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Infection prevention and control core practices:

A roadmap for nursing practice

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FOR THE SIXTEENTH year in a row, nurses have been recognized as the most trusted profession in the United States.[1] The value of ethics and integrity continue to be recognized and appreciated by those we serve—our patients and their families. It's our responsibility to provide and perform care that adheres to best practice evidence consistently and reliably. One area where care must consistently align with best practice is infection prevention and control. This article discusses guidelines and best practices promoted by the Nursing Infection Control Education Network and the CDC Healthcare Infection Control Practices Advisory Committee to improve antibiotic stewardship, reduce microbial transmission, and prevent the spread of infection in any healthcare setting.

Increased resistance

The CDC continues to stress the urgent issue of increasing microbial resistance to the few remaining drugs available to treat them.[2] It recently joined forces with the American Nurses Association (ANA) to bring awareness to this issue through an approach that prevents inappropriate antibiotic use and stresses infection prevention. By preventing infection, the use of antibiotics may be unnecessary thereby reducing opportunities for the development of drug resistance.

A partnership between the CDC, ANA, and 20 professional nursing organizations has resulted in the Nursing Infection Control Education Network.[3] Its goal is to improve adherence to infection prevention practices through enhanced infection prevention and control training. Success involves using core practices that prevent movement of microorganisms between patients, healthcare providers, and the environment to avert transmission of microorganisms and ultimately prevent infection.

Nursing implications

In 2014, members of the CDC Healthcare Infection Control Practices Advisory Committee began summarizing the core practices identified as critical for the prevention of infection associated with healthcare. These practices, described in 16 current CDC guidelines, are relevant to care provided by healthcare providers in any healthcare setting. Following

extensive review, the *Core Infection Prevention and Control Practices for Safe Healthcare Delivery in All Settings* was published in 2017.[4] It's organized into eight distinct, yet interrelated, infection prevention and control domains (see *Categories of core practices*).[4] The first four relate to the organizational infrastructure needed to sustain successful implementation of the core practices. These underlying elements include:

1. leadership support
2. education and training of healthcare personnel on infection prevention
3. patient, family, and caregiver education
4. performance monitoring and feedback.

Action-oriented core practices that are applicable to nurses and all healthcare providers in all settings include:

5. standard precautions
6. transmission-based precautions
7. use of temporary invasive medical devices
8. occupational health.

Each of these domains is described below with specific implications for nursing practice.

Core practices

Leadership support. Senior nursing leaders, along with other organization leaders, must ensure that the healthcare organization provides sufficient resources to enable frontline personnel to consistently adhere to infection prevention practices. They should also ensure that personnel charged with implementing an infection prevention program are appropriately educated with infection prevention–specific education. These individuals need the support of leaders to empower them with the authority that ensures the program's effectiveness.[5-16]

Leadership doesn't come only from the executive level; it should be evident in the practice of all nurses and demonstrated through the care they provide. Nurses must be empowered to act and respond to the needs of patients and lead change among coworkers and other team members. It's the nurse's responsibility to include leadership development in his or her individual performance development plan and take steps to achieve that goal.[5-16]

Education and training of healthcare personnel on infection prevention. Assessment of areas of practice where performance doesn't meet expectations should be targeted for improvement and then be part of every nurse's professional development plan. The nurse must have knowledge regarding specific practice issues, but more important, the nurse must be able to apply that knowledge, think critically to address both the expected and unexpected, and perform with consistent practice excellence regardless of where care is delivered.[5-8,10-12,14-17] Competence is defined as the ability to apply knowledge in practice, and specific competencies focusing on hospital-based healthcare workers have been proposed and can be used to form a basis for a facility education and training program emphasizing infection prevention.[18]

Patient, family, and caregiver education. Preventing infection requires engagement of patients, their families, and caregivers, as well as other healthcare providers. Patients must be empowered and enabled to perform self-care in a way that minimizes preventable harm. Often they rely on family members and others for assistance. Patient and caregiver engagement includes sharing information, assessing their ability to perform desired tasks, ensuring they have the ability to perform those tasks, evaluating that performance, and providing feedback regarding improvement. Information and training methods must recognize language and health literacy capabilities and barriers.

