

SPECIAL COMMUNICATION

Requirements for infrastructure and essential activities of infection control and epidemiology in out-of-hospital settings: A Consensus Panel report

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In 1997 the Association for Professionals in Infection Control and Epidemiology and the Society for Healthcare Epidemiology of America established a consensus panel to develop recommendations for optimal infrastructure and essential activities of infection control and epidemiology programs in out-of-hospital settings. The following report represents the Consensus Panel's best assessment of requirements for a healthy and effective out-of-hospital-based infection control and epidemiology program. The recommendations fall into 5 categories: managing critical data and information; developing and recommending policies and procedures; intervening directly to prevent infections; educating and training of health care workers, patients, and nonmedical caregivers; and resources. The Consensus Panel used an evidence-based approach and categorized recommendations according to modifications of the scheme developed by the Clinical Affairs Committee of the Infectious Diseases Society of America and the Centers for Disease Control and Prevention's Healthcare Infection Control Practices Advisory Committee.

INTRODUCTORY COMMENTARY

Central to the mission of health profession societies is a focus on the patient and a marshaling of the most current credible scientific evidence to provide the best and safest outcomes to preserve and restore the health of the patient. Quality health care requires teamwork and the ability to put into practice the processes necessary to ensure that quality. The following Consensus

Panel report is the second in the series initiated by SHEA and APIC to establish recommendations designed to protect patients and health care workers from infections. The focus on the first report published in February 1998 was the acute care hospital. This report extends the scope of interest to extended care, selected ambulatory care, and home care settings. Both Consensus Panel reports have been collaborative and

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This report and the recommendations in it were formally

approved by the APIC and SHEA boards in 1999 and endorsed by the organizations represented by panel members: JCAHO, CDC, PIDS, and NAHC.

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multidisciplinary. Professional societies, government agencies, and regulatory groups worked together to craft the most scientifically valid recommendations.

The first Consensus Panel concentrated on the acute care hospital because of the wealth of scientific information about control of nosocomial infections that developed in hospitals during the last 30 years. In the work of the current panel, the general framework and categories of recommendations from the first group turned out to be applicable in many ways to the out-of-hospital health care settings chosen. Of considerable interest is that almost all of the references used by the current Consensus Panel are from articles published and studies done in the 1990s. This fact alone helps confirm the validity of the 23 recommendations. However, this panel has clarified the many ways the patient populations differ in these out-of-hospital settings. Just as the care of the patient is now collaborative, so is the evolving structure of providing that care.

During the past decade, health care delivery has undergone enormous changes; the nationwide growth in managed care organizations and the changing methods of provider reimbursement are restructuring the entire health care system. Diversification and integration strategies have blurred historical separations between the activities of hospitals, nursing homes, physicians, and other providers.¹ Services are being offered in, and in many cases, shifting to, less-costly settings, such as ambulatory clinics, work sites, and homes.

Factors that have contributed to the increasing trend of delivery of health care outside hospitals include the following: (1) economic forces resulting in earlier discharge of patients from hospitals, (2) advances in medical technology, and (3) the patient's desire to receive care outside the hospital. In addition, patients may be managed in their homes or in ambulatory care settings from the onset of illness rather than initiating care in the hospital. Such patient care settings (ie, home, ambulatory, and extended care) have increased markedly in recent years as has the complexity of care provided in these settings.

Infection prevention and control issues are important throughout this continuum of care. Infections in patients may lead to serious morbidity and mortality, readmission or admission to a hospital, increased use of antibiotics, and increased costs of care. Performing surgical procedures and invasive device insertions and managing and providing care for patients who are increasingly immunocompromised in these settings presents new infection control challenges.² Therefore, infection control practices must now encompass infections that patients may acquire as a result of their care or treatment

The focus of these recommendations is the "health care organization." This recognizes the continuing evolution of health care systems in the United States. The independent hospital and solo physician practices have been replaced by management, contractual, insurance, and other arrangements that have linked hospital, extended care facilities, ambulatory centers, and home health agencies together. The recommendations in this report and the recommendations in the one that preceded it give health care administrators, policy makers, and regulators a firm scientific basis for protecting patients and health care workers from a substantial number of infections.

The core of expertise in infection control is likely to reside within the acute care hospital infection control program. Health care organizations should draw on this expertise. It is the duty and responsibility of health care organizations to implement these recommendations.

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outside the acute care hospital as well as protect health care providers and caregivers in these settings.

Whereas there is an established body of information relating to the practice of infection control and epidemiology in inpatient settings,^{3,4} there is no published consensus on how infection control programs should be structured and managed in settings outside the acute care hospital. The manner in which functional components of any health care organization (HCO)—including infection control—are administered and managed depends on various factors, including the size of the HCO, the types of patients for whom care is provided, the types of clinical activities performed, and whether the HCO is independently operated, is affiliated with a hospital, or is part of a larger network or health system. Therefore, infection control and epidemiology activities may be identified under various organizational labels or titles in out-of-hospital settings.

