Infection Prevention in Outpatient Oncology Settings
Dr. Alice Guh, Centers for Disease Control and Epidemiology
A Webber Training Teleclass

Outline
- Review U.S. outbreaks associated with outpatient oncology care
- Outline recommended infection prevention practices for U.S. outpatient oncology settings
- Describe CDC tools for preventing infections among oncology patients

Shift in Healthcare Delivery to Outpatient Settings
- ~5000 outpatient oncology facilities in the United States
- >1 million U.S. patients with cancer receive outpatient chemotherapy and/or radiation each year
- Distribution of outpatient chemotherapy services among Medicare recipients:
  - 67% in physician offices
  - 24% in hospital-based outpatient settings
  - 9% in both settings

Concerns About Outpatient Care
- Expansion of services without proportionally expanded infection control oversight
  - Infection control practices vary greatly
  - Some facilities lack written infection control policies and procedures for patient protection
- Outpatient oncology settings are not routinely inspected for infection control practices
- Lack systematic surveillance to detect infections originating in outpatient settings

Oncology Patients: Risks for Infection
- Immunosuppression
  - Medications
  - Underlying disease
- Invasive long-term central lines
  - Essential: infusion of chemotherapy, blood draws
  - Provide direct portal-of-entry to bloodstream

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Example 1: Hepatitis C Virus Outbreak in Nebraska
- 2002 – gastroenterologist reported to state health department a cluster of 4 HCV infections
  - Patients who received care at single hematology/oncology clinic
  - All genotype 3a (rare)
- Health department conducted investigation
  - 615 patients notified to be tested for HCV
  - At least 99 patients with HCV identified
  - Lacked previous evidence of HCV infections
  - Genotype 3a in all available samples (n=95)

HCV Outbreak – Nebraska, 2002
Infection Control Assessment
- Nurse reused syringes to access saline bag for flushes
  - After syringes were used to withdraw blood from patients’ catheters
  - Patient recalled seeing blood in saline bag
- Saline bag used as common-source supply for multiple patients
  - Contaminated bag could have served up to 25-50 patients
- Breaches came to light in 2001, but never reported to public health authorities

Example 2: Hepatitis B Virus Outbreak in New Jersey
- 2009 – gastroenterologist reported to state health department 2 patients with acute HBV infection
  - No traditional risk factors
  - Both received care at same hematology/oncology clinic
- Freestanding hematology/oncology clinic
  - Small number of clinical staff
- State and local health department initiated investigation

Following the Nebraska HCV Outbreak: One Survivor’s Response

HCV Outbreak – New Jersey, 2009
Case-Finding
- 4600 patients notified to be tested
- At least 29 outbreak-associated HBV cases

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HCV Outbreak – New Jersey, 2009
Infection Control Assessment
Suboptimal hand hygiene and glove use

Use of saline bags as common-source supply

Storing opened single-dose vials for future use

Suboptimal chemotherapy preparation

HCV Outbreak – New Jersey, 2009
Infection Control Assessment
Blood Stain on Floor in Chemistry Room

Additional Actions
- Hematology/Oncology practice was closed
- Board of Medical Examiners suspended physician's license

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Example 3:
Outbreak of Pseudomonas aeruginosa and Klebsiella pneumoniae Bloodstream Infections – Mississippi, 2011

- July 2011 – local hospital reported to state health department a cluster of bloodstream infections among 4 patients:
  - P. aeruginosa with identical antimicrobial resistance patterns
  - 2 also with K. pneumoniae
  - All had received infusion at same outpatient cancer facility
- Freestanding cancer center
  - Single-physician owned, small number of staff
- State and local health department investigated

P. aeruginosa / K. pneumoniae Outbreak – MS, 2011
Case-Finding

- 16 patients with bloodstream infections with P. aeruginosa, K. pneumoniae, or both

P. aeruginosa / K. pneumoniae Outbreak – MS, 2011
Infection Control Assessment

- Unlicensed individual functioning in nurse role (infusing chemotherapy)
- Recent decision by facility to reuse heparin and saline syringes as cost savings measure
  - Directly reused syringes between patients; discarded only when blood visible in syringe
- Used common-source saline bag to flush ports
  - Reused syringes throughout the day for same patient

