



HHS Public Access

Author manuscript

Nursing. Author manuscript; available in PMC 2018 December 12.

Published in final edited form as:

Nursing. 2018 August ; 48(8): 28–29. doi:10.1097/01.NURSE.0000544318.36012.b2.

Infection Prevention and Control Core Practices: A Roadmap for Nursing Practice

Ruth M Carrico, PhD DNP FSHEA CIC^[1], Hudson Garrett, PhD MPH FNP-BC^[1], Dawn Balcom, DNP APRN^[1], Janet Burton Glowicz, PhD RN, MPH, CIC, FAPIC^[2]

¹-University of Louisville Global Health Center, Division of Infectious Diseases, University of Louisville School of Medicine, Louisville, KY

²-Centers for Disease Control and Prevention, Division of Healthcare Quality Promotion, Prevention and Response Branch, Contractor, Northrop Grumman Corporation, Atlanta, GA

Abstract

In 2017, the CDC released a set of Core Practices focusing on infection prevention and control relevant for care delivered in all settings. These eight Core Practices address foundational elements of practice and should be embedded into every aspect of nursing care and part of every nurse's professional development plan.

Introduction

Again, and for the sixteenth year in a row, nurses have been recognized by the general public as the most trusted profession in the country as shown by the December 2017 Gallup Poll results [1]. The value of ethics and integrity continue to be recognized and appreciated by those we serve-- our patients and their families. Our communities depend on us to give them our best, every shift, every day, and with every encounter. Healthcare is undoubtedly in crisis in both access to and quality of care. As nurses, it is 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 in the area of infection prevention and control. Episodes of pathogen transmission in healthcare settings as well as emergence of organisms resistant to antibiotics used to treat them are demonstrations of the challenges that exist in this alignment.

The Centers for Disease Control and Prevention (CDC) has recognized, and continues to stress, the urgent issue of increasing resistance of microorganisms to the few remaining drugs we have available to treat them [2]. In fact, the CDC has recently joined forces with the American Nurses Association (ANA) to bring awareness to this issue and the

Corresponding Author Ruth M Carrico PhD DNP FNP-C FSHEA CIC, Associate Professor, University of Louisville Global Health Program, Division of Infectious Diseases, University of Louisville School of Medicine, 501 E Broadway, Suite 140C, Louisville, KY USA, 40202, Phone: 502-852-6485, ruth.carrico@louisville.edu.

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Use of trade names is for identification only and does not imply endorsement by the Public Health Service or by the U.S. Department of Health and Human Services.

importance of safeguarding our remaining antibiotics through a more effective approach that prevents inappropriate use and stresses infection prevention. Further, a partnership between the CDC, ANA, and 20 professional nursing organizations has resulted in the Nursing Infection Control Education (NICE) Network [3]. The goal of this collaboration is to improve adherence to infection prevention practices through the provision of enhanced infection prevention control training. These partnerships are but a few examples of the work being done to address the fundamental issues of safe care practice. Success involves the performance of patient care using the basic or core practices that prevent movement of microorganisms between patients, healthcare personnel, and the environment. These actions work to prevent transmission of microorganisms and ultimately prevent development of the infection. Simply said, without movement of microorganisms to the patient, the need to treat a resultant infection is greatly reduced or even eliminated. As nurses are leaders in healthcare in virtually every healthcare setting, it is incumbent upon us to recognize and respond to deviations from best practice and actively work to address that gap. Our job, as the most trusted healthcare worker, is to ensure that every patient receives safe care, every time care is provided. This is our responsibility, our promise, and our covenant with our patients.

In 2014, work began by members of the CDC Healthcare Infection Control Practices Advisory Committee aimed at summarizing the basic, or core, practices identified as critical for the prevention of infection associated with healthcare. These practices, included and described in sixteen current CDC guidelines, focus on those practices and interventions that are recognized as being important to safe patient care. All are relevant to care provided by healthcare workers in any setting where care is delivered. Following extensive review, *Core Infection Prevention and Control Practices for Safe Healthcare Delivery in All Settings* was published [4].