Concomitant with changes in the health care delivery system in the United States, changes have occurred in public health priorities that have an impact on infection control programs. The public health infrastructure has been the underlying foundation that supported the planning, delivery, and evaluation of public health activities and practices.⁵ Among these activities has been cooperation with infection control programs in surveillance and support and assistance to infection control as needed. However, funding for public health has decreased in recent years, in some cases, with a change in activities by local and state agencies lessening their involvement in infection control. There are efforts to rebuild the US public health infrastructure to address infectious disease issues and provide tools and resources to facilitate interactions between HCOs and health departments.⁵

Box 1. Settings referred to in this document**Health care settings addressed in document**

Extended care
 Long-term care facility
 Rehabilitation facility
 Skilled nursing facility
 Hospice
 Ambulatory care
 Outpatient surgery
 Dialysis center
 Infusion center
 Home care
 Intravascular-related care
 Other device-related care

Health care settings not addressed in document*

Behavioral health
 Out-of-home child care
 Individual physician or practitioner office
 Clinics
 Respite care
 Home hospice

*Except when discussed in the context of the settings addressed in the document

In 1998 a document entitled "Requirements for Infrastructure and Essential Activities of Infection Control and Epidemiology in Hospitals: A Consensus Panel Report"⁶ was published. It outlined recommendations for infection control programs in the hospital. The purpose of the current document is to establish recommendations for the infrastructure and essential activities of infection control in relevant settings outside the hospital. The settings addressed and not addressed by this document are outlined in Box 1.

The health care settings not specifically addressed in this document must still implement appropriate infection control practices even though they may not have a formal infection control infrastructure. Health care providers in these settings should follow basic infection control practices and be prepared to identify and investigate problems. They also have a responsibility for ensuring communication with other health care settings on infectious disease issues. In time, they too may find it beneficial to affiliate with a more formal infection control program to provide services comprehensively across the continuum of care.

EXTENDED CARE SETTINGS

Currently, more than 1.5 million persons reside in nursing homes in the United States. This number is less than 10% of the US population that is currently older than 65 years; however, demographic trends suggest that at least 43% of the US population who turned 65 in

1990 will spend some time in an extended care facility.⁷ There are many different types of extended care facilities, which vary considerably in the type of services they provide and the population they serve. These types include the following:

- Adult day care units
- Residential care facilities
- Rehabilitation facilities
- Long-term care facilities
- Nursing homes
- Chronic disease hospitals
- Veterans' Affairs nursing home care units

There are also residential facilities for persons who require both medical care and related psychosocial services. Young persons as well as elderly persons may reside in these facilities. However, the largest numbers of institutionalized persons reside in nursing homes, and more than 90% of these persons are elderly. Most information relating to infections in extended care facilities comes from nursing homes.⁸

The high frequency of infections in nursing home populations is well documented.⁸ The 3 most common infection sites are respiratory tract, urinary tract, and skin and soft tissue. The reported overall incidence of infection has varied from 2.6 to 9.5 per 1000 resident-days, with respiratory infections accounting for 0.7 to 4.4 infections per 1000 resident-days, urinary tract infections, 0.1 to 2.4, and skin and soft tissue infections, 0.1 to 2.1. The differences in the reported rates of infection reflect a lack of uniform definitions used to identify infections, the use of different surveillance (case-finding) strategies, as well as differences in the types of populations studied, leading to wide variations in calculated risks of infection. In addition to high rates of endemic infections, outbreaks occur frequently.⁸⁻¹²

Many factors contribute to the frequency of infections in extended care facilities.⁸ Recent changes in long-term institutional care, with increasing use and management of invasive devices, such as endotracheal or tracheostomy tubes, central intravascular lines, and percutaneous feeding tubes, have increased the likelihood of infection. For example, the prevalence of chronic indwelling urinary catheters in extended care facilities is universally associated with bacteruria.¹³

The extended care population presents unique problems in addressing issues related to infections. There is often uncertainty in making a specific clinical diagnosis of infection, as well as determining whether an infection is present in a patient or, if an infection is present, whether it is symptomatic.^{14,15} Usual clinical diagnostic features are imprecise because of the complexity and chronicity of symptoms associated with comorbid illness. Bacteriologic diagnosis is problematic because of the very high prevalence of colonization of the upper respiratory tract and of

skin lesions with potentially pathogenic microorganisms.⁸ The high frequency of infections, together with this diagnostic uncertainty, results in high intensity of antimicrobial use, much of which is empiric or provided for symptoms that may not be related to infection.¹⁵

