Improving Care

Overall Project Goals & Objectives

Antimicrobial Stewardship is hardly a new concept or practice in healthcare. The emergence of multi-drug resistant organisms over the last thirty years, and particularly the alarming increase in pan-resistant organisms (those resistant to any available antimicrobial agent) has increased the attention to and proliferation of dedicated Antimicrobial Stewardship Programs (ASP). While international policy and practice has led the way in establishing antimicrobial stewardship as a central practice in healthcare, the U.S. has struggled to standardize methods for tracking and comparing antimicrobial utilization and lacks a national initiative to ensure stewardship programs and initiatives exist universally in healthcare settings. As attention to the National Action Strategy for Healthcare-Associated Infections has grown and with the public awareness of healthcare-associated infections (HAI) outbreaks and particularly drug-resistant pathogens, there is an important opportunity to elevate this perceived "niche focus" to a central component of quality improvement in healthcare.

The value of antimicrobial stewardship interventions to both clinical and institutional outcomes is compelling. While more research is needed to demonstrate the economic benefits of stewardship programs, recently published studies (Stevenson et al; Standiford et al, ICHE April 2012) show significant economic impacts and the consequences of turning away from such approaches. Most important is the clear opportunity to improve clinical outcomes for patients: among them avoidance of adverse medication events, prevention of unnecessary therapy in transitions of care, and reduced incidence of *Clostridium difficile* (Shrestha NK et al; Elligsen M et al, Kook et. al, ICHE, 2012).

SHEA and its collaborating partners are undertaking this project to increase the competencies across professional teams in healthcare settings who have the charge of (or desire to take on responsibility for) improving appropriate antimicrobial use in their institutions. We intend to create a benchmark for knowledge and skill in this area and to provide resources that will improve the capacity and effectiveness of both emerging and well-established antimicrobial

stewardship programs. Meeting this goal requires that we more clearly define the practice and scope of stewardship, assist individuals in assessing their learning needs and finding ready resources for education, and clarify unmet learning needs that need to be addressed in order to increase the breadth of healthcare practitioners with ability to improve appropriate use of antimicrobials in healthcare.

The specific objectives of this project include the following:

1. **Define a universal, inter-professional profile of the knowledge and skills required for effective antimicrobial stewardship (AS).** This objective will clarify the definition of antimicrobial stewardship in practice and provide a benchmark for individuals and institutions to assess skill sets and team resources and roles essential to improving antimicrobial use in patient care.

2. **Widely disseminate this resource to an inter-professional community across healthcare settings.** Using collaborator networks, media extensions via relationships with such organizations as the CDC and Medscape, and international collaborations (e.g., PAHO, WHO Global Infection Control Network), we will expand the awareness of this resource and drive audience development for educational content.

3. **Facilitate individualized benchmarking and skill development planning.** Evaluating professional society programs, educational content and other resources allows an individual to assess their skills and knowledge against the "map" and create a customized educational pathway. This "mapping" also will highlight content needs that will be essential to continuous skill development in the field.

4. **Evaluate impact and identify additional unmet educational needs.** Aggregating uptake data and information about the change in knowledge and practice will demonstrate the value of the inter-professional intervention focus. Such evaluation will also lead to clarification on knowledge and skills where collaborative content development could be most beneficial to the field.

Needs Assessment

In 2007, the State of California enacted a requirement that all general acute care hospitals establish a process for evaluating judicious use of antimicrobial agents. However, this did not require intervention to improve use (CA code: 1288.55-1288.88). Not surprisingly, two findings emerged from the state's mandate: the definition of what constituted an antimicrobial stewardship process and the individuals responsible and involved in implementation of antimicrobial stewardship, varied widely across the state. The State has since focused on raising the knowledge and skill level statewide to establish more consistency in implementation. Education programs abound, including utilization of training programs such as those sponsored by SHEA, IDSA, the ID Society of California, state universities and ASHP and

SIDP (the latter targeted more specifically to pharmacists). In all this rapid knowledge dissemination, there have been two outcomes that are the central motivators for this proposed project:

1. An absence of **clearly defined scope of knowledge and skills** that individuals on an antimicrobial stewardship team ought to possess. Such a "benchmark" is essential to defining what stewardship programs and interventions really are and to a future of evaluating effectiveness (e.g. quality measurement).

2. An opportunity for **collaborative content development** that maintains fidelity to the development of healthcare teams dedicated to antimicrobial stewardship, as outlined in the 2007 IDSA-SHEA Guidelines (IDSA-SHEA Guidelines, 2007)). Interprofessional education has the potential to elevate the capacity and effectiveness of teams within and across institutions and healthcare settings, and to raise the knowledge and skills of all essential stakeholders in improving antimicrobial use and thereby, patient care.