The aims of this paper are to highlight those core infection prevention and control practices and link to the work performed by every nurse, and performed under the direction of every nurse, in every setting where care is delivered.

Practice Implications

The ability to put knowledge into action is one way to define competence. *Core Infection Prevention Control Practices for Safe Healthcare Delivery in All Settings* [4], is organized into eight distinct, yet interrelated, infection prevention and control domains. A list of Core Practices is shown in Table 1. The first four domains relate to the organizational infrastructure needed for nurses to sustain successful implementation of the Core Practices. These underlying elements include 1) support from leadership, 2) education and training about infection prevention, 3) patient, family and caregiver education, and 4) performance monitoring and feedback. Action oriented Core Practices that are applicable to nurses and all healthcare personnel in all settings include 5) standard precautions, 6) transmission-based precautions 7) use of temporary invasive medical devices and 8) occupational health. Each of these eight domains will be described below with specific implications to nursing practice.

Core Practices

1. Leadership Support [5–16]

Nurses at all levels are leaders in healthcare. 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. Senior leaders should also ensure that personnel charged with implementing the infection prevention program are appropriately educated, with infection prevention specific education. These individuals need the support of leaders to empower them with authority that ensures the effectiveness of the program.

Leadership does not emerge solely from the executive level. It should be evident in the practice of every nurse and demonstrated through the care they provide. Nurses leading teams in the provision of care are role models for other nurses and other disciplines. To that end, the ability for nurses to lead practice change and improve care for all patients cannot be overemphasized. Nurses must be empowered to act and respond to the needs of patients and must also be empowered to lead change among coworkers and other team members. Leadership involves continuous evaluation of practice and implementation of practice change in order to achieve the level of quality that is expected. If leadership development is needed, it is the responsibility of the nurse to include that in his/her individual performance development plan and take steps to achieve that plan.

2. Education and training of healthcare personnel on infection prevention [5–8, 10–12, 14–17]

Ongoing education and training are an irrefutable element of nursing practice. Assessment of areas of practice where performance does not meet expectations should be targeted for improvement and should then be part of a professional development plan for every nurse. It is important to have knowledge regarding specific practice issues, but it is even more important to 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. Competence is defined as the ability to apply knowledge in practice, and specific competencies focusing on hospital-based healthcare workers have been proposed [18]. Importantly, those same competencies are relevant to care provided in any setting and can be used to form a basis for a facility education and training program emphasizing infection prevention [18].

3. Patient, family and caregiver education [6–9, 11–12, 14–15]

Preventing infection requires engagement of the patient, their families and caregivers, as well as other healthcare personnel. Patients must be empowered and enabled to perform self-care in a way that minimizes preventable harm. Often they rely upon their family members and others for assistance. Patient engagement begins with shared information, an assessment of their ability to perform desired tasks, ensuring they have the ability to perform those tasks, evaluation of that performance, and feedback regarding improvement. In addition, information and training methods must recognize both language and health literacy capabilities and barriers. An example of an activity central to preventing transmission of

infection is hand hygiene. Teaching patients to cleanse their hands and enabling family members to help them perform this simple task can provide a number of secondary benefits. One of those benefits is performance of hand hygiene by new groups of individuals (families or visitors) who are then less able to be involved in contamination of the environment or movement of microorganisms from the environment to their patient loved ones.

4. Performance monitoring and feedback [5–17,19]

Most every nurse has been involved in an individual evaluation of his or her performance. A primary goal of performance evaluation is to enable improvement by identifying areas of strength and weakness. Without objective and informative input, it is difficult to improve performance in patient care. Nurses must be actively engaged in the monitoring of performance at all levels. Checklists, observations, collaborative rounds and timely feedback to all that are part of the care team are examples of activities critical to improvement strategies. Evaluation of performance should be sought and feedback used to perform reflection and practice change.

5. Standard precautions [20]

Standard precautions are foundational practices for preventing the movement of pathogens during the course of care. Nurses appropriately using Standard Precautions assume that all patients may be infected or colonized with an organism that could be spread in the healthcare setting. Emphasis on blood borne pathogens by the Occupational Safety and Health Administration Bloodborne Pathogens Standard [20], 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 implementation of steps to prevent movement of those organisms. Essential elements of Standard Precautions include the following core practice elements: 1) hand hygiene, 2) environmental cleaning and disinfection, 3) injection and medication safety, 4) risk assessment with appropriate use of personal protective equipment, 5) minimizing potential exposures, and 6) reprocessing of reusable medical equipment.