There are substantial differences between acute and extended care institutions in patient characteristics, the type of care provided, the specific needs for increased social and personal contact, and staff resources. Recommendations for development of infection control programs in extended care have applied infection control practices to the extended care setting.¹⁶ Nevertheless, there are no reported studies that evaluate the overall effectiveness of an infection control program in extended care facilities. However, there is ample evidence that implementation of infection control measures may control and limit the frequency and extent of outbreak situations.¹⁷⁻²¹

AMBULATORY CARE SETTINGS

The growth in managed care, with its attendant pressure to reduce the duration of or eliminate the inpatient stay, has resulted in a shift of many services previously delivered only in hospitals to that of ambulatory care settings. However, the delivery of health care in the outpatient setting is very different from that in the acute care facility. The patient mix and interactions are more varied; patients' clinical status may be well to acutely ill, requiring visits that may be brief or may last the entire day. Traditionally, infection control professionals have considered the risk for infection in the outpatient setting to be low. However, as more invasive procedures are performed in the ambulatory care setting, patients and health care workers alike are at risk for developing or transmitting infection. Goodman and Solomon²² reviewed published articles and identified 53 reports of transmission of infection that occurred in the outpatient setting between 1961 and 1990. Their analysis revealed that most of the outbreaks were associated with nonadherence to infection control procedures.

Three areas of ambulatory care are especially important from an infection prevention and control perspective. These include the following:

- Ambulatory surgery setting: a setting in which surgical services are provided to patients not requiring hospitalization
- Ambulatory infusion setting: an out-of-home setting in which parenteral therapy is administered to patients who do not require hospitalization, including freestanding, physician office-based, or hospital-based centers
- Dialysis center setting: an out-of-hospital, out-of-home setting dedicated to the provision of dialysis services to patients with renal failure

Ambulatory care surgery settings

An increasing number of surgical procedures are performed in ambulatory care settings,²³ with a projected 75% of all surgical procedures in the United States being performed in such settings by the year 2000.²⁴ Moreover, an increasing number of "not-so-minor" surgical procedures are now performed in ambulatory care settings,^{25,26} and patients with increasing levels of surgical risk are becoming candidates for outpatient surgery. Along with the provision of more complex ambulatory surgery procedures has come an increase in risk of developing procedure-related infections. For these reasons, it is essential to develop and implement an effective infection control program for ambulatory surgery.

Infusion center settings

It is estimated that 250,000 patients receive community-based parenteral therapies annually in the United States, with a projected growth rate of more than 10% per year.²⁷ Furthermore, it is estimated that 32% of antibiotic courses are currently administered at infusion centers.²⁸ Many other therapeutic products, such as chemotherapeutic agents, parenteral nutrition, blood components, and immunoglobulins, also are often administered in this setting.²⁹ A variety of locations are often used for administration of parenteral therapies, including physicians' offices, freestanding ambulatory infusion centers, and ambulatory care clinics.³⁰⁻³² As a result of the increasing frequency of parenteral therapies administered in infusion centers and the attendant risk of potentially serious bloodstream infections associated with such therapies, effective infection control programs must be developed and implemented in these centers.

Dialysis center settings

More than 180,000 patients undergo maintenance dialysis annually in the United States, with 85% receiving hemodialysis.³³ Most patients receive dialysis in centers that are affiliated with hospitals or are freestanding. Dialysis procedures and equipment are continually evolving, requiring ongoing education and training of personnel regarding proper infection control techniques. Bloodstream infections and pyrogenic reactions are not uncommon in dialysis centers.³³⁻³⁸ Furthermore, numerous outbreaks of bloodstream infections and infections associated with arteriovenous fistulas, the peritoneal cavity, and exit sites of permanently placed long-term catheters have been associated with patient care in dialysis centers. These outbreaks are frequently a result of deficiencies in basic infection control practices.³³⁻³⁷ Transmission of bloodborne pathogens (eg, hepatitis B virus, HIV, and hepatitis C virus) from

patient-to-patient and patient-to-health care worker remain of particular concern in this setting.³⁹⁻⁴²

HOME CARE SETTINGS

The National Association for Home Care identified a total of more than 20,000 home care organizations in the United States as of 1996. This total represents an increase of approximately 89% over the past 10 years.⁴³

Home care organizations are broadly defined as operational units that provide one or more home care programs to persons in their place of residence. Home care programs can include the following:

- Professional multidisciplinary services provided on an intermittent basis
- Private duty services provided on a hourly or shift basis
- Personal care and support services provided on part-time, intermittent, hourly, or shift basis
- Home infusion therapy that provides both pharmaceutical products and skilled nursing services
- Hospice care, which is an organized program of interdisciplinary services for terminally ill patients and their families to provide palliative medical care and supportive social, emotional, and spiritual services in the place of residence⁴⁴

Durable medical equipment and supply companies, whereas not defined as home care organizations, are certainly ancillary to home care services and provide home care patients with products ranging from ventilators, wheelchairs, and walkers to catheters and wound care supplies.⁴⁵ Appropriate adherence to good infection control practice applies to these providers as well.

