Sacred Cows: Infection Control Practices Across the Country

Janet Eagan, RN, MPH, CIC
Chris Rimkus, RN, MN, AOCN
Lenise Taylor, RN, MN, AOCNS

Objectives

- Compare infection prevention practices from 3 institutions of Isolation, Visitation and Room Cleaning for BMT inpatients.
- Discuss methods of preventing infection in BMT patients while being seen in the outpatient clinic.
- Describe variations in practice in preventing infection from nutritional sources in the BMT patient.

Topics

- Room Cleaning
- Infection Control in the Ambulatory Setting
- Visitation Practices in the Inpatient Setting
- Protective Environments in the Inpatient Setting
- Skin Antisepsis – Chlorhexidine Bathing
- Infection Prevention through Diet

Format

- Define the topic
- Share practices from
  - Presenters
  - Audience Response
- Survey distributed among BMT centers
- Discuss available evidence

(ARS) Who do we represent?

- Adult BMT
- Pediatric BMT
- Adult and Pediatric BMT

(ARS) Who do we represent?

- Inpatient BMT
- Inpatient BMT/HemeOnc
- Outpatient BMT
- Outpatient BMT/HemeOnc
Room Cleaning: As a Way to Prevent Infection
Chris Rimkus RN, MSN, AOCN
Clinical Nurse Specialist
Siteman Cancer Treatment Center
St. Louis, MO

Focus on:
• Background information
• Room cleaning products
• What to clean in the room
• Is the housekeeper the key to preventing spread?

 BJH Experience

(ARS) What products/process does your institution use to clean BMT rooms?
• Bleach
• Uniquat Ammonia based
• Xenex UV light
• Sani wipes/soap and water

(ARS) Is your housekeeper unit based or contracted?
• Unit based
• Contracted
Check all the room equipment that is included in the daily clean:
- Bed Rail
- Blood pressure cuff
- Bedside commode
- Urinals
- In room equipment (portable monitor)
- Refrigerator
- Patient personal items

Do you have special recommendations for cleaning hotel rooms for the outpatient?
- No
- Yes

Let's review the evidence (or lack thereof):
- Go over some background BRIEFLY
- Evidence on room cleaning
Microorganisms Live WITH US and AROUND US

- Colon $10^{12}$
- Gingival area $10^{12}$
- Vagina $10^9$
- Saliva $10^8$
- Small intestine $10^7$
- Skin surface $10^6$
- Nose $10^4$
- Stomach $10^{0-4}$
- C difficile spores can live for months on contaminated surfaces and pass from patient to patient
  - All surfaces that are contaminated
  - Slides, rails, BSC, toilets, shower, sink, bathroom door knobs
  - Playrooms and toys
  - Hotels/homes
- MRSA, VRE, pseudomonas and acinobacter live for months on dry surfaces; norovirus at least a week.
- APIC guide: heaviest contaminated site is floor and bathroom (foot covers)

Pillars of Infection Control

- Hand Hygiene
- Isolation and use of PPE
- Environmental Issues (cleaning and waste disposal)
- Decontamination of equipment
- Antibiotic policy

Cleansing Materials

- Bleach
  - Hypochlorites are the most widely used of the chlorine disinfectants
  - They are fast acting, low cost, have a broad spectrum of antimicrobial activity, do not leave toxic intermediates, and are not affected by water hardness
  - They are very active against viruses and are the disinfectant of choice for environmental decontamination following body fluid spillage from a patient with known or suspected blood-borne viral infections
- Uniquat
  - Are positively charged and they kill microbes by inactivation of energy producing enzymes, denaturation of cellular proteins, and rupture of the cell membrane
  - OAG at low concentrations inhibit the growth of bacteria (bacteriostatic) but do not kill them. Gram-negative bacilli (e.g. Pseudomonas spp) may cause contamination and grow in diluted or illuminated solution
  - Therefore, any unused solutions should be discarded immediately after use. Decanting from one container and topping up should be avoided. This can result in contamination and promote growth of Gram-negative bacilli which may then colonise the wound
  - Single use packets should be used
- Xenex - UV radiation cleaning robot. Has evidence to show it can terminally clean rooms with C difficile and VRE with up to 90% reduction of contamination over bleach
- Sanitisers/sanitizers and water - mostly alcohol based (although there are a variety of additives)
  - Alcohol does not penetrate well into organic (especially protein-based) matter, and should therefore be used to disinfect only physically cleaned hard surfaces or equipment

Modes of Transmission

- Direct:
  - Physical person to person contact with transmission of microbes
  - Hand hygiene