P. aeruginosa / K. pneumoniae Outbreak – MS, 2011
Infection Control Assessment

- Prepared syringes containing non-chemotherapy medications, kept for multiple days
  - Opportunity for contamination
- Long-standing practice

Example 4:

- October 2011 – local hospital reported increase in number of blood cultures growing bacillus
  - All in patients receiving care at same oncology clinic
- Subsequent testing of isolates indicated they were Tsukamurella spp.
  - Environmental pathogen
  - Rare cause of disease, mostly among immunosuppressed patients with central lines

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Health Department Investigation

- Oncology clinic located on hospital campus, but independently owned and operated
- Site inspection by state and regional epidemiologists
  - Infection control lapses were identified and remediated
  - Sporadic cases occurred in 2012
- CDC field assistance in June 2012

Tsukamurella spp. Cases by Month of First Positive Culture (n=15 cases)

- Number of cases
- Month First Positive Culture Collected

Potential Clues: Specific Exposures

- Only known common exposure among all cases was receipt of care at oncology clinic
- Several cases: only clinic exposure was saline flush
  - Received no chemotherapy prior to infection
- Late-onset cases
  - All had lines accessed in September/October 2011 (known infection control lapses present in clinic)
  - No novel exposures later in time uncovered

Infection Control Assessment

- Prior to November 2011
- Used saline bag as common-source supply for saline flushes for multiple patients
- Used non-sterile cotton balls moistened with alcohol to clean catheter hubs prior to access

Infection Control Assessment

- Prior to November 2011
- Used saline bag as common-source supply for saline flushes for multiple patients
  - Changed to commercially packaged saline flush syringes
- Used non-sterile cotton balls moistened with alcohol to clean catheter hubs prior to access
  - Changed to sterile commercially packaged 70% isopropyl alcohol pads

Additional Observations of Concern

Unsafe injection practices:

- Using single-dose vials for >1 patient over multiple days
- Using same syringe/needle to access medication vials that were used for >1 patient

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WV Oncology Clinic:
Medication Preparation Room Layout

Hood for preparation of chemotherapy medications

Other medications prepared here

WV Oncology Clinic:
Medication Preparation Room Layout

Concerns regarding seal of window (air quality)

Hood disinfected with alcohol of insufficient strength

Medications prepared next to sink (possible contamination with tap water)

Lapses Related to Medication Preparation

- Window opened intermittently (air quality)
- Glove boxes placed on windowsill (bugs found in boxes)

Recommendations: (USP)
- Standards for air flow and particulate count where medications are prepared
- Ideally, gloves worn when preparing chemotherapy should be sterile

Example 5:

- 12 patients with Pantoea spp. bloodstream infections
  - All received infusion products prepared on-site at the same oncology clinic
- Infection prevention assessment performed of the infusion room and on-site pharmacy (including the “clean room” – where chemotherapy preparation occurs)

Clinic A Infusion Room

- Hand hygiene, port access adequate
- Infusion products adjacent to sinks

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Clean Room Concerns
- Hand hygiene gaps
- Medication vial septa inadequately cleaned

Contrary to guidelines

Clean Room Concerns
- Hand hygiene gaps
- Medication vial septa inadequately cleaned
- Presence of sink

Contrary to guidelines

Environmental Culture Results
- Pantonella

Infusion Room

Pantonella spp. Outbreak – IL, 2012-2013
Additional Results
- 10 of 12 patient isolates and Pantonella isolate from clean room sink matched by PFGE
  - Suggesting outbreak may have resulted from tap water contamination of infusates (during preparation) or subsequent surface contamination of infusion bags/containers
- Deficiencies in clinic's water system
  - Substantial dead space piping
  - Scant chlorine residual (<0.2 ppm) in all 3 sinks of pharmacy and 4 of 5 infusion room sinks
  - Water heterotroph plate count exceeded EPA limits for all 8 sinks tested

Summary of Infection Control Lapses
- Unsafe injection practices
  - Storing opened single-dose vials for use over multiple days
  - Use of single-dose vials for >1 patient
  - Use of saline bag as common source for >1 patient
  - Storing prefilled or unopened saline/heparin syringes for later use
  - Reuse of syringes to access medication vials/bags
  - Direct syringe reuse from one patient to another
- Inadequate environmental conditions for chemotherapy preparation and suboptimal handling / placement of infusion products
- Suboptimal disinfection for accessing central line and poor hand hygiene

Just Scratching the Surface...

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What Are Key Areas for Infection Prevention in Outpatient Oncology Settings?
- Increased attention to preparation and administration of injectable medications
- Maintain appropriate environment and procedures for chemotherapy preparation
- Ensure appropriate central line access and care

Injection Safety
- Proper use and handling of parenteral medications and related supplies for any injection procedure:
  - Syringes, needles, intravenous tubing, medication vials, and parenteral solutions

Injection Safety: Key Recommendations
- Dedicate SDVs for single patient use and do not store opened SDVs for future use
- Avoid using saline bags as common-source supply for >1 patient
- Use new syringe/needle to access medication vial/bag
- Avoid prefilling and storing batch-prepared syringes (outside of pharmacy setting)
- Whenever possible, use commercially manufactured or pharmacy-prepared prefilled syringes (saline, heparin)

What Are Key Areas for Infection Prevention in Outpatient Oncology Settings?
- Increased attention to preparation and administration of injectable medications
- Maintain appropriate environment and procedures for chemotherapy preparation
- Ensure appropriate central line access and care

Guidance for Sterile Compounding: USP 797
- Segregated compounding area (separate from patient care)
  - No unsealed windows, doors connecting to high traffic flow, etc.
  - No sink in clean room
  - Meet specified air quality
- Use chemo hood meeting standard requirements
- Don appropriate PPE
- Follow aseptic technique for sterile compounding, with appropriate beyond-use-dating

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Central Line Access and Care
- Scrub access port with appropriate antiseptic
  - Chlorhexidine, povidone iodine, 70% alcohol
- Access only with sterile device
- Ensure appropriate saline and/or heparin flush of line
  - Preparation, administration

CDC Campaign – October 2011: Preventing Infections in Cancer Patients
- Joint effort between Division of Healthcare Quality Promotion (DHQP) and Division of Cancer Prevention and Control (DCPC)
  - DHQP – Tool for healthcare providers: Basic Infection Control and Prevention Plan for Outpatient Oncology Settings
  - DCPC – Resources for patients and caregivers: Interactive educational website that assesses patient’s risk for infection and provides information to prevent infections

CDC Tools for Outpatient Oncology Care

Preventing Infections in Cancer Patients: Tool for Healthcare Providers

Main Components of the Basic Infection Control and Prevention Plan
- Education and Training
- Surveillance and Reporting
- Standard Precautions
- Transmission-Based Precautions
- Central Venous Catheters

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Infection Prevention Plan
Education and Training
- Education and training of all facility staff
  - At orientation and repeated at least annually and anytime policies or procedures are updated
  - Job- or task-specific infection prevention practices
- Competency evaluations
  - Regular audits to assess staff adherence to recommended practices

Infection Prevention Plan
Surveillance and Reporting
- Purposes: case-finding, outbreak detection, and improving healthcare practices
- Conduct facility surveillance for healthcare-associated infections and/or process measures
  - Central-line associated bloodstream infections
  - Hand hygiene
- Adhere to local, state, and federal requirements for reportable diseases and outbreak reporting

Infection Prevention Plan
Standard Precautions
- Hand hygiene
- Use of personal protective equipment
- Respiratory hygiene and cough etiquette
- Safe injection practices (including appropriate medication storage and handling)
- Safe handling of potentially contaminated equipment or surfaces in the patient environment

Standard Precautions: Respiratory Hygiene
- Identifying patients and visitors with respiratory symptoms at the point of entry into healthcare facility
  - Reception/waiting area
- Instituting measures to prevent spread of respiratory infections
  - Spatial separation, facemask use
  - Ensuring availability of supplies
- Promoting cough etiquette
- Enhancing measures during periods of increased respiratory virus activity

Standard Precautions: Injection Safety
- Outlines practices for:
  - General safe injection practices
  - Soreal injection procedures
  - Phlebotomy procedures
- Describes storage and handling of parenteral medications (outside of pharmacy setting)
  - Single-dose and multi-dose vials
  - Specific steps for medication preparation
  - When to discard

Standard Precautions: Cleaning and Disinfection of Devices and Environmental Surfaces
- Pertains to disinfection of:
  - Noncritical patient-care devices (e.g., blood pressure cuff)
  - Environmental surfaces in patient-care and common-use areas
  - Exam rooms, chemotherapy suite
  - Bathrooms
- Focus cleaning on high-touch surfaces

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Infection Prevention Plan
Transmission-Based Precautions
- Intended to supplement Standard Precautions
  - Use when route of transmission is not completely interrupted by Standard Precautions
- Identifying potentially infectious patients for applying additional precautions
  - Contact Precautions
    - Suspected infectious diarrhea, draining wounds or skin lesions
  - Droplet Precautions
    - Respiratory viruses
  - Airborne Precautions
    - Tuberculosis, disseminated herpes zoster

Infection Prevention Plan
Central Venous Catheters
- General maintenance and access procedures
  - Use of aseptic technique for accessing central venous catheters
  - Blood draws from catheters
  - Changing catheter site dressing and injection caps
- Catheter-specific recommendations:
  - Peripherally inserted central catheters (PICCs)
  - Turrened catheters
  - Implanted ports

Appendix Section (I)
- List of Persons Designated to Specific Tasks
- List of Reportable Diseases/Conditions
  - Facility to obtain information from health department websites

Appendix Section (II)
- CDC Infection Prevention Checklist for Outpatient Settings
  - Tailor to oncology settings to evaluate personnel competency and adherence to recommended practices

Additional Resources
- Web links to national guidelines
  - Occupational health requirements
  - Appropriate preparation and handling of antineoplastic agents
  - Infection prevention issues unique to blood and marrow transplant centers
  - Clinical recommendations and guidance for treatment of patients with cancer

Oncology facilities without a plan can start using this plan, and further supplement as needed.
Does not replace need for facilities to have regular access to an individual with training in infection control
Oncology facilities with an existing plan should ensure that essential elements are included.

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Patient and Caregiver Web Site
www.PreventCancerInfections.org

- The interactive online tool, called 3 Steps Toward Preventing Infections During Cancer Treatment, helps cancer patients assess their risk for developing neutropenia and subsequent infections.
- Users complete a brief risk assessment to assess their risk.

Next Steps for CDC

- Increase understanding of current chemotherapy preparation practices to inform prevention efforts
  - Performed in-depth interviews with small sample of outpatient oncology facilities (n=18) but need to conduct more interviews as well as observations
  - Engage pharmacy and oncology nursing professional organizations
- Continued dissemination of Basic Infection Control and Prevention Plan
  - Initial responses from facilities were positive, requesting additional materials including pocket guide

Thank you

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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.

Coming Soon

November 5 (Free WHO Teleclass – Europe)
GLOBAL APPLICATION OF BEHAVIOUR CHANGE MODELS AND INFECTION CONTROL STRATEGIES
Dr. Michael Borg, St. Luke’s Hospital, Malta
Sponsored by the World Health Organization

November 6 (Free Teleclass)
CBC IS MAKING THE CERTIFICATION PROCESS WORK FOR ALL!
Craig H Gillam and Lili Jo Newman, Certification Board of Infection Control

November 13 EMERGING RESPIRATORY VIRUSES: ARE HEALTHCARE WORKERS PROTECTED?
Dr. Volker Roth, The Ottawa Hospital

November 20 THE ROLE OF COMPANION ANIMALS IN INFECTION TRANSMISSION
Prof. Timothy Lunders, Ohio State University & Prof. Jason Stul, University of Guelph

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