One activity central to preventing transmission of infection is hand hygiene. Teaching patients to cleanse their hands properly and enabling family members to help them perform this task can help prevent environmental contamination or movement of microorganisms from the environment to their loved ones.[6-9,11,12,14,15]

Performance monitoring and feedback. A primary goal of performance evaluation is to enable improvement by identifying areas of strength and weakness. Without objective and informative data, it's difficult to improve performance in patient care. Nurses must be actively engaged in monitoring their performance at all levels. Checklists, observations, collaborative rounds, and timely feedback to the care team are examples of activities critical to improvement strategies.[5-17,19]

Standard precautions. These foundational practices prevent the movement of pathogens during the course of care. Nurses who are using standard precautions appropriately assume that all patients may be infected with an organism that could be spread in the healthcare setting. Emphasis on bloodborne pathogens by the Occupational Safety and Health Administration (OSHA) Bloodborne Pathogens Standard may result in the belief that standard precautions involve only certain body fluids. In fact, standard precautions involve recognizing that patients and the healthcare environment may be reservoirs of infectious organisms. Implementation of standard precautions involves recognition of these risks and the steps needed to prevent movement of those organisms. Essential elements of standard precautions include:

- hand hygiene
- environmental cleaning and disinfection
- injection and medication safety
- risk assessment with appropriate use of personal protective equipment (PPE)

• minimizing potential exposures
• reprocessing of reusable medical equipment.[20]

Microorganisms are present in the patient-care environment, and bloodborne pathogens such as HIV and hepatitis B and C viruses may persist in the blood and body fluids of asymptomatic patients. As part of our routine practice, we must have strategies that keep us from coming into unprotected contact with a patient's body fluids, not just those patients we've previously recognized as potentially infectious.[21] We want to avoid any opportunity for pathogen movement that may ultimately cause illness in ourselves or transmission to the patient, family, or visitors.

Hand hygiene. Despite the emphasis on providing care with clean hands, the evidence continues to demonstrate that we think we clean our hands more often than we actually do. Hand hygiene can be performed with a soap-and-water hand wash or an alcohol-based hand rub. The CDC and the World Health Organization have published guidelines that define proper hand hygiene.[7,22] It's important to understand who performs hand hygiene, when it should be performed, how it should be performed, under what conditions, and with which products so that no patient is touched by a nurse or any member of the care team whose hands haven't been properly cleansed. Nurses must be able to recognize risk for cross-contamination, such as when the nurse moves from a dirty or contaminated patient-care task to a clean patient-care task, and when moving between patient-care touches and touches involving the care environment. Nurses must ensure that no interaction with patients is performed by someone whose hands could transmit organisms to them, the equipment used in their care, medication administered to them, or the environment that surrounds them. Protecting patient safety may require nurses to intervene before other healthcare personnel touch a patient without performing proper hand hygiene or when there's movement between environmental surfaces or objects that may be contaminated, without the necessary performance of hand hygiene.

Environmental cleaning and disinfection. The clinical care environment is a key component in enabling or facilitating transmission of pathogens. When touched, contaminated environmental items and surfaces contaminate the hands of nurses and other healthcare personnel. They can then move microorganisms to patients, other surfaces or items, and other nurses. Surfaces, furniture, and equipment in patient rooms must be regularly cleaned and disinfected using agents approved by the Environmental Protection Agency for use in healthcare settings.[17] This includes paying attention to all monitoring equipment such as blood glucose monitors; mobile items such as bedside commodes, wheelchairs, infusion pumps, and computer keyboards; and any other item moved from one patient room or area to another. Nurses must be aware of microorganisms that are particularly challenging with respect to environmental contamination (such as *Clostridium difficile*) and communicate and work with environmental services personnel to take proper precautions. Further, nursing leadership is vital in recognizing risks present in the clinical care environment that require rapid action and resolution, such as practice deviations associated with construction barriers or failure to clean and disinfect point-of-care equipment. The network of team members includes many other partners beyond environmental services such as clinical engineering, plant operations or facilities management, central sterile processing, and the clinical lab.