Despite efforts by the Centers for Disease Control and Prevention (CDC), SHEA and other professional societies to promote the concept and methods for Antimicrobial Stewardship, the uptake in acute care hospitals has been slow. Recent policy initiatives have focused on incentivizing the development pipeline for antimicrobial agents and fostering collaborative solutions to ensure the lifespan of effective use of these agents. At the same time, CDC and several large institutions are grappling with standardizing methods of assessing antimicrobial use, in an important effort to create nationally comparable data. These efforts, as well as CMS' pilot implementation of assessing antimicrobial stewardship activities as part of the infection control survey of Medicare hospitals, are all important strides in preserving and optimizing the use of antimicrobials in healthcare. SHEA and its partners believe that another critical component of this national focus on antimicrobial stewardship is developing a skilled workforce of physicians, pharmacists and other healthcare personnel who must work together to promote effective use of antimicrobials. There is therefore an increased need for comprehensive, inter-professional educational resources to guide practitioners in effectively evaluating antimicrobial use within their institutions, and implementing interventions to optimize treatment, thereby reducing inappropriate prescribing, avoiding adverse events, and improving patient care.

Over the past five years, SHEA has assessed the availability and content of educational programs addressing antimicrobial stewardship and developed original content that moved the field beyond raising awareness to fostering basic and advanced skills in designing and implementing programs. At the same time, we have noted that while widely acknowledged as a team enterprise (IDSA-SHEA Guidelines, 2007), educational content largely exists within professional silos of physicians and pharmacists. Through this initiative, SHEA intends to optimize the visibility and reach of highly regarded education and certificate programs and resources that currently exist (e.g., SHEA and CDC's Get Smart web resources, SHEA and PIDS online modules, MAD-ID and SIDP certificate programs), map those against defined knowledge

and skills developed with an inter-professional target audience in mind, collaboratively identify unmet needs in knowledge and practice, and build education resources to meet those needs.
SHEA identified a critical need to define the knowledge and strategies required to successfully manage antimicrobial use in healthcare settings, and benchmark expected skills of the professional team doing such work. This will help institutions accurately assess whether they "do" antimicrobial stewardship and provide a universal measure to compare strategy effectiveness.

Novel Educational Content from SHEA

- Quality Measure Development and Approaches
- Benchmarking Strategies
- Business Case Development
- Stewardship Strategies for Immunocompromised Patients
- Antimicrobial Stewardship in Outpatient Context
- Stewardship in the OR and ER

From SHEA member surveys, program evaluations from five years of SHEA-CDC Epidemiology Training courses and workshop evaluations from four unique activities addressing AS (data on file), SHEA discerned the knowledge and practice needs that guide our inception of this project. Data were collected using a one-month all-member survey of research and practice priorities in 2008 and 2012; post-activity evaluation surveys; and 60-day post-activity follow up surveys. All responses were aggregated and reviewed by educational staff, the SHEA Antimicrobial Stewardship Task Force, and SHEA research and education committees. Based on this review, SHEA distilled a list of learning needs and priorities to guide initiatives to advance the practice and impact of antimicrobial stewardship, including the following:

- Improved understanding of how inappropriate prescribing contributes to resistance;
- Consistent knowledge of regulatory mandates regarding appropriate antimicrobial use;
- Improved clinical understanding of antimicrobial classes;
- Ability to develop algorithms and antimicrobial use guidelines;
- Ability to identify viable interventions appropriate to unique populations;
- Ability to identify and respond to antimicrobial shortages;
- Improved knowledge of methods of obtaining and interpretation of microbiologic data;
- Ability to create and interpret an institutional antibiogram; and
- Ability to identify appropriate outcome and process measures that demonstrate impact of antimicrobial stewardship interventions on cost and patient outcomes.

The proposed project will confirm these assessed needs by using a consensus-focused effort to define knowledge and skills sets essential to the antimicrobial stewardship team and also seek to address some of them by aggregating professional educational content and promoting it to a diverse audience. Finally, this project offers the opportunity for future collaboration on unmet needs that are prioritized by the collaborating organizations. In our view, this strengthens the applicability and uptake of future educational initiatives that seek to advance the practice of antimicrobial stewardship in healthcare settings and thereby improve patient care.

