

# THE INFECTIOUS DISEASE SERVICE LINE: NEXT FRONTIER IN HOSPITAL/PHYSICIAN CO-MANAGEMENT?

■ Ronald G. Nahass, MD, MHCM, FIDSA, and Andres Rodriguez, MBA, MSPH

### In this article...

*Take a look at a system wide, collaborative approach led by infectious disease specialists that can significantly improve patient safety and outcomes, reduce costs, and mitigate risks.*

### THE EFFECTIVE DIAGNOSIS, MANAGEMENT

and prevention of infectious diseases (ID) is one of the toughest challenges facing health care providers. Concerns related to ID have enormous impact on patient safety, patient outcomes and the bottom line in virtually every clinical care setting, from the outpatient clinic to the intensive care unit.

Although there is ample evidence that infections can be controlled and many of them prevented, the numbers of preventable hospital-acquired infections, serious antibiotic side effects and other ID-related problems remain alarmingly high.

- According to the Agency for Healthcare Research & Quality (AHRQ), the number and cost of infection-related hospital admissions is nearly twice that of cardiovascular disease.<sup>1</sup> Among the top 10 diagnoses for hospital admissions, four are ID-related and one of them, septicemia, is the single most expensive condition to treat in U.S. hospitals.<sup>2</sup>
- Infections are the leading causes of hospital readmissions,<sup>3</sup> with pneumonia at number one and four other conditions related to ID among the top 15.

- Particularly troubling to patients and payers alike is an unacceptably high number of hospital-acquired infections (HAIs). In 2003, the Institute of Medicine report “Transforming Health Care Quality,” listed the prevention of HAI among its priority areas for national attention. Yet the Centers for Disease Control and Prevention estimates that more than 720,000 HAIs still occur each year<sup>4</sup> at an overall annual direct medical costs of HAI to U.S. hospitals ranging from \$28.4 billion to \$33.8 billion.<sup>5</sup> [Figure 1]
- Antibiotic resistance is estimated to cause a minimum of 2 million illnesses and 23,000 deaths annually.<sup>6</sup>

Payers and regulators are taking a hard look at the human and financial costs of ID and have initiated reforms that limit payments or impose penalties for hospitals that have a high incidence of ID-related readmissions and HAIs.<sup>7</sup>

As we transition from volume-based to value-based reimbursement models, hospitals can expect to pay an increasingly higher price for the failure to effectively manage ID from the prevention and outcome perspectives. But as these statistics attest, the problem is not easy to solve.

ID and related issues are difficult for hospitals to track, evaluate and control over all sites of care. They can occur anywhere in the health care system, on any service and at any time. Local or regional epidemics can occur suddenly, which adds additional complexity to providers' management of ID.

Nonetheless, it has been demonstrated that system wide, cooperative programs can dramatically cut the incidence and costs of infectious disease.<sup>8</sup> For the most part, these programs have focused on individual components of ID care, such as prevention or antimicrobial stewardship. Rarely, however, are all components of ID care organized and managed collectively in the systematic, collaborative manner that is typical of a health system approach to other program models.

In the new environment of pay-for-value it is time to look at an innovation that will bring the best of evidence-based medicine and managerial and leadership structure to the problems of ID. One solution worth exploring is an Infectious Disease Service Line (IDSL) based on a hospital/physician co-management model.

**INFECTIOUS DISEASE SERVICE LINE** — Many hospitals are adapting to today's economic realities and regulatory changes by integrating hospital/physician co-management agreements into their strategic plans. These arrangements:

- Bridge the divide between a health system's attending staff and hospital staff.
- Align hospital/physician incentives for outcomes, cost and quality.
- Facilitate greater communication and interaction among providers.
- Strengthen managerial oversight.
- Prepare providers for payment reforms that require greater collaboration between and among providers.

FIGURE 1

Estimates of Health Care-Associated Infections Occurring in Acute Care Hospitals in the United States, 2011	
Major Site of Infection	Estimated No.
Pneumonia	157,500
Gastrointestinal Illness	123,100
Urinary Tract Infections	93,300
Primary Bloodstream Infections	71,900
Surgical Site Infections From Any Inpatient Surgery	157,500
Other Types of Infections	118,500
Estimated Total Number of Infections in Hospitals	721,800

Magill SS, Edwards JR, Bamberg W, et al. Multistate Point-Prevalence Survey of Health Care-Associated Infections. N Engl J Med 2014;370:1198-208.

Hospital partnerships with specialty physicians for cardiology, orthopedics and oncology service lines are common and newer models such as geriatrics are emerging. The primary



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objective of these arrangements is to provide a legal framework that allows payments to physicians and providers that refer business to the hospital and, through this incentive, achieve improvements in quality and costs. But we are missing an opportunity if we view service lines solely through the lens of generating revenue or admissions to a health system.

Although the IDSL does not directly add to revenue or admissions, it can significantly reduce costs and enhance margin, improve safety and outcomes, and reduce the risk of HAI. And, as payers, regulatory agencies and patient advocates gather and report data on health system performance, hospitals with a demonstrable record of successfully managing infectious disease can expect preferential referrals from payers, providers and patients.

What the ID Service Line offers:

- Long-term focus on safety and risk reduction and system-wide infection prevention and control efforts
- 24/7 availability of ID clinicians
- Efficient resource management across various sites of service
- Effective management of patient care transitions, including use of outpatient parenteral antimicrobial therapy and continuing care in long-term settings
- Strong competency in promoting team communications across all specialties and along the continuum of care

**THE VALUE OF THE ID SPECIALIST** — Specialists in ID, a subspecialty of internal medicine, have years of special training beyond residency in preventing, diagnosing and managing infections, including those caused by bacteria, viruses, fungi and parasites. They are experts in the use of antibiotics, and the dangers of their misuse, and experts in the appropriate use of laboratory services to diagnose infectious diseases.

They have formal training in immunology, epidemiology and infection control. There are numerous studies demonstrating the benefits of ID specialist interventions. One recently published review of more than 220,000 Medicare claims showed that patients treated by an ID specialist have better outcomes than those who are not. They have shorter lengths of ICU and acute care stays, are less likely to be readmitted within 30 days and less likely to die in the hospital or after discharge. And the earlier the ID intervention, the better the outcomes and the lower the costs.<sup>9</sup>

**CASE HISTORY** — Here’s a case history of how an IDSL and early intervention by an ID specialist could have prevented a disastrous outcome.

A woman with diabetes came to the emergency room with a fever and a red and swollen foot. She was diagnosed with cellulitis, a common skin infection. Because foot infections in patients with diabetes can lead to serious complications and long-term morbidity, the decision was made to treat her with broad-spectrum antibiotics. These powerful drugs can be lifesaving, but they also are more likely to have serious side effects and contribute to antibiotic resistance.

When the woman’s symptoms did not respond, a second broad spectrum antibiotic was prescribed. She developed the troubling symptom of diarrhea, later diagnosed as clostridium difficile infection (CDI). This serious HAI is receiving focused attention from the CDC for its epidemic growth, its huge cost<sup>10</sup> and strong evidence that most cases can be avoided with proper management. [Figure 2]

It was only then that an ID specialist was consulted, who correctly diagnosed the patient — not with cellulitis, but with gout — a noninfectious disease. It was too late for effective intervention. The severity of this woman’s CDI led to the removal of her colon, lengthy ICU and acute care stays and discharge to a nursing home.

This example illustrates some of the most common (and costly) errors that can be prevented with an IDSL.

- Misdiagnosis. Gout is just one of many noninfectious conditions that present with infection-like symptoms, and misdiagnosis is common. ID physicians are uniquely qualified to distinguish between infectious and non-infectious diseases, and between different types of infectious disease.
- Lack of communication and collaboration between providers. In an IDSL arrangement, mutually agreed upon, system-wide best practice guidelines for managing infectious or suspected infectious disease would be in place. The parameters might include guidelines for when an ID consultation is indicated and restrictions on using broad spectrum antibiotics without specialty consultation. A particular vulnerability for this hospital is that a second course of broad spectrum antibiotics was prescribed despite the ineffectiveness of the first. Clear guidelines and a direct channel to an ID physician would have prevented this inappropriate medical decision.
- Potential misuse of antibiotics. Even had the diagnosis of cellulitis been correct, this case history underscores the importance of prescribing broad spectrum antibiotics with caution and according to evidence-based guidelines. Many mild or moderate cases of cellulitis, even in diabetics, can be effectively treated with narrow-spectrum antibiotics, which are far less likely to result in adverse side effects like CDI. The ID specialist has the skills to decide when and which antimicrobials are appropriate based on individual clinical circumstances.

FIGURE 2

C-DIFFICILE INFECTION COSTS AND PREVENTION		
The average total cost for a single inpatient C. difficile infection (CDI) is more than \$35,000, and the estimated annual cost for the health care system exceeds \$3 billion. <sup>1</sup>		
<b>PREVENTION CDI AT RHODE ISLAND HOSPITAL<sup>2</sup></b>		
A five-step program for reducing CDI		
1. CDI infection control plan		
2. Monitor morbidity and mortality of C-diff		
3. Improve test sensitivity		
4. Enhance environmental cleaning		
5. Standardize the treatment plan		
Metric	2006	2012
Incidence/1,000 discharges	12.2	3/6
Mortality (N)	52	19
<small>1. Walsh N. C. difficile Inpatient Stays Long, Costly. MedPage Today. December 8, 2012.            2. Mermel, LA et al. Reducing Clostridium difficile Incidence, Colectomies, and Mortality in the Hospital Setting: A Successful Multidisciplinary Approach. The Joint Com J 2013;39:298. 0</small>		

**COMPONENTS OF THE INFECTIOUS DISEASES SERVICE LINE**

— A comprehensive IDSL comprises hospital/ID physician co-management of six components: clinical care, infection prevention, antimicrobial stewardship, microbiology laboratory oversight, employee health and resource management. Each of these provides opportunities to capture value and improve net margin. Collectively they offer a value-added benefit to systems, patients and payers looking for a preferred provider based on quality and cost.

**CLINICAL CARE** — ID specialists should be available 24/7, with clear guidelines in place for when ID consultation is mandatory. Ideally, clinical care oversight by the ID specialist should extend beyond acute care.

This adds value in managing patient transitions to outpatient or long-term care, which can reduce acute hospital lengths of stay. Many infections previously treated in the hos-

pital can now be managed safely in the outpatient setting with a properly managed IDSL.

In the long-term setting, ID is a significant cause of hospital readmissions, including CDI and problems with antibiotic resistance.<sup>3</sup> In 2015, CMS will extend its penalties for avoidable readmissions to include long-term care facilities, which often have limited resources and expertise to address these concerns.<sup>7</sup>

An effective IDSL also includes ID rescue. If, for example, a patient develops an infectious complication after open heart or joint replacement surgery and the institution is in a bundled payment arrangement for such services, the cost for managing infections in that bundle becomes a potential risk.

Co-management or risk/gain-sharing arrangements with ID specialists focus on managing complications in the most cost-effective manner from all perspectives. The best outcome becomes a rescue of the patient and the provider, both of whom are at risk for loss (the patient for loss of life, limb or function; the institution/provider for reputation, treatment costs and liability).

Infection prevention and control — These are the traditional areas emphasized by health care systems to create value-based management of infectious diseases. There now are convincing data demonstrating that a focused, process-oriented approach can reduce infections, save money and improve patient safety in an acute care setting. The evidence that certain HAIs can be avoided is leading more and more insurers to limit payments for these expensive complications. [Figure 2].

**ANTIMICROBIAL STEWARDSHIP** — This also has a long-standing record of success in acute care settings and, CMS has proposed rules that would require health systems to meet certain minimum standards for this activity.

Most successful programs are the result of a team-based approach that incorporates active engagement by infectious disease clinicians, a feature of the IDSL. Studies indicate that 30 percent to 50 percent of antibiotics prescribed in hospitals are unnecessary or inappropriate.<sup>11</sup>

In one example of a successful hospital/physician partnership, an antimicrobial stewardship program saw a 30 percent reduction in total antibiotic costs and an 8 percent decrease in total pharmaceutical costs. Over a three-year period, antimicrobial costs were reduced from \$11.48 to \$8.64 per patient day, for a total savings of nearly \$300,000.<sup>12</sup>

Effective stewardship also is required to reduce the risks of CDI and address antibiotic resistance, both of which are quality outcome imperatives in many reimbursement models. The American Hospital Association, in its 2013 report on “The Appropriate Use of Medical Resources”, puts antimicrobial stewardship on its “top five” list of hospital-based procedures or interventions that should be reviewed and discussed by a patient and physician before proceeding.<sup>13</sup>

**OVERSIGHT OF THE MICROBIOLOGY LABORATORY** — Oversight by an ID specialist is frequently overlooked as a source for value. ID physicians in collaboration with the pathologists,

however, can help ensure proper utilization of the resources in the microbiology laboratory. This activity will become even more critical as newer molecular methods become widely adopted. Understanding the best ways to use or limit the use of these tests provides direct cost benefit and indirect safety benefit by focusing clinicians on appropriate and inappropriate care.

**EMPLOYEE HEALTH** — This requires an ID physician to help evaluate exposures, mitigate infectious diseases risk to staff and assure safety through proper use of vaccination and serology testing. Incorrectly done this can lead to significant costs to health systems to manage outbreaks and exposures.

**RESOURCE MANAGEMENT** — This is important throughout the health system. Areas included in an IDSL are red bag waste, devices and dressings, and wound care products. Concerns to address include the appropriateness of certain devices such as antimicrobial urinary or central line catheters to prevent device-related HAIs, and monitoring and advising on the management of the red bag waste stream. The ID specialist is able to help health systems navigate the marketing and promotional claims for these new products to assess their value and ensure they are deployed cost effectively.

If not properly managed and coordinated, these six areas collectively add billions of dollars to our health care bill. Most hospitals have prevention programs, many have stewardship programs, some have microbiology lab oversight and all have employee health. A very few have active ID engagement in clinical care, rescue or resource management.

For those who have some — or even all — of the six IDSL components, it is unlikely that they are organized with coordinated and collaborative system-wide managerial oversight. Linking them in a service line with oversight by an ID specialist represents a significant opportunity to decrease costs and improve outcomes.

**ESTABLISHING THE IDSL SERVICE LINE** — Identifying a team and team leadership is critical to establishing the IDSL. Ideally, leadership includes an infectious diseases physician with a well-established clinical reputation who will be the intellectual content expert for all aspects of the service line.

Additional leadership is provided by the health system’s director of infection prevention. Other team members who are important for effective collaboration across the system are a dedicated pharmacist, clinical microbiologist and representatives of employee health and ICU. Since data capture and management is a crucial element of an effective IDSL, the addition of a data analyst is recommended.

There are innumerable metrics that can and should be measured. Most facilities are already tracking central line-associated bloodstream infection (CLASBI), catheter-associated urinary tract infection (CAUTI), ventilator-associated pneumonia (VAP) and surgical site infection (SSI), but all should be assessed in the context of clinical outcomes. Mortality, LOS, ICU days and readmission rates also should be part of the

dashboard of performance for the IDSL.

Accountability of the leadership is expected and should be aligned with the organization's goals through the co-management agreement. Important features of the IDSL are outcomes for infection metrics with incentives for achieving mutually agreed upon goals.

Incentives should be tied to maintenance or reduction in important clinical outcomes such as mortality, LOS and readmissions to avoid concern that a reduction in care incentivized by the agreement may create poorer outcomes. Once optimal, achievable metrics are attained, incentives are tied to maintenance of the achievement.

To get started, existing service line management agreements can be used as a model. As a next step, health systems should identify a key ID opinion leader in their region to help organize and develop the IDSL. In the absence of local expertise, many hospitals without necessary clinical resources use telehealth services to manage such arrangements. Neurology services, intensive care, radiology and infectious disease all have been cited as examples of the use of this emerging technology.

**CONCLUSION** — The United States has the most expensive health care system in the world, yet we underperform other developed nations by several different measures of quality.<sup>14</sup> U.S. health care systems frequently seek to improve their bottom line by finding opportunities to add services that bring more patients to the hospital and promote leading-edge care by adding the latest technologies.

Recently, however, emphasis is shifting from growing revenue to improving value. Many innovations in care delivery have been introduced, including bundled payments for defined episodes of care that incorporate risk for adverse events, and models of care that pay for outcomes rather than services such as Accountable Care Organizations (ACO).

Efforts at publicly reporting certain measures of quality also encourage institutions to focus on improving patient safety and outcomes and reducing risk. Institutions that successfully navigate this value-based approach in managing and preventing infectious disease will improve their bottom line through efficiencies, reductions in hospital admission/readmission, fewer complications, better transitions in care, and aggressive management of institutional resources. High-value providers also will enjoy increased revenues through preferential referrals.

Infectious diseases are serious and costly problems that require innovative solutions. We would not think of operating a cardiovascular service without active input and oversight by cardiovascular specialists. Yet few hospitals have committed the resources to similarly involve ID specialists in an area that is potentially more costly and poses greater risks. The IDSL service line is a new frontier in hospital/physician co-management arrangements that merits our exploration.



Ronald G. Nahass, MD, MHCM, FIDSA, is president of ID Care in Hillsborough, New Jersey and clinical professor of medicine at Rutgers University Robert Wood Johnson Medical School in New Jersey.

[RNahass@idcare.com](mailto:RNahass@idcare.com)



Andres Rodriguez, MBA, MSPH is director of practice and payment policy at the Infectious Diseases Society of America in Arlington, Virginia.

[arodriguez@idsociety.org](mailto:arodriguez@idsociety.org)

## RESOURCES

Policy Statement on Antimicrobial Stewardship by Infectious Disease Society of America (IDSA), the Society for Healthcare Epidemiology of America (SHEA) and the Pediatric Infectious Diseases Society (PIDS).

The American Hospital Association toolkit on Antimicrobial Stewardship

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