We protect ourselves and our patients from contact by recognizing how microorganisms are spread and using appropriate protection during all patient encounters. Healthcare personnel and patients are exposed to microorganisms during the course of care. These microorganisms are present in the patient care environment, and blood borne pathogens like HIV, and Hepatitis B and C may persist in the blood and body fluids of asymptomatic patients. Therefore, we must have, as part of our routine practice, strategies that keep us from ever coming into unprotected contact with a patient's body fluid, not just those we have previously recognized as potentially infectious [21]. We want to avoid any opportunity for pathogen movement that may ultimately be responsible for causing illness in ourselves, or transmission to the patient, their family or visitors who trust us to protect them.

5a. 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 handwash or with

an alcohol-based hand rub. Both CDC and the World Health Organization (WHO) have published guidelines [7,22] that define the important steps, including how and when to clean hands. For nurses, as well as all other healthcare personnel, it is important that there be clear knowledge regarding who performs hand hygiene, when it should be performed, how it should be performed, under what conditions, and with which products. A required outcome of practice is that no patient is touched by a nurse, or a member of their care team, if their hands have not been properly cleansed. Nurses must be able to recognize risk for cross contamination. This means cleansing hands must occur between touches involving the patient and when the touch involves their care environment. Examples include 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 be ready to respond appropriately to ensure that every interaction with a patient is performed by someone whose hands are not carrying organisms to them, to equipment used in their care, medication administered to them, or to the environment that surrounds them. Since nurses are the quintessential patient advocate, this also means we must hold all healthcare personnel accountable for their own hand hygiene practice. Protecting the safety of the patient may mean that we intervene before another healthcare personnel touches a patient without performing appropriate hand hygiene.

5b. Environmental cleaning and disinfection.—Evidence continues to mount showing that the clinical care environment is a key component in enabling or facilitating transmission of pathogens. When touched, contaminated environmental items and surfaces result in contamination of the hands of nurses and other healthcare personnel. They, in turn, are able to move microorganisms to patients, other surfaces or items, and even themselves. Surfaces, furniture, and equipment in patient rooms must be regularly cleaned and disinfected using agents that are approved by the Environmental Protection Agency (EPA) for use in healthcare settings [17]. This includes attention to all monitoring equipment as well as cords and cables, and mobile items such as bedside commodes, wheelchairs, blood glucose monitors, infusion pumps, and any other item moved from one patient room or area to another. Ensuring collaborative efforts between nursing and environmental services is key to achieving the level of environmental cleanliness necessary for patient safety. In addition, the nurse must be aware of microorganisms that are particularly challenging with respect to environmental contamination (e.g., *Clostridium difficile*) and be prepared to communicate and work with environmental services personnel to ensure proper attention. Further, leadership from the nurse is vital in recognizing risks that may be present in the clinical care environment and prompting rapid action and resolution. Examples include practice deviations involving construction barriers or failure in point of care equipment cleaning and disinfection. This demonstrates that the network of team members is expansive and includes a number of other partners beyond environmental services such as clinical engineering, plant operations or facilities management, central sterile processing, and the clinical laboratory.

5c. Injection and Medication Safety.—Numerous outbreaks have been identified in United States healthcare facilities related to unsafe injection practices. These have included reuse of syringes [23] sharing of insulin pens and blood glucose monitoring equipment

[24], reuse of medication vials [25], and administration of contaminated medication that has been diluted or compounded [26,27], just to name a few. The concept of one needle, one syringe, one patient, one time, has been a focus of large scale CDC education campaigns and alerts. However, without an understanding of the conceptual basis as to how organisms can be transmitted during medication preparation and administration, injection, and sharp device use, outcomes like these will continue to plague our patients. As nurses have a major role in medication administration, they must be competent in all aspects of its preparation, handling, and administration as well as all supplies and equipment used for injection or puncture. They must also be expert in identifying 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 be used to assess existing safe injection practice, a free application is available from the Apple® App Store entitled “Safe Injection Practices”.