Intervention Design and Methods

In February 2011, SHEA partnered with CDC to convene a multi-stakeholder meeting to discuss collaborative approaches to education, research and policy development in this area (See Appendix B for a list of partner organizations). We sought this meeting because of the rapid emergence of similar educational content from several professional societies as well as increasing interest in policy arena for identifying solutions to antibiotic resistance. SHEA and CDC saw an opportunity to harmonize efforts and to provide the field with unified messages, resources and opportunities for learning and leadership. While the dialogue gave rise to policy papers and led to the SHEA Spring 2012 Leadership Forum, silos in educational content and needs assessment continue to exist. SHEA and its collaborating organizations see an important opportunity at this time to align our efforts in education content development, to improve the definition of essential skill sets and to centralize access to resources that promote the practice of antimicrobial stewardship in all appropriate healthcare settings.

For this proposed initiative, SHEA intends to enhance collaborative partnerships with health institutions, professional societies with similar mission and new media to expand the visibility and reach of our intervention. The project will include the following elements:

1. **Document Knowledge and Skills that Define Antimicrobial Stewardship.** SHEA will articulate comprehensive knowledge and skill elements for professionals building, leading and evaluating ASPs. This benchmark will guide development of certification requirements and inform quality measure development.
2. **Synthesize and Evaluate Educational Resources**. We will assess existing educational content against these core elements and create an online "portal" for professionals seeking to build competency in AS.
3. **Define Practice Gaps**. We will identify critical, enduring knowledge and practice gaps through this assessment that demand development of educational tools and content.

The overall aim is creating roadmap for users to identify educational resources and tools that best fit their learning and implementation needs along a spectrum of knowledge and skills in Antimicrobial Stewardship. We will create a baseline for skill and needs assessment (a benchmark) and create the platform to widen access and utility of existing programs. In the future, this project will contribute to assessing change in education, practice and drive future education planning of the individual professional societies alone and in collaboration.

The primary audiences for this initiative are physicians and pharmacists with a role and responsibility in the design, implementation and measurement of antimicrobial stewardship in a healthcare setting, as well as members of the healthcare team essential to effective stewardship programs. We aim to reach a minimum of 5,000 physicians, pharmacists, hospital administrators, infection preventionists, and public health officials through this initiative. Taking into account that stewardship is of interest on an international level, our plan to employ new media resources in dissemination, and our respective partners' substantial member

network reach, we believe this is a conservative estimate of the potential interest and impact of this initiative.

Our approach will include the following methods:

- Identification of key partner organizations based on established interest in antimicrobial stewardship and efforts specifically in education and practice implementation
- Consensus building process using a series of guided discussions over teleconference to pinpoint specific areas of knowledge and skills essential to implementing antimicrobial stewardship
- Refinement of core competencies that can be endorsed by the partners and published as a consensus document
- Collaborative review of existing educational content (modules, certification programs, sample and template documents and other resources) to map these resources to the core competencies
- Creation of a centralized, co-branded web portal that presents these resources to the target audiences
- Measurement of dissemination and utilization through web analytics, surveys, and post content evaluations and feedback tools

Design of Outcomes Evaluation

SHEA continually seeks to assess the scientific and educational impact of its programs on both individual participants and in institutional practices. As a scientific organization, SHEA also reviews the effectiveness of the specific measures of change. For this educational initiative, SHEA and its partners will employ pre- and post-intervention strategies to determine the impact on stated practice gaps. Methods for identifying these outcomes will be predominantly web-surveys that seek information on a user's education needs and perceived practice gaps and barriers to implementation. Further, we will collaborate with our partners to assess both change in knowledge (pre- and post-tests) as well as change in practice (post activity, 60-day and six-month post activity) for both organization-specific and collaborative educational programs.

The following measures will demonstrate that identified gaps are met:

1. **Increased Awareness**

   SHEA will continue evaluate both whether healthcare practitioners have an increased awareness of Antimicrobial Stewardship and awareness of the website and the educational programs this partnership will promote. Measurement of increased awareness will include:

   - Web analytics on the education map "portal"

- Demographic information on visitors with emphasis on profession type and institution
- Utilization data on educational modules and other resources
- Media impressions from publication of the core competencies and resource dissemination fostered by this project

2. Change in knowledge

SHEA and its partners will also assess change in knowledge through pre- and post-tests for individuals who utilized the educational content. Measurement of change in knowledge will assess learners' competency in the following areas, for example:

- Inappropriate prescribing and linkage to resistance
- Mandates and core measures related to antimicrobial use
- Antimicrobial classes, mechanism of activity and adverse events
- Adapting interventions to unique populations

3. Change in practice

SHEA will ask individuals upon completion of each program to report on how they intend to apply learnings and change practices. Between three and six months following the educational program, SHEA and its partners will send a brief questionnaire to participants asking how they have changed their practice since participating in the program. Questions will seek general feedback about implementation of changes in practice, as well as specific assessment of the following:

- Frequency in reporting short-term post-intervention implementation of algorithms or guidelines
- Using antibiograms
- Implementing new antimicrobial stewardship programs
- Identifying and implementing process measures related to Stewardship

4. Increased implementation

SHEA will use its ongoing connection with the target audience, including SHEA members and members of its partner organizations, to assess increased implementation of stewardship programs during the course of this initiative. Through brief online surveys on the portal website as well as of educational program participants, we will seek to identify trends in expanded implementation as well as implementation in wider healthcare settings.

