



# Infection prevention in outpatient oncology settings

CDC offers tools to fight back against infections among cancer patients.

BY ALICE Y. GUH, MD, MPH, LISA C. RICHARDSON, MD, MPH, AND ANGELA DUNBAR, BS

**D**espite advances in oncology care, infections remain a major cause of morbidity and mortality among cancer patients.<sup>1-3</sup> Several factors predispose cancer patients to developing infections, including immunosuppression from their underlying cancer and chemotherapy treatment. Frequent contact with healthcare settings may expose them to other patients with transmissible infections. Patients with cancer often require the placement of long-term intravascular devices, such as implanted ports, to provide ease with chemotherapy infusion. However, these devices can provide direct portal-of-entry for microorganisms to enter the bloodstream if they are not appropriately disinfected prior to access. Thus, careful attention to proper infection prevention practices is essential to the care of cancer patients to minimize their risks for infectious complications.

In recent decades, the vast majority of oncology services have shifted from inpatient to outpatient settings. Each year nearly 650,000 patients with cancer receive outpatient chemotherapy.<sup>4</sup> However, not all outpatient facilities maintain regular access to infection prevention expertise or have dedicated infection prevention policies for patient protection.

Furthermore, unlike acute care hospitals, there is limited federal and state regulatory oversight of many outpatient settings, including outpatient oncology facilities. As a result, many outpatient facilities are not routinely inspected for infection prevention practices.

Breaches in basic infection prevention practices have resulted in a number of outbreaks

The image shows a brochure titled "The Three Steps" from the website www.preventcancerinfections.org. It is divided into three main sections: 1. PREPARE: Watch Out for Fever!, 2. PREVENT: Clean Your Hands!, and 3. PROTECT: Know the Signs and Symptoms of an Infection! Each section includes "When?" and "Why?" sub-sections with detailed instructions and warning signs. At the bottom, there is an "Emergency Number Card" with fields for doctor's daytime and after-hours numbers, and a list of instructions on when to call the doctor. The card also includes the website URL and a note to carry the card with one at all times.

The Three Steps Brochure was created for cancer patients and caregivers to help increase awareness about the importance of infection prevention.

IMAGE COURTESY CDC/[WWW.PREVENTCANCERINFECTIONS.ORG](http://WWW.PREVENTCANCERINFECTIONS.ORG).

involving outpatient oncology settings. For example, in a Nebraska oncology clinic, syringe reuse to access saline bags shared among multiple patients led to the transmission of hepatitis C virus to at least 99 cancer patients, resulting in one of the largest healthcare-associated outbreaks of viral hepatitis.<sup>5</sup> Similar lapses in injection safety (e.g., reusing single-dose vials on multiple patients, storing prefilled saline flush syringes for later use) have also been implicated in outbreaks of bacterial bloodstream infections among cancer patients.<sup>6-8</sup> Other identified lapses have included poor hand hygiene, suboptimal disinfection of injection caps (e.g., needleless connectors) prior to accessing central lines, and inadequate environmental conditions for chemotherapy preparation.

To help combat this public health challenge, CDC launched its *Preventing Infections in Cancer Patients* campaign in October 2011. This public health program offers healthcare providers, patients, and families a set of user-friendly resources designed to help reduce the risk of life-threatening infections during a cancer patient's treatment. Each of these tools is described in more detail in the following sections.

#### BASIC INFECTION CONTROL AND PREVENTION FOR OUTPATIENT ONCOLOGY SETTINGS (BICAPP)

The BICAPP ([www.cdc.gov/hai/pdfs/guidelines/basic-infection-control-prevention-plan-2011.pdf](http://www.cdc.gov/hai/pdfs/guidelines/basic-infection-control-prevention-plan-2011.pdf)) can be used by any outpatient oncology facility to standardize and improve infection prevention practices. The document is based on the CDC's evidence-based guidelines as well as relevant guidelines from professional societies and is tailored for quick implementation in outpatient oncology facilities. **It includes key policies and procedures that will ensure a facility meets or exceeds minimal expectations of patient safety.** The main components of the plan include the following:

**EDUCATION AND TRAINING.** All facility staff should receive appropriate education and training in infection prevention during orientation as well as annually and any time policies change. Competency evaluations of facility staff should be regularly conducted to



BICAPP can be used by any outpatient oncology facility to standardize and improve infection prevention practices. IMAGE COURTESY THE CDC.

assess adherence to recommended infection prevention practices.

**At Your Fingertips:** A list of names of designated personnel and their specific roles and tasks and contact information that can be tailored to your facility is provided as an appendix.

**SURVEILLANCE AND REPORTING.** Routine surveillance of infections (e.g., bloodstream infections) and process measures related to infection prevention practices (e.g., hand hygiene) should be conducted for outbreak detection and improvement of healthcare practices. Facility staff should also be aware of and adhere to local, state, and federal requirements for reportable diseases and outbreak reporting.

**At Your Fingertips:** The BICAPP contains an appendix where a facility can insert a list of reportable disease/conditions specific to their state and the appropriate contact information for their local and state health authorities.

**STANDARD PRECAUTIONS.** All facility staff should adhere to Standard Precautions, which include: 1) hand hygiene; 2) use of personal protective equipment (e.g., gloves, gowns, facemasks) depending on the anticipated exposures; 3) respiratory hygiene and cough etiquette; 4) safe injection practices, including appropriate medication

storage and handling; and 5) safe handling and cleaning/disinfection of potentially contaminated equipment or surfaces in the patient environment. Procedures for each component of Standard Precautions are detailed in the BICAPP. For example, as part of respiratory hygiene, triaging of patients upon entry to the facility should be performed, especially during periods of increased community respiratory virus activity, to prevent spread of respiratory infections among clinic patients. Safe injection practices that are relevant to oncology facilities include appropriate preparation and handling of saline and heparin syringes for flushing central lines.

#### TRANSMISSION-BASED PRECAUTIONS.

Implementation of additional precautions, such as Contact Precautions, Droplet Precautions, and Airborne Precautions, may be warranted in certain situations and should be applied based on a patient's history and symptoms.

**CENTRAL VENOUS CATHETERS.** When accessing a patient's central line for infusions and blood draws, all facility staff should use

**OUT OF SIGHT, OUT OF MIND...  
NOT THIS TIME!**

*Did you know?*  
**One of the most dangerous side effects of chemotherapy cannot be seen?**

That's right, a low white blood cell count, or neutropenia, puts cancer patients at a higher risk for getting an infection.

An infection in people with cancer is an emergency. Be prepared, and remember the following three things during chemotherapy:

1. Treat a fever as an emergency, and call your doctor right away if you develop a fever.
2. Find out from your doctor when your white blood cell count will be the lowest because this is when you are most at risk for infection.
3. If you have to go to the emergency room, it's important that you tell the person checking you in that you have cancer and are receiving chemotherapy; if you have an infection you should not sit in the waiting room for a long time. Infections can get very serious in a short amount of time.

Learn more at: [www.cdc.gov/cancer/preventinfections](http://www.cdc.gov/cancer/preventinfections)

National Center for Chronic Disease Prevention and Health Promotion  
Division of Cancer Prevention and Control  
Made possible by a CDC Foundation partnership with Amgen

The Out of Sight, Out of Mind poster alerts both providers and consumers that patients undergoing chemotherapy are at a higher risk of developing infections. IMAGE COURTESY CDC/[WWW.PREVENTCANCERINFECTIONS.ORG](http://WWW.PREVENTCANCERINFECTIONS.ORG).

## EMERGENCY ROOM PERSONNEL

A fever in cancer patients may be more than meets the eye.

This is especially true for a cancer patient undergoing chemotherapy who develops a fever.

Get the full picture about people with cancer who are receiving chemotherapy.

If they have a fever, remember—

1. A fever may be the only sign of infection and should be treated as an emergency.
2. Developing an infection is a life-threatening complication.
3. A minor infection can turn serious fast. Quick action can save a life.



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Intended for healthcare personnel, the Emergency Room Personnel poster increases awareness of the dangers of fevers in cancer patients.

IMAGE COURTESY CDC/[WWW.PREVENTCANCERINFECTIONS.ORG](http://WWW.PREVENTCANCERINFECTIONS.ORG).

aseptic technique, including scrubbing the access port with an appropriate antiseptic agent. Additional maintenance and access procedures, such as changing catheter site dressing and injection caps, are outlined in the BICAPP for various types of central lines. **At Your Fingertips:** The appendix provides a list of relevant resources, including the United States Pharmacopeia (USP) Chapter <797> *Guidebook to Pharmaceutical Compounding—Sterile Preparations*. All oncology facilities that provide on-site chemotherapy preparation should follow USP guidance in consultation with the state pharmacy board.

**At Your Fingertips:** The BICAPP also includes the CDC Infection Prevention Checklist for Outpatient Settings that can be tailored by an outpatient oncology facility to systematically assess personnel adherence to recommended infection prevention practices.


## INTERACTIVE WEBSITE FOR CANCER PATIENTS AND CAREGIVERS TO PREVENT INFECTIONS

While the BICAPP is a resource for healthcare providers, the *Preventing Infections in*

*Cancer Patients* campaign also created an educational tool for patients and their caregivers that addresses one of the most common and potentially deadly side effects in patients receiving chemotherapy treatments: neutropenia (low white blood cell count).

Patients with neutropenia are more susceptible to bacterial infections. Their risk for acquiring a life-threatening infection increases progressively with both the duration and magnitude of neutropenia. The CDC used knowledge gained through formative research to tailor messages and launch a website aimed at helping cancer patients understand their risk for developing a low white blood cell count and steps they can take to lower their risk of infection when they are most vulnerable.

*Three Steps Toward Preventing Infections During Cancer Treatment* ([www.preventcancerinfections.org](http://www.preventcancerinfections.org)), is an evidence-based tool that assesses a cancer patient's risk for developing neutropenia during chemotherapy. After the assessment is completed, patients can receive downloadable information about how to help lower their risk for infection and keep themselves healthy while receiving chemotherapy. Educational information is available for everyone even if the assessment is not completed. The CDC hopes this information will lead cancer patients and caregivers to take actions to seek care if they develop this potentially life-threatening condition.

For more information, action steps, and tools to help reduce a cancer patient's risk of developing potentially life-threatening infections during chemotherapy treatment, please visit [www.cdc.gov/cancer/preventinfections](http://www.cdc.gov/cancer/preventinfections) or [www.preventcancerinfections.org](http://www.preventcancerinfections.org). 

## References

1. Kamboj M, Sepkowitz KA. Nosocomial infections in patients with cancer. *Lancet Oncol* 2009;10:589–597.
2. Maschmeyer G, Haas A. The epidemiology and treatment of infections in cancer patients. *Int J Antimicrob Agents* 2008;31:193–197.
3. Guinan JL, McGuckin M, Nowell PC. Management of health-care-associated infections in the oncology patient. *Oncology* 2003;17:415–420.
4. Halpern MT, Yabroff KR. Prevalence of outpatient cancer treatment in the United States: estimates from the Medical Panel Expenditures Survey (MEPS). *Cancer Invest* 2008;26:647–651.
5. Macedo de Oliveria A, White KL, Leschinsky DP, Beecham BD, Vogt TM, Moolenaar RL et al. An outbreak of hepatitis C virus infections among outpatients at a hematology/oncology clinic. *Ann Intern Med* 2005;142:898–902.

## AT YOUR FINGERTIPS: BASIC INFECTION CONTROL AND PREVENTION FOR OUTPATIENT ONCOLOGY SETTINGS (BICAPP)

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- A list of names of designated personnel and their specific roles and tasks and contact information that can be tailored to your facility is provided as an appendix.

6. Watson JT, Jones RC, Siston AM, Fernandez JR, Martin K, Beck E, et al. Outbreak of catheter-associated *Klebsiella oxytoca* and *Enterobacter cloacae* bloodstream infections in an oncology chemotherapy center. *Arch Intern Med* 2005;165:2639–643.
7. Abe K, Tobin D'Angelo M, Sunenshine R, Noble-Wang J, Cope J, Jensen B, et al. Outbreak of *Burkholderia cepacia* bloodstream infection at an outpatient hematology and oncology practice. *Infect Control Hosp Epidemiol* 2007; 28:1311–1313.
8. Kim MJ, Bancroft E, Lehnkering E, Donlan RM, and Mascola L. *Alcaligenes xylosoxidans* bloodstream infections in outpatient office. *Emerg Infect Dis* 2008;14:1046–1052.

Alice Y. Guh, MD, MPH, is with the Centers for Disease Control and Prevention's Division of Healthcare Quality Promotion in Atlanta, Georgia. Lisa C. Richardson, MD, MPH, is with the Centers for Disease Control and Prevention's Division of Cancer Prevention and Control in Atlanta, Georgia. Angela Dunbar, BS, is with the CDC Foundation in Atlanta, Georgia.