Home care organizations are caring for more acutely ill patients who often have a number of underlying medical conditions such as chronic obstructive pulmonary disease, cancer, AIDS, diabetes, renal failure, and decubitus ulcers. When combined with the use of invasive devices associated with home health treatment (feeding tubes, tracheostomies, vascular access devices, urinary catheters), these conditions significantly increase the patient's risk of infectious complications.^{46,47}

There are limited data outlining the epidemiology of infections in home care. However, several outbreaks of bloodstream infections have been documented among persons receiving home infusion therapy.⁴⁸⁻⁵⁰ Risk factors for bloodstream infection among patients receiving home infusion therapy include external central venous catheters,⁴⁸ multilumen central venous catheters,⁵¹ and use of needleless infusion systems.^{48-50,52}

Infection control implications are important not only for home care patients, but also for home care workers and informal caregivers. Patients with known or silent contagious diseases or conditions pose potential risks to home health professionals and other caregivers.

Because of these trends in home care, the patient, patient care providers, and home health workers are at risk for developing or transmitting infection.^{50,53,54} Consequently, there is the need for prevention and control of home-acquired infections.^{55,56} Surveillance and reporting are included in these activities because patients may develop infections after discharge from acute care or ambulatory care settings.

GOALS FOR INFECTION CONTROL AND EPIDEMIOLOGY

There are 3 principal goals for health care infection control and prevention programs, regardless of the setting:

- Protect the patient
- Protect the health care worker, visitors, and others in the health care environment
- Accomplish the previous 2 goals in a timely, efficient, and cost-effective manner, whenever possible

These goals are outlined completely in the first Consensus Panel report.⁶ Achieving these goals is the driving force behind every recommendation and action of the infection control program. These goals are relevant to patient-care activities in any setting in which health care is provided, including skilled nursing facilities, acute care nursing homes, rehabilitation units, urgent care centers, same-day surgery facilities, ambulatory care centers, behavioral health facilities, and home care programs. However, this panel has chosen to focus on 3 major settings: extended care, ambulatory care, and home care. These areas were selected because we believe there is sufficient published information and expert experience to justify and support recommendations for these settings. However, we believe that the recommendations made are also appropriate, perhaps with minor modifications, for all other out-of-hospital settings. The goals, recommendations, and expected outcomes that follow represent a single standard of care for all health care settings outside of the hospital.

FUNCTIONS OF INFECTION CONTROL AND EPIDEMIOLOGY

The principal functions are:

1. To obtain and manage critical data and information, including surveillance for infections
2. To develop and recommend policies and procedures
3. To intervene directly to prevent infections
4. To educate and train health care workers, patients, and nonmedical caregivers

MANAGING CRITICAL DATA AND INFORMATION

The activities that comprise this function include developing and implementing surveillance plans, monitoring these plans, and internal and external reporting of infection information and data.

Surveillance systems for infections

The most important data management activity for all infection control programs is surveillance for infections and other adverse events in patients and staff. The type and method of surveillance must be tailored to the setting. It should be based on the types of infections most common to the care or services provided and the population served.⁵⁷⁻⁶⁰ Persons performing infection surveillance must have access to all data and information vital to performing this activity; which will include access to computerized databases that are required for accurate and complete identification of infectious complications of health care.

Developing and implementing a surveillance plan

Documentation of the frequency, type, and associations of infections is an important component of the infection control program. Surveillance needs to be simple and pragmatic. The definitions used for surveillance of infection must be relevant to settings outside the acute care hospital.^{15,47,61,62} These definitions should take into account the type of information routinely available in each setting.

Internal and external reporting of information and data

There are no nationally recognized benchmark data for infection rates outside the acute care hospital; therefore, each HCO should monitor its own data for trends. Attempts to compare infection rates among HCOs require careful evaluation of variations in patient characteristics in different facilities, access to and use of diagnostic tests, and the resources available in each setting to ensure the completeness and accuracy of surveillance. Efforts to develop external comparisons (eg, ORYX⁶³) should be focused on infections that may be most readily identifiable and preventable and must take into account issues such as confidentiality, uniform definitions and data elements, infrastructures of data management, and data quality. Early priorities might include infections in persons with invasive devices, such as bloodstream infections in patients receiving infusion therapy, or diseases amenable to simple, effective interventions, such as vaccine-preventable diseases. Given their expertise, infection control professionals should be included in developing definitions for any national database.