5d. Risk assessment with appropriate use of personal protective equipment.

—Standard Precautions requires personnel to consider the type of activity in which he/she will engage, select the appropriate type and level of personal protective equipment (PPE) to prevent exposure to microorganisms, use that PPE correctly, remove it in a way to prevents self-contamination, then disposal in appropriate types of waste receptacles. The use of PPE must not be restricted solely to patients with known pathogens. For example, donning of gowns, gloves, masks and eye protection may be warranted when extubating mechanically ventilated patients, as it may be reasonable to anticipate that an exposure to respiratory secretions will occur as the patient coughs upon removal of the device. Using personal protective equipment (PPE) as a barrier between the nurse and the patient or the contaminated environment is addressed in regulatory standards by OSHA [20] as well as CDC recommendations [11]. Use of PPE includes a full range of activities and competencies including the ability to select, put on, wear, take off, and dispose of the protective items. When done correctly, these critical actions serve to protect the nurse wearing the item, the patient who may be inadvertently contaminated had the nurse not used PPE correctly, the environment, and other coworkers or visitors. Nurses may not recognize or understand these differences and why they exist, so ensuring that education and training are part of PPE use is critical to ensure applicable and reliable infection prevention practice. Familiarity 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]. Further, nurses are responsible for ensuring the safety of their patients so they must be well versed in PPE use in order to ensure proper technique and practice used by others who may come into contact with those patients or their clinical care environment.

5e. Minimizing potential exposures—There are specific activities the nurse should use to minimize opportunities for exposure to patient body fluids. In addition to the selection and use of PPE as previously described, additional actions such as the use of respiratory hygiene, cough etiquette, 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 as actions that contain respiratory secretions through use of 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, immediate access to products that can be used to cleanse hands, and instructional signage that can be used by healthcare personnel, patients, and visitors [11]. An additional practice that can minimize exposure 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.

5f. Reprocessing reusable medical equipment between each patient and when soiled—Maintaining a clear separation of clean from dirty, whether it involves medical equipment, or during processes of care, are examples of aseptic techniques [10]. Examples of aseptic technique involving reusable medical equipment familiar to nurses is ensuring that those pieces of equipment no longer needed by a particular patient are quickly removed from the patient care area, sequestered in preparation for reprocessing, and sent for decontamination, cleaning and disinfection prior to reuse. This principle is also applied in medication rooms where soiled items are to always be restricted from entering those areas. Specific actions nurses must take that recognize the risks associated with shared equipment include: 1) rapid removal of items from the patient care environment when no longer necessary; 2) sequestering of used equipment so it cannot inadvertently be used by another patient until it has been decontaminated, cleaned and disinfected; and 3) prompt cleaning and disinfection prior to reuse by another patient. In addition, mobile patient care equipment such as glucose meters 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.

6. Transmission-based precautions

Standard Precautions should be the foundation for patient interactions as it provides 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 is 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 personal protective equipment, 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, identification of barriers to appropriate use of isolation and protective equipment, and education that corrects errors in practice and reinforces safety. Nurses must be aware of isolation precautions used within settings where they practice so they can adhere with those precautions and assist others to do the same. Further, nurses must continually be aware of barriers to implementation of protective strategies (e.g., interruption in access to supplies, changes in the physical environment, access to sinks, lack of resources) so those barriers can be addressed [10,11].

7. Temporary invasive medical devices for clinical management

The presence of an invasive device represents risk to the patient and the need for each individual device should be part of regular nursing assessment. Any invasive device should carry a treatment or diagnostic benefit that exceeds its risk. For example, an indwelling urinary catheter may be necessary for intake and output monitoring during an acute phase of care, but once that phase has passed the patient should be assessed to determine if that device is truly 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 (e.g., a patient with urinary incontinence with an indwelling urinary catheter 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 that may serve to prevent an avoidable infection.