Injection and medication safety. Numerous outbreaks of infection have been identified in United States healthcare facilities related to unsafe injection practices such as reuse of syringes, sharing of insulin pens and blood glucose monitoring equipment, reuse of medication vials, and administration of contaminated diluted or compounded medication.[23-27] The concept of one needle, one syringe, only one time, has been a focus of large-scale CDC education campaigns and alerts. Because nurses have a major role in medication administration, they must be competent in all aspects of its preparation, handling, and administration as well as in the safe management of all supplies and equipment used for injection or puncture. They must also be able to identify care situations that pose risks, such as inappropriate medication compounding by others, failure to use protective equipment during high-risk injections, and workarounds or "infection control hacks" that may seem to make sense or save time but deviate from best practice. For those interested in an audit tool that can help assess existing safe injection practice, a free app called Safe Injection Practices is available for download from the Apple App Store.

Risk assessment with appropriate use of PPE. Standard precautions require personnel to consider the type of activity in which they'll use the

Categories of core practices[4]

1. Leadership support
2. Education and training of healthcare personnel on infection prevention
3. Patient, family, and caregiver education
4. Performance monitoring and feedback
5. Standard precautions
6. Transmission-based precautions
7. Use of temporary invasive medical devices
8. Occupational health

appropriate type and level of PPE to prevent exposure to microorganisms, use that PPE correctly, remove it in a way that prevents self-contamination, and dispose of it in appropriate waste receptacles. The use of PPE must not be restricted to patients with known pathogens. Donning of gowns, gloves, masks, and eye protection may be warranted when extubating patients because exposure to respiratory secretions may occur as the patient coughs upon removal of the device.

Using PPE as a barrier between the nurse and the patient or the contaminated environment is addressed in regulatory standards by OSHA as well as CDC recommendations.[11,20] When done correctly, these actions protect the nurse wearing the item, the patient who may be inadvertently contaminated if the nurse didn't use PPE correctly, the environment, and other coworkers or visitors. Being familiar with the performance standards of various pieces of PPE, as outlined in the Association for the Advancement of Medical Instrumentation (AAMI) standards, and recognizing the labeling of the various levels of PPE as described in the AAMI standards should be part of the knowledge set of all nurses.[28]

Minimizing potential exposures. Besides the selection and use of PPE, additional actions such as the use of respiratory hygiene, cough etiquette, and hand hygiene should be part of routine practice during all patient-care interactions.[5,11,15] The CDC has outlined respiratory hygiene and cough etiquette actions that contain respiratory secretions. These include using masks and tissue to contain secretions, preventing hand contamination during a cough by teaching all individuals to cough into their elbow region instead of hands, ensuring immediate access to products that can be used to cleanse hands, and providing instructional signage that targets healthcare personnel, patients, and visitors.[11] An additional practice that can minimize transmission is early recognition of signs and symptoms of infection such as fever and/or cough, then use of early segregation practices such as isolation or cohorting. Early integration of these practices in triage areas as well as entry points into the healthcare facility or setting should be part of business as usual.

Nurses who are using standard precautions appropriately assume that all patients may be infected with an organism that could be spread in the healthcare setting.

Reprocessing of reusable medical equipment. An example involving reusable medical equipment familiar to nurses is ensuring that any equipment no longer needed by a patient is quickly removed from the patient-care area, sequestered in preparation for reprocessing, and sent for decontamination, cleaning, and disinfection before reuse. This principle is also applied in medication rooms where soiled items are never permitted to enter. Specific actions nurses must take that recognize the risks associated with shared equipment include:

- rapid removal of items from the patient-care environment when no longer necessary
- sequestering used equipment so it can't inadvertently be used by another patient until it's been decontaminated, cleaned, and disinfected
- promptly cleaning and disinfecting equipment before reuse by another patient.

