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Letter to the Editor

A new paradigm for infection prevention programs: An integrated approach

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To the Editor—Infection control (now infection prevention) in healthcare settings is a relatively young medical discipline dating back only to the 1970s. Nationwide surveillance for healthcare-associated infections (HAIs) was initiated by the Centers for Disease Control and Prevention (CDC) in 1970 via the National Nosocomial Infections Study (NNIS). The scientific foundation for infection prevention was established by the Study on the Efficacy of Nosocomial Infection Control (SENIC) project that demonstrated essential components of effective programs included (1) conducting organized surveillance and control activities and (2) having a trained, effectual infection control physician, (3) having an infection control nurse per 250 beds, and (4) having a system for reporting infection rates to practicing surgeons.[1] The SENIC project also reported the growth in the number of hospitals having an infection prevention nurse (from 6% prior to 1970 to 80% in 1977).[2] However, by 1996 only 47.6% of facilities has a hospital epidemiologist.[3]

The initial focus of infection prevention departments was surveillance for HAIs, outbreak evaluations and control, and reduction of device-associated HAIs. In the past 50 years, the spectrum of activities of an infection program has dramatically increased to include the following: (1) surveillance and prevention of multidrug-resistant pathogens (eg, methicillin-resistant *Staphylococcus aureus*, vancomycin-resistant *Enterococcus*, β-lactamase–producing gram-negative bacilli, carbapenem resistant *Enterobacterales, Candida auris*);[4,5] (2) prevention of *Clostridioides difficile*; (3) recognition and mitigation of biothreats (eg, anthrax), and emerging infectious diseases (eg, Ebola SARS-CoV-2); (4) public reporting to multiple agencies rating hospitals; and (5) financial penalties for hospitals by the Centers for Medicare & Medicaid Services for "poor" performance including high HAI rates. The most important of these may be the paradigm shift from "control" of HAIs to "prevention" of all HAIs (ie, the goal is now zero HAIs) (Table 1).

Infection prevention programs have access to several new tools to aid in the prevention of HAIs: (1) widespread use of electronic medical records that allow more complete and efficient access to medical records documentation; (2) improved information technologies that allow for data mining, manipulation of large data sets, easier use of sophisticated statistics, and machine learning[6]; (3) improved microbiology laboratory methods that aid in determining microbe transmission pathways and outbreak investigations (eg, MALDI-TOF and whole-genome sequencing) as well as rapid microbe identification methods (eg, PCR)[5,7]; and (4) quality improvement methodology that allows a more systematic approach to identifying problems and then implementing evidence-based infection prevention efforts.

As infection prevention has grown both more complex but also more sophisticated, infection prevention programs have 2 options as they adapt to this new reality. First, their staff can continue to be composed of hospital epidemiologists and infection preventionists with the infection prevention department reaching out to other hospital departments for expertise in quality improvement, informatics, advanced epidemiologic and statistical methods, advanced microbiologic methods, and compliance monitoring and coaching.[8] Second, they can accept the new paradigm of evolving into a truly integrated department (Table 1). Based on our experience at the University of North Carolina Medical Center, the advantages of an integrated department are substantial and include the following: (1) ability to approach all infection prevention and control activities (eg, outbreaks, HAI reduction, emerging diseases and pandemics) using a multidisciplinary approach; (2) rapid access to required expertise; (3) ability to ensure needed expertise for long-term improvement projects; (4) cross pollination of infection prevention knowledge with other disciplines, improving ability to reduce HAIs; and (5) taking the lead in planning for future pandemics.[9] Most importantly, staff with training in nonclinical medicine (eg, quality improvement, informatics, and compliance monitoring) have time to also develop a broad and deep background in the enormous literature of infectious diseases, hospital epidemiology and infection prevention. For example, they become knowledgeable about guidelines on HAI prevention set out by the Centers for Disease Control and Prevention (CDC) and

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Table 1. Infection Prevention: Scope of Service and Example of an Integrated Program

Surveillance
• Surveillance for HAIs using CDC NHSN definitions: central line–associated bloodstream infections, urinary catheter–associated urinary tract infections, ventilator-associated events (and pneumonia), surgical site infections, and *Clostridioides difficile* infection
• Surveillance for multidrug-resistant pathogens: methicillin-resistant *Staphylococcus aur*eus, vancomycin-resistant enterococci, extended spectrum-resistant Gram-negative bacilli, carbapenem-resistant Enterobacterales, and *Candida auris*
• Syndromic surveillance for community outbreaks and acts of bioterrorism
• Sentinel event surveillance
• Trend analysis of healthcare personnel blood exposures annually (in conjunction with occupational health)
• Clusters of infections in healthcare staff (in conjunction with occupational health)
• Immunization coverage: influenza, mumps–measles–rubella, and varicella (in conjunction with occupational health)
• Annual trend analysis of communicable disease exposures (in conjunction with occupational health)
Outbreaks/Exposures
• Investigation and prevention and control interventions for cluster of infections
• Molecular analysis of “outbreak” pathogens to assess relatedness, mode of transmission, and source/reservoir
• Environmental cultures (when indicated)
• Air sampling for pathogens (when indicated)
• Communicable disease exposure evaluations and contact notifications
Microbiologic/Environmental quality control assessments
• Respiratory and gastrointestinal endoscope evaluations
• Aid in developing policies for sterilizer monitoring and environmental assessment of pharmacy (compounding)
• Construction: Blueprint review, preconstruction meetings, and construction rounds biweekly
• Infection prevention rounds: inpatient and outpatient facilities with trend analysis annually
Continuous quality improvement
• Use multidisciplinary quality teams to work toward infection reduction goals
• Monitor process measures as part of quality improvement initiatives
• Periodic Lean Six-Sigma improvement projects
• Collaboration with quality organizations hospital-wide on infection prevention measures
Regulatory compliance and accreditation
• The Joint Commission
• Centers for Medicare and Medicaid services
• Federal agencies: Occupational safety and Health Administration (eg, tuberculosis, bloodborne Pathogens, COVID-19), Food and Drug Administration, Environmental Protection Agency (eg, disinfectants)
• State agencies: department of facility services, state and local health departments
Committee involvement
• Hospital Infection Control Committee
• Environmental Health and Safety Committee
• Personnel and Environmental Safety Subcommittee
• Anti-infective Subcommittee, Pharmacy and Therapeutics
• Medical Staff Executive Committee
• Product Management Committee and Quality Practice Committee
• Intensive Care Advisory Improvement Committee
• Hospital-wide Improvement Council
• Clinical Quality Management
• Professional Liability Advisory Committee
• Emergency Preparedness Committee
• Needlestick Prevention Task Force
• Preventing Patient Harm Guiding Coalition

(*Continued*)

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Table 1. (*Continued*)

• Nursing Shared Governance Committees (ie, Practice Council, Quality Council, Practice Council)
• Nursing Performance Improvement Committee
Education
• Unit-specific newsletters
• Inservice and presentations to staff, attending physicians, residents, contract employees, students, and volunteers
• Media production (eg, video, slides, web-based training, handouts, and posters)
• Infection prevention staff continuing education (eg, weekly journal club)
• Statewide programs for infection control and prevention
• Departmental safety coordinator training for infection prevention
• Learning management system educational programs for infection prevention
• Professional organizations (eg, APIC, SHEA, and IDSA)
Consultation
• Policy development and review
• Infection prevention website
• New products/devices
• Responding to healthcare personnel needs by phone and e-mail, service provided 24/7
• Resource for university and campus health services
• Liaison with state and county health departments
• Preparation for emerging pathogens or bioterrorist events and possible sudden influx of patients
• Resources for all healthcare facilities in the state
Pandemic planning
• Playing a lead role in pandemic planning
• Developing procedures and policies that focus on key pandemic issues: enhanced surveillance, early identification of potentially infectious persons, availability of pre- and postexposure vaccines and therapies (if available), plans for adequate staffing, appropriate signage, and integration into incident command structure
• Developing and maintaining a core group of trained personnel (physicians, nurses, respiratory therapists, etc)
• Maintaining a stockpile of appropriate personal protective equipment
• Developing and maintaining medical units capable of safely providing care of patients with highly communicable diseases (eg, avian influenza, Ebola)
• Maintaining availability of required laboratory devices and equipment (and appropriately trained technicians)
Example of staffing of an integrated infection prevention program
• Hospital epidemiologists (N = 2): provides leadership and relevant expertise.
• Public health epidemiologist and associate director (N = 1): manages database of healthcare-associated infections and provides analysis and dissemination of HAI outcome and process measure data.
• HAI surveillance analyst (N = 1): responsible for analyzing, disseminating, and fulfilling requests for surveillance and infection-related process measure data.
• Senior medical technologist (N = 1): responsible for molecular analysis of outbreak strains, routine assessment of biological indicators of sterilization and air sampling for fungi, and serves as liaison with the microbiology laboratory.
• Quality improvement (N=2): lead multidisciplinary workgroups focused on HAI prevention in specific areas (eg, central-line–associated bloodstream infections, catheter-associated urinary tract infections, surgical-site infections, and *C. difficile* infections), and provide a framework for quality improvement and aid in outcome analyses.
• Compliance specialist (N = 1): performs compliance audits of evidence-based infection prevention practices, provides education to ensure compliance, and supports facilities engineering by reviewing all renovation and construction projects for adherence to Infection control risk assessments (ICRAs).
• Highly communicable disease preparedness and response coordinator (N = 1): leads development and compliance of policies to improve highly communicable disease preparedness and response (eg, SARS-CoV-2, Ebola, measles, novel influenza, etc).
• Project coordinator (N = 1): responsible for administrative duties, database management, and technical assistance in report and policy preparation.
• Lead infection preventionist & associate director (N = 1): Responsible for the day-to-day operations of the infection preventionists and assesses all HAI surveillance for accuracy.
• Infection preventionists (N = 10): responsible for education, consultation, surveillance, implementation science, patient safety, and quality improvement for both inpatient units, ancillary patient care areas, and outpatient clinics.

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professional organizations. Finally, having a department with an integrated team with diverse expertise can enhance professional satisfaction in a field often without many opportunities for traditional upward mobility or promotion opportunities. In addition, having a motivated workforce may reduce staff burnout, improve job satisfaction, and contribute to a positive workplace culture.

Additional programs might be evaluated as part of an integrated infection prevention department. First, development of a formal "infection prevention liaison" program may be considered. Such a program should include a member from each clinical (eg, medical intensive care unit) and nonclinical unit (eg, radiology) that meets at least once a month with key members of the infection prevention department and receives periodic infection prevention lectures and updates. Liaisons can serve as 2-way communicators (ie, updating their units with the latest infection prevention policies and providing feedback from individual units to infection prevention leadership). Second, infection prevention can be integrated with antimicrobial stewardship programs (CDC recommendations).[10] Antimicrobial stewardship plays a key role in *C. difficile* reduction and control of multidrug-resistant pathogens. For example, at the University of North Carolina Medical Center, the Director of Infection Prevention also serves as the Administrative Director of Antimicrobial Stewardship. In addition, members of the antimicrobial stewardship team play a key role in advising on issues relating to diagnostic stewardship (eg, appropriate collection of blood cultures and indications for urinalysis or urine culturing). Successful antimicrobial stewardship programs are also multidisciplinary in nature, so direct alignment with the infection prevention team can provide synergistic support and strategy.

In conclusion, we believe that an integrated infection prevention department should be considered as the paradigm of the future. Such a department will be better equipped to achieve zero HAIs as the ultimate goal and will be better prepared to respond to future pandemics.

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Differences in infection prevention and control training needs between healthcare workers: Results of a learning needs assessment focused on nursing assistants and dental professionals

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To the Editor—Despite profession-specific competencies[1] and evidence that infection prevention and control (IPC) training reduces infection risk,[2–5] most IPC training targets physicians and nurses, with relatively little material focused on other healthcare professionals (HCPs). In 2020, the Nebraska Infection Control Assessment and Promotion (ICAP) program collaborated with