It is important to develop procedures that facilitate communication of epidemiologically important information on infections regarding both patient and staff infections between and among HCOs.⁴⁶ This information needs to be shared effectively across all settings

in the continuum of care to ensure feedback for completeness of surveillance in each setting and to permit appropriate infection control practices to be implemented as patient care requires. Fig 1 outlines a model for comprehensive surveillance of health care-associated infections illustrating the significance of sharing infection prevention and control information among all HCOs, settings, and public health departments to provide complete and useful surveillance data and other information. It is important to develop procedures to facilitate exchange of this information.

Complementary systems should be developed and maintained such that hospitals can report back to facilities and providers of extended care, home health care, or ambulatory care when their patients are hospitalized with an infection.⁶⁴ Similarly, persons in nonhospital settings must be able to notify hospital-based infection control professionals when extended care, home health care, or ambulatory care patients are found to have infections that were acquired in the hospital. In addition, infection control staff in out-of-hospital settings must be able to share such information among themselves. Local public health officials may be able to assist in this area (Fig 1).

Public health personnel are important collaborators in infection control. Public health agencies and infection control departments should be a focal point for prevention and control of infection by monitoring spread of microorganisms within the community, responding to infectious disease outbreaks, and coordinating communication and intervention across the continuum of care.

DEVELOPING AND RECOMMENDING POLICIES AND PROCEDURES

The activities that comprise this function include ensuring appropriateness and feasibility of policies, ensuring compliance with regulations, guidelines, and accreditation requirements, and employee health activities. To the greatest degree possible, HCOs should strive to ensure that policies and procedures are evidence-based and consistent with scientific knowledge and expert consensus.

Ensure appropriateness and feasibility

Written policies and procedures should address all elements of care. These elements will include environmental issues such as food handling, laundry handling, and cleaning, visitation policies, and direct patient care practices, including handwashing and immunization. The policies and procedures must be relevant to the setting, continually updated to remain current, and accessible to all staff.

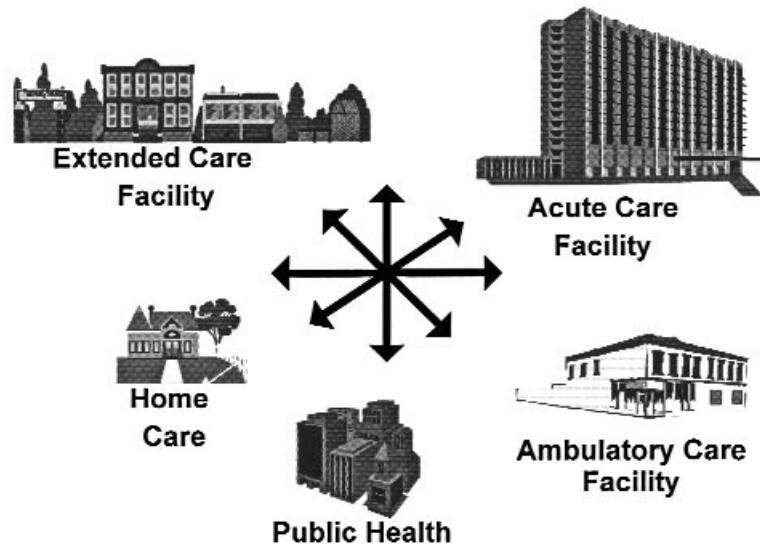


Fig 1. Outline of the significance of sharing infection prevention and control information among all HCOs and settings to provide complete and useful surveillance data and other information. Adapted from Jarvis W and Waller L, Centers for Disease Control and Prevention, 1998.

Sophisticated medical therapies are now increasingly performed outside the hospital and include intravascular infusion, dialysis, and mechanical ventilation.⁶⁵ Policies and procedures related to infection control practice in out-of-hospital settings might be patterned after current hospital standards and guidelines (eg, those issued by the Centers for Disease Control and Prevention's Healthcare Infection Control Practices Advisory Committee [HICPAC], APIC, and SHEA⁶⁶). When establishing infection control policies and procedures, it is crucial that the means of implementing them be clearly outlined and consistent with evidence-based infection control and epidemiologic principles. The policies and procedures should describe what infection control measures are necessary to prevent transmission of infection.

Compliance with regulations, guidelines, and accreditation requirements

Regulations relevant to infection control in out-of-hospital settings occur at both the federal and state level. All HCOs are subject to regulation and oversight by various agencies, authorities, and government bodies. Some regulations may be specific to extended care, home health, or ambulatory care, whereas others are generally relevant to all health care facilities. Some nonlegislative standards may constitute required practices under certain conditions. For example, JCAHO standards may be incorporated into state licensing regulations as well as Medicare and Medicaid regulations.⁶⁷

Employee health

Persons who work in health care settings are exposed more frequently to infectious diseases. They also may pose a risk to patients and other health care workers if they develop a communicable disease. Thus HCOs have the dual responsibility of preventing transmission of infections from patients to health care workers and limiting introduction of infections by staff members to interrupt spread both to patients and other staff. These objectives are achieved through an effective employee health program and policies.

The employee or occupational health program is a crucial component of the infection control program within an HCO. It is charged with developing and implementing systems for diagnosis, treatment, and prevention of infectious diseases in health care workers. It plays an important role in infection control within the HCO. The infection control program and the employee or occupational health program should have collaborative policies and procedures for health care personnel. These collaborative activities include placement evaluations, health and safety education, immunization programs, evaluation of potentially harmful infectious exposures and implementation of appropriate prevention measures, coordination of plans for managing outbreaks among personnel, provision of care to personnel for work-related illnesses or exposures, and maintenance of health records for all health care personnel.⁶⁸

INTERVENING DIRECTLY TO PREVENT INFECTIONS

The activities that comprise this function include interruption of the transmission of infectious diseases, outbreak investigation and control, and performance improvement activities.

Endemic/epidemic disease

Epidemic disease may occur in any setting and can be associated with substantial morbidity and mortality.^{8,16} Early intervention to prevent outbreaks or limit the spread of infections once an outbreak has been identified will interrupt transmission of disease, decreasing the impact on patients' health, patient care, and cost.¹⁶⁻²¹

The expertise and resources for infection control in a given HCO may be insufficient in an outbreak. Expertise related to outbreak management and infectious diseases may be obtained from state and local public health agencies, through linkages with other facilities, including acute care hospitals, or through a formal consultation arrangement with experts in infection control and health care epidemiology. The outbreak management team must have the authority to institute changes in practice or take other actions that are required to control the outbreak. As outbreaks may be anticipated to occur, plans to respond appropriately to such events should be developed before their occurrence.

Although the occurrence of outbreaks of infections often evokes considerable notice because they are easily identified and carry a connotation of danger, the morbidity and mortality that occurs as a result of endemic infections is greater than that associated with outbreaks.⁶⁹ Endemic cases represent the recurring health care-associated problems related to infectious disease in a particular setting. These endemic problems represent the baseline rate of infection among the population receiving care in that setting. The goal of infection control is to work consistently to decrease this baseline incidence; the management of these endemic infections encompasses techniques of epidemiology and quality improvement. Improvement in the endemic rate of infection within the HCO requires a review of processes that might lead to the development of the infection.⁷⁰

Interrupting the transmission of infectious diseases

In-depth investigations must be conducted to obtain information once a problem or trend is identified.^{34,35} Health care-associated infections may spread from person-to-person (eg, infections transferred from a staff member to a patient or from a patient to a staff member). Infections or microorganisms may also be spread from environmental sources (eg, from equipment or devices) to patients.

EDUCATING AND TRAINING HEALTH CARE WORKERS, PATIENTS, AND NONMEDICAL CAREGIVERS

The increasing complexity of care provided to patients and the increasing severity of illness of patients in out-of-hospital settings necessitates increasing awareness of appropriate measures of infection prevention and control. Staff, patients, and caregivers must receive ongoing training regarding proper infection control procedures.^{55,56,71} In addition, it is essential that health care workers receive at least a rudimentary knowledge of the epidemiology of health care-associated infections specific to the setting in which they are employed. This knowledge will allow them to be better able to understand and comply with the practices and procedures necessary for the prevention and control of infections. The educational program should include education regarding surveillance, its uses, and the extent and nature of existing and potential problems related to infection in their organization.

RESOURCES

The resources for infection control and epidemiology should be proportional to the size, case mix, and estimated infectious risks of the populations served by the HCO. HCOs must comply with basic accreditation standards, federal regulations, and state and local licensing standards. Infection control functions are a critical component of quality health care, and adequate personnel and nonpersonnel resources are needed to ensure a quality program.

The infection control program must clearly be the responsibility of at least one designated person. In some HCOs, this person may also have other responsibilities (ie, infection control activities will be part time). In this situation, the expected number of hours per week that are devoted to infection control should be clearly stated.

Specific knowledge and training relevant to infection control and epidemiology makes this person more effective in overseeing an infection control program. Thus persons with this responsibility who are not specifically trained in infection control should have the opportunity to take courses and avail themselves of other educational opportunities that will increase their capacities in the field of infection control.

Some organizations will not be of a size or complexity sufficient to justify the resource commitment of full-time, on-site expertise in epidemiology and infectious diseases. If the person charged with the responsibility for infection control in the HCO is not specially trained or experienced in infection control, the HCO must ensure that oversight of the infection

Box 2. Recommendation categories

I. Strongly recommended

Strongly recommended for implementation based on:

- Evidence from at least one properly randomized, controlled trial, or
- Evidence from at least one well-designed clinical trial without randomization, or
- Evidence from cohort or case-control analytical studies (preferably from more than one center), or
- Evidence from multiple time-series studies

II. Recommended

Recommended for implementation based on:

- Published clinical experience or descriptive studies, or
- Reports of expert committees, or
- Opinions of respected authorities

III. Recommended when required by governmental rules or regulations

control program is provided by an experienced person or group with such expertise. This augmentation, available on a contract basis or through a relationship with other facilities in an organization or outside the HCO (eg, a health department, private consultant, or other institution, as needed) ensures that the HCO has personnel trained in and familiar with basic infection control skills. Given the increasing emphasis on cost containment and the need to justify expenditures, a trained and experienced infection control professional can be especially helpful in evaluating the cost of the program and balancing these expenses against the benefits and requirements of the infection control program.⁶⁵

One person should be charged with the infection control process and keep up-to-date on regulatory changes. Both the on-site staff responsible for infection control and any experts or consultants who participate in the program must be vested with the authority to carry out the components of the program and be supported throughout the organization by appropriate managerial and supervisory personnel. Within the management of the HCO, it is important to have a person(s) who facilitates and supports the infection control program.⁷²⁻⁷⁴

Persons who oversee infection control programs must have access to resources adequate to allow them to fulfill their responsibilities. In general, these resources include the following:

- Personnel resources: infection control professionals, consultative services of a health care epidemiologist, and clerical support
- Nonpersonnel support: access to office support, space, supplies, and equipment; computer support/Internet capability; microbiology laboratory support; reference laboratory testing; data manage-

ment and statistical support; clinical publications; budget to support outbreak or exposure investigations; and education

The Consensus Panel recommendations are as follows:

REQUIREMENTS FOR INFRASTRUCTURE AND ESSENTIAL ACTIVITIES OF INFECTION CONTROL AND EPIDEMIOLOGY IN OUT-OF-HOSPITAL SETTINGS

Whereas recommendations in this document are based on evidence for effectiveness whenever possible, limitations in information relevant to out-of-hospital settings means consensus of persons with expertise in these settings and infection control frequently must be accepted. Recommendations therefore are categorized in Box 2 by using a modification of the scheme developed by the Clinical Affairs Committee of the Infectious Diseases Society of America and the CDC HICPAC classification scheme.^{75,76}

FUNCTIONS

Managing critical data and information, including surveillance for infections

Recommendation 1: Infection control personnel should develop policies and procedures for ongoing communication with other health care organizations (HCOs) to identify, prevent, manage, and control infections as patients move between HCOs throughout the continuum of care. *Category II.*

- Report infectious complications and adverse events associated with medical and surgical procedures (eg, surgical site infections) to the HCO in which the procedure was performed or from which the patient was discharged
- Report epidemiologically important infections to the HCO to which the patient will be transferred

Recommendation 2: Surveillance of health care-associated infections must be performed. *Category I*

Incorporate the following elements in the surveillance process:

- Identification and description of the problem or event to be studied
- Standard case definitions appropriate for the setting
- Definition of the population at risk
- Selection of the appropriate methods of measurement, including statistical tools and risk stratification
- Identification and description of data sources and data collection
- Definition of numerators and denominators
- Preparation and distribution of reports to appropriate groups

Recommendation 3: Surveillance data must be appropriately analyzed and used to monitor and improve infection control and health care outcomes. *Category I*

Recommendation 4: Clinical performance and assessment indicators used to support external comparative measurements should meet the criteria previously delineated by APIC and SHEA for hospitalized patients.⁷⁷ *Category II*

Specifically, these indicators and their analyses must address:

- How process is related to outcome
- How to measure variation and quality
- That the numerators and denominators are defined
- That data collection is feasible, and the collected data are collected completely and reliably
- That the data are appropriately risk-adjusted when analyzed
- That data be adjusted for the populations' severity of illness and case-mix differences when analyzed before external comparison
- That personnel be trained regarding proper study and use of indicators
- That benchmarks be developed and used to compare the indicator's performance

Developing and recommending policies and procedures

Recommendation 5: Written infection prevention and control policies and procedures must be established, implemented, maintained, and updated periodically. *Both Categories II and III*

- The policies and procedures should be scientifically sound.
- The policies and procedures should lead to improved prevention of infections and other adverse events or improved patient and employee outcomes.
- The policies and procedures should be reviewed regularly to assess their practicality and cost-effectiveness.
- The policies and procedures should incorporate compliance with regulatory issues.

Recommendation 6: Policies and procedures should be monitored periodically for effectiveness, both to ensure that staff are able to comply fully with and fulfill organizational requirements and to ensure that the policies are having the desired result in preventing and controlling infections. *Both Categories II and III*

Compliance with regulations, guidelines, and accreditation requirements

Recommendation 7: HCOs should engage infection control personnel in maintaining compliance with relevant regulatory and accreditation requirements. *Both Categories II and III*

Recommendation 8: Infection control personnel should have appropriate access to medical or other relevant records, information in regard to the HCO's compliance with regulations, standards, etc, and to staff members who can provide information on the adequacy of the HCO's compliance with regard to regulations, standards, and guidelines. *Both Categories II and III*

Recommendation 9: The infection control program should collaborate with, and provide liaison to, appropriate local and state health departments for reporting of communicable diseases and related conditions and to assist with control of infectious diseases in the community. *Both Categories II and III*

Employee health

Recommendation 10: The infection control program personnel should work collaboratively with the HCO's employee health program personnel. *Category II*

- The HCO should have access to consultation and direction from a physician (or designee) with expertise in infectious disease and health care epidemiology.
- Infection control personnel should review and approve all employee health policies and procedures that relate to the transmission of communicable diseases in the HCO.

Recommendation 11: At the time of employment, all HCO personnel should be evaluated for conditions relating to communicable diseases. *Both Categories II and III*

The employment record should include the following:

- Medical history, including immunization status and assessment for conditions that may predispose personnel to acquiring or transmitting communicable diseases
- Tuberculosis screening
- Serologic screening for vaccine-preventable diseases, as deemed appropriate
- Such medical examinations as are indicated by the above

Recommendation 12: The HCO evaluates employees and other health care workers (eg, students, volunteers) for conditions related to infectious diseases that may have an impact on patient care, the employee, or other health care workers periodically. This evaluation should include a review of required immunizations and status of tuberculosis screening. *Both Categories II and III*

- Medical records of all health care workers must be kept confidential.
- The HCO should track employee immunization and tuberculosis screening status.

Recommendation 13: Employees must be offered immunizations based on regulatory requirements. HICPAC Personnel Guidelines and recommendations

of the Centers for Disease Control and Prevention's Advisory Committee on Immunization Practices for health care workers should also be followed. *Both Categories I and III*

Recommendation 14: The HCO's employee health program should institute policies and procedures for the evaluation of exposed or infected health care workers. *Category I*

- Exposed health care workers should be evaluated for circumstances surrounding the exposure, evaluation of symptoms, need for postexposure prophylaxis, need for treatment, and work restrictions.
- Infected symptomatic and asymptomatic health care workers should be assessed for disease communicability, work restrictions, and treatment, as appropriate.

Intervening directly to prevent infections

Recommendation 15: Infection control personnel in HCOs must have the capacity to identify and implement measures to control endemic and epidemic infections and adverse events. *Category I*

- HCOs must have an ongoing system to obtain pertinent microbiologic data.
- Ongoing communication and consultation with clinical staff throughout the organization must be maintained to identify infectious and adverse events, to assist in maintenance and monitoring of infection control procedures, and to provide consultation.
- When an outbreak occurs, infection control personnel must have adequate resources and authority to ensure a comprehensive and timely investigation and the implementation of appropriate control measures.
- Institutional policies and procedures should be developed so that roles and responsibilities are outlined clearly.

Educating and training health care workers, patients, and nonmedical caregivers

Recommendation 16: HCOs must provide ongoing educational programs in infection prevention and control to health care workers. *Both Categories I and III*

- Infection control personnel knowledgeable regarding epidemiology and infectious diseases should be active participants in the planning and implementation of the educational programs.

Recommendation 17: Educational programs should be evaluated periodically for effectiveness. *Both Categories II and III*

- Educational programs should meet the needs of the group or department for which they are given and must provide learning experiences for persons with a wide range of educational backgrounds and work responsibilities.

- Participation of health care workers at educational programs should be documented.

Recommendation 18: The health care organization must have a mechanism to ensure that patients and caregivers receive appropriate information regarding infection prevention and control. *Category II*

Resources—personnel

Recommendation 19: The HCO must assure adequate personnel and supporting resources to fulfill the functions of the infection control program. *Category II*

Recommendation 20: All HCOs should have access to the ongoing services of a person who is trained in infection prevention and control (ie, an infection control professional [ICP]), who provides oversight for the infection control program. *Category II*

Recommendation 21: All HCOs should have access to continuing services of a physician trained in health care epidemiology. *Category II*

Recommendation 22: ICPs should be encouraged to obtain Certification in Infection Control. *Category II*

Other resources

Recommendation 23: Resources should be provided for continuing professional education of employees and infection control personnel who work directly for the organization. *Category II*

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