8. Occupational Health

As the person most trusted by patients and the general public, nurses must demonstrate and acknowledge that trust through a devotion to primary disease prevention. CDC has clearly articulated the list of vaccine-preventable diseases for which healthcare personnel should be immune. These include rubeola (measles), mumps, rubella, hepatitis B, and varicella. CDC also emphasizes the need for receipt of one dose of Tdap for pertussis prevention and annual influenza vaccination [29]. Other vaccines may also be appropriate, such as meningococcal vaccine, for those working in laboratory settings or other environments with recognized exposure risks. The Occupational Safety and Health Administration (OSHA) has mandated that healthcare personnel must be provided with the opportunity to be vaccinated against Hepatitis B, at no cost [20]. Both CDC and OSHA address the need for testing for infection with *Mycobacterium tuberculosis* at an interval consistent with job risk [9]. Another personal health issue relevant to nursing practice involves reporting to work when ill. 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 the nurse to question his/her 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 interruptions [5].

Conclusion

There may be a temptation to discount CDC guidelines, thinking that they are geared only to, or primarily toward, acute care settings. In reality, the focus of those guidelines is on development of infection based upon risk and are therefore applicable for use in every setting where healthcare is delivered. The basic messages embedded in CDC guidelines include performance of hand hygiene, early and rapid removal of devices once no longer necessary, engagement of family members and caregivers, and training of healthcare providers are applicable, regardless of the setting. It therefore becomes the responsibility of the individual healthcare personnel to use the elements of basic infection prevention practice and develop a personal competency evaluation and a related professional development plan. That plan may include activities such as targeted education, honing of existing skill sets, implementation of new knowledge, and exploration of how to accomplish local change by pulling together teams. Those whose job responsibilities involve education,

training, competence assessment, and performance monitoring may also use *Core Infection Prevention and Control Practices for Safe Healthcare Delivery in All Settings* to develop a step-by-step approach for all healthcare personnel that aligns with job responsibilities.

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

References

1. Brennan M Nurses Keep Healthy Lead as Most Honest, Ethical Profession. 2017. Available from http://news.gallup.com/poll/224639/nurses-keep-healthy-lead-honest-ethical-profession.aspx?g_source=CATEGORY_SOCIAL_POLICY_ISSUES&g_medium=topic&g_campaign=tiles
2. Centers for Disease Control and Prevention (2014). Get Smart: Know When Antibiotics Work. Available from <https://www.cdc.gov/getsmart/healthcare/>.
3. American Nurses Association (2017). Nursing Infection Control Education (NICE) Network. Available from <http://www.nursingworld.org/MainMenuCategories/WorkplaceSafety/Healthy-Work-Environment/InfectionPreventionControlEducation>
4. Centers for Disease Control and Prevention (2017). Core infection prevention and control practices for safe healthcare delivery in all settings. Recommendations of the Healthcare Infection Control Practices Advisory Committee. Available from <https://www.cdc.gov/hicpac/pdf/core-practices.pdf>
5. Bolyard EA, Tablan OC, Williams WW, Pearson ML, Shapiro CN, Deitchmann SD Guideline for Infection Control in Healthcare Personnel, 1998. Hospital Infection Control Practices Advisory committee. Infect Control Hosp Epidemiol. 1998 Jun; 19(6):407–63. Available from <http://www.cdc.gov/hicpac/pdf/infectcontrol98.pdf> [PubMed: 9669622]
6. Mangram AJ, Horan TC, Pearson ML, Silver LC, Jarvis WR. Guideline for Prevention of Surgical Site Infection, 1999. Hospital Infection Control Practices Advisory committee. Infect control Hosp Epidemiol 1999 Apr 20(4):250–78. Available from http://www.cdc.gov/hicpac/pdf/guidelines/SSI_1999.pdf [PubMed: 10219875]
7. Boyce JM, Pittet D, Healthcare Infection Control Practices Advisory Committee, Society for Healthcare Epidemiology of America, Association for Professionals in Infection control, Infectious Diseases Society of America, Hand Hygiene Task Force. Guideline for Hand Hygiene in Health-Care Settings: recommendation of the Healthcare Infection Control Practices Advisory committee and the HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force. Infect control Hosp Epidemiol. 2002 Dec 23(12 Suppl):S3–40. Available from <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5116a1.htm> [PubMed: 12515399]
8. Schulster L, Chin RY, Healthcare Infection Control Practices Advisory Committee. Guidelines for Environmental Infection Control in Health-Care Facilities. Recommendations of CDC and the Healthcare Infection Control Practices Advisory Committee. MMWR Recomm Rep 2003 Jun 6:52(RR-10):1–42. Available from http://www.cdc.gov/hicpac/pdf/guidelines/eic_in_hcf_03.pdf
9. Jensen PA, Lambert LA, Iademarco MF, Ridzon R. Guidelines for Preventing the Transmission of Mycobacterium tuberculosis in Health-Care Settings, 2005. MMWR Recomm Rep. 2005 Dec 30:54(RR-17):1–141. Available from <http://www.cdc.gov/mmwr/pdf/rr/rr5417.pdf>
10. Siegel JD, Rhinehart E, Jackson M, Chiarello L, Healthcare Infection Control Practices Advisory Committee. Management of Multidrug-Resistant Organisms in Healthcare Settings, 2006. Am J Infect control, 2007 Dec 35 (10 Suppl 2):S165–93. Available from <http://www.cdc.gov/hicpac/pdf/MDRO/MDROGuideline2006.pdf> [PubMed: 18068814]
11. Siegel JD, Rhinehart E, Jackson M, Chiarello L, Healthcare Infection Control Practices Advisory Committee. 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings. Am J Infect control. 2007 Dec 35(10 Suppl 2):S65–164. Available from <http://www.cdc.gov/hicpac/pdf/isolation/Isolation2007.pdf> [PubMed: 18068815]
12. Gould CV, Umscheid CA, Agarwal RK, Kuntz G, Pegues DA, Healthcare Infection Control Practices Advisory Committee, Guideline for Prevention of Catheter-Associated Urinary Tract