Mobile patient-care equipment such as blood glucose monitors must be promptly cleaned and disinfected between uses and care should be taken to minimize contamination if the equipment must be taken into the patient room.

Transmission-based precautions. Standard precautions should be the foundation for patient interactions because they provide a basis for safe care that protects patients and healthcare personnel by assuming that every patient and patient encounter may provide an infection transmission opportunity. Transmission-based precautions are used when an organism has been identified or suspected and there's reasonable knowledge as to how the organism may be spread during the course of care. Transmission-based precautions include the selection, use, and disposal of PPE, use of segregation practices including patient placement and isolation, and use of sound and practical policies and procedures. The role of the nurse extends into role modeling, monitoring practice of others, identifying barriers to appropriate use of isolation and protective equipment, and educating others in a way that corrects errors in practice and reinforces safety. Nurses must be aware of the isolation precautions used within settings where they practice so they can adhere to those precautions and assist others to do the same. Further, nurses must continually be aware of barriers to

implementation of protective strategies (such as interruption in access to supplies, changes in the physical environment, lack of access to sinks, and lack of resources) so those barriers can be addressed.[10,11]

Use of temporary invasive medical devices for clinical management. The presence of an invasive device represents risk to the patient and evaluating the need for each individual device should be part of regular nursing assessment. Any invasive device should carry a diagnostic or treatment benefit that exceeds its risk. For example, an indwelling urinary catheter may be necessary for monitoring intake and output during an acute phase of care, but once that phase has passed, the patient should be assessed to determine if that device is still needed and, if not, promptly removed.[12] Daily, or even more frequent, assessment for need can prevent a device from being left in for use as a care convenience (such as an indwelling urinary catheter used for patients with urinary incontinence or an arterial line used for blood draws) or even forgotten. Development, implementation, and evaluation of the impact of nurse-driven protocols that can facilitate assessment of need and device removal may help prevent an avoidable infection.

Occupational health. The CDC has clearly articulated the list of vaccine-preventable diseases for which healthcare personnel should be immune (including rubeola, mumps, rubella, hepatitis B, and varicella). The CDC also emphasizes the need for pertussis prevention (Tdap) and annual influenza vaccination.[29] Other vaccines may also be appropriate, such as meningococcal vaccine, for those working in lab settings or other environments with recognized exposure risks. OSHA has mandated that healthcare personnel be given the opportunity to be vaccinated against hepatitis B at no cost.[20] A recent Call to Action published by the National Foundation for Infectious Diseases (NFID) highlighted the importance of collaborative efforts in improving healthcare personnel immunization rates.[30] Organizations such as the Immunization Action Coalition, as well as NFID, have developed resources to assist with immunization effort improvements and are readily available at no cost.[31] Both the CDC and OSHA address the need for testing for infection with *Mycobacterium tuberculosis* at an interval consistent with job risk.[9]

Presenteeism, or coming to work when ill, represents a risk to patients and others, and should not occur. Some specific health conditions that should cause nurses to question their ability to provide safe care includes presence of fever with or without cough, vomiting or diarrhea, rash or skin lesions, and draining wounds or skin eruptions.[5]

Follow the roadmap to prevent infection

Some nurses may be tempted to discount CDC guidelines thinking they're geared primarily toward acute care settings. In reality, the guidelines focus on development of infection based upon risk and are applicable to every healthcare setting. The basic messages in these guidelines include performance of hand hygiene, early and rapid removal of invasive devices once no longer necessary, engagement of family members and caregivers, and training of healthcare providers. It's the responsibility of individual healthcare professionals to use the elements of basic infection prevention practice and develop a personal competency evaluation and a related professional development plan.

The first and best step involves a personal decision and acceptance of professional responsibility. The roadmap for improved infection prevention practice begins with you. ■

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