Detailed Workplan

This project extends from approximately November 1, 2012 to the first quarter of 2014, with primary design and implementation of the intervention by mid-2013 and emphasis on evalution and findings to define unmet needs by the end of 2013. A detailed workplan is outlined in the following table.

Deliverable	Scheduled Completion	Organization Responsibility
Define Core Knowledge and Skills Development in Antimicrobial Stewardship	December 2012/January 2013	SHEA; input and review from PIDS, SIDP, MAD-ID, IDSA, ASHP, NFID
Assessment of Existing Needs in AS Skill Development	December 2012	SHEA
Develop schema for comparison of programs (e.g., credit hours, map to skills document)	December 2012	SHEA
Develop joint paper outlining the process and consensus findings; submit for publication in ICHE	January/February 2013	SHEA and Partners
Review Existing Education Programs from the participating societies	January- March 2013	All Partnering organizations
Draft comparison tool and resource website	February-March 2013	SHEA and Partners
Design and Test Portal	March-April 2013	SHEA and Partners
External Review	March-April 2013	SHEA and Partners will identify reviewers
Develop Communication/Dissemination Strategy	February – April 2013	SHEA, with review from partnering organizations
Launch Site; Communication tools	May-June 2013	SHEA
Gather metrics on utilization	June 2013-January 2014	SHEA, with review from partner organizations
Survey on Knowledge and Skills; evaluation of education content	January 2014	SHEA, with review from partner organizations
Ongoing Evaluation (Quarterly Review of Evaluations/Pre-Post Tests)	Ongoing	SHEA
Publication of Findings and "Future of Stewardship"	Spring 2014	SHEA

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Partner Organizations

SHEA will partner with professional societies with similar mission to ensure comprehensive assessment and creation of resources that serve inter-professional audiences. The following organizations have agreed to participate in this project and provide expert input, review and commitment of educational content and resources to the final portal. In addition, the organizations have agreed to collaborate in dissemination of this project, its findings, and the resulting web-based resources. SHEA has included official letters of support from most of the current partner organizations; ASHP is currently considering how they would like to be involved (See Appendix B).

a. **American Society of Health System Pharmacists (ASHP) --** The American Society of Health-System Pharmacists (ASHP) is the membership organization that works on behalf of pharmacists who practice in hospitals and health systems. For almost 70 years, we have been on the forefront of efforts to improve medication

use and enhance patient safety. Our advocacy efforts, publications, and educational offerings are designed to advance your practice as you improve patient care.

b. **Infectious Diseases Society of America (IDSA)** – Comprised of over 4,000 physicians trained in infectious disease, IDSA is dedicated to high quality education and training across the careers of its members. IDSA is particularly interested in advancing the skills and leadership necessary to promote implementation of AS, as one element in a comprehensive strategy to stem antimicrobial resistance globally.

c. **MAD-ID** – This non-profit organization has developed one of several certificate programs on AS geared for infectious disease pharmacists and hosts an annual training conference and leadership meeting that is highly regarded as an expert resource for professionals to garner knowledge and practical skills to implement stewardship programs.

d. **National Foundation of Infectious Diseases (NFID) –** This non-profit, tax-exempt 501c(3) organization founded in 1973 is dedicated to educating the public and healthcare professionals about the causes, treatment, and prevention of infectious diseases.

e. **Pediatric Infectious Diseases Society (PIDS)** – Representing over 1,000 pediatricians with infectious disease specialty, PIDS has fostered a focus on stewardship strategies that address unique pediatric perspectives. PIDS has sponsored an annual meeting on pediatric stewardship strategies and collaborated with SHEA on training workshops and development of online learning resources in this area.

f. **Society for Infectious Disease Pharmacists (SIDP)** – A non-profit professional society representing over 400 pharmacists specializing in infectious diseases. SIDP has developed one of several certificate programs on AS geared for this professional society**.**

Public sharing of the goals, methods and outcomes will occur using partner communication vehicles and websites; CDC, Medscape and other organizations with which SHEA and one or more of the partners currently collaborates; and SHEA's media firm, as appropriate. SHEA anticipates submitting a paper summarizing the knowledge and skills consensus document and also a commentary on the methods and outcomes for publication in *Infection Control and Hospital Epidemiology* (ICHE) at the culmination of this project.

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