- Infection 2009. Infect control Hosp Epidemiol, 2010 Apr 31(4):319–26. Available from <http://www.cdc.gov/hicpac/pdf/CAUTI/CAUTIguideline2009final.pdf> [PubMed: 20156062]
13. Centers for Disease Control and Prevention. Guidance for Control of Infections with Carbapenem-Resistant or Carbapenemase-Producing Enterobacteriaceae in Acute Care Facilities. MMWR 2009 Mar 20;58 (10):256–60. Available from <http://www.cdc.gov/hai/pdfs/cre/cre-guidance-508.pdf>
 14. Division of Viral Disease, National Center for Immunization and Respiratory Diseases, Centers for Disease Control and Prevention. Updated Norovirus Outbreak Management and Disease Prevention Guidelines. MMWR 2011 Mar 4;60(RR-3):1–18. Available from <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr6003a1.htm>
 15. O’Grady NP, Alexander M, Burns LA, Dellinger EP, Garland J, Heard SO, Lipsett PA, Masur H, Mermel LA, Pearson ML, Raad I, Randolph AG, Rupp ME, Saint S, Healthcare Infection Control Practices Advisory Committee. Guidelines for the Prevention of Intravascular Catheter-Related Infections. Am J Infect Control. 2011 May 39(4 Suppl 1):S1–34. Available from <http://www.cdc.gov/hicpac/pdf/guidelines/bsi-guidelines-2011.pdf> [PubMed: 21511081]
 16. Centers for Disease Control and Prevention. Guide to Infection Prevention for Outpatient Settings: Minimum Expectations for Safe Care. November, 2015. Available from <https://www.cdc.gov/infectioncontrol/pdf/outpatient/guide.pdf>
 17. Rutala WA, Weber DJ, Healthcare Infection Control Practices Advisory committee. Guideline for Disinfection and Sterilization in Healthcare Facilities, 2008. Available from http://www.cdc.gov/hicpac/pdf/guidelines/disinfection_nov_2008.pdf
 18. Carrico R, Rebmann T, English JF, Mackey J, Cronin. (2008). Infection prevention and control competencies for hospital-based health care personnel. American Journal of Infection Control. 2008 Dec; 36(10):691–701. [PubMed: 19084164]
 19. Tablan OC, Anderson LJ, Besser R, Bridges C, Haijeh R, Healthcare Infection Control Practices Advisory Committee. Guidelines for preventing health-care-associated pneumonia, 2003 recommendations of the CDC and the healthcare Infection Control Practices Advisory Committee. MMWR Recomm Rep 204 Mar 26;53(RR-3):1–26. Available from <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5303a1.htm>
 20. US Department of Labor. Occupational Safety & Health Administration. 29 CFR 1910.1030 Bloodborne Pathogens. March 6, 1992. Available from https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_id=10051&p_table=STANDARDS
 21. Chughtai AA, Barnes M, Macintyre CR. (2016). Persistence of Ebola virus in various body fluids during convalescence: evidence and implications for disease transmission and control. Epidemiol Infect, 144(8):1652–1660. [PubMed: 26808232]
 22. World Health Organization. WHO Guidelines on hand Hygiene in Health Care: First Global Patient Safety Challenge Clean Care Is Safer Care. Geneva. World health Organization, 2009. Available from http://whqlibdoc.who.int/publications/2009/9789241597906_eng.pdf
 23. Fischer GE, Schaefer MK, Labus BJ, Sands L, Rowley P, Azzam IA, et al. Hepatitis C Virus Infections from Unsafe Injection Practices at an Endoscopy Clinic in Las Vegas, Nevada, 2007–2008. CID 2010;51:267–273.
 24. Thompson ND, Perz JF, Moorman AC, Holmberg SD. Nonhospital Health Care-Associated Hepatitis B and C Virus Transmission: United States, 1998–2008. Ann Intern Med 2009;150:33–39. [PubMed: 19124818]
 25. Groshkopf LA, Roth VR, Feikin DR, Arduino MJ, Carson LA, Tokars JI, et al. *Serratia liquefaciens* Bloodstream Infections from Contamination of Epoetin alfa at a Hemodialysis Center. NEJM 2001;344:1491–1497. [PubMed: 11357151]
 26. Vasquez AM, Lake J, Ngai S, Halbrook M, Vallabhaneni S, Keckler MS, et al. (2016). Notes from the Field: Fungal Bloodstream Infections Associated with a Compounded Intravenous Medication at an Outpatient Oncology Clinic—New York City, 2016. MMWR Morb Mortal Wkly Rep 65:1274–1275. [PubMed: 27855144]
 27. Ross K, Mehr J, Carothers B, Greeley R, Benowitz I, McHugh L, Henry D, et al. Outbreak of Septic Arthritis Associated with Intra-Articular Injections at an Outpatient Practice—New Jersey, 2017. MMWR Morb Mortal Wkly Rep 2017;66:777–779. Available from 10.15585/mmwr.mm6629a3 [PubMed: 28749922]

28. ANSI/AAMI:PB70:2012. (2012). Liquid barrier performance and classification of protective apparel and drapes intended for use in healthcare facilities, Association for the Advancement of Medical Instrumentation, Arlington VA.
29. Centers for Disease Control and Prevention. Immunization of health-care personnel: recommendations of the Advisory committee on Immunization practices (ACIP). *MMWR Recomm Rep*. 2011 Nov 25;60(RR-7):1–45. Available from <http://www.cdc.gov/mmwr/pdf/rr/r6007.pdf>

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 1.

Categories of Core Infection Prevention and Control Practices for Safe Healthcare Delivery in All Settings

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
a) Hand Hygiene
b) Environmental Cleaning and Disinfection
c) Injection and Medication Safety
d) Risk Assessment with Appropriate Use of Personal Protective Equipment
e) Minimizing Potential Exposures
f) Reprocessing of Reusable Medical Equipment
6. Transmission Based Precautions
7. Temporary Invasive Medical Devices for Clinical Management
8. Occupational Health

Centers for Disease Control and Prevention (2017). Core infection prevention and control practices for safe healthcare delivery in all settings. Recommendations of the Healthcare Infection Control Practices Advisory Committee. Available from <https://www.cdc.gov/hicpac/pdf/core-practices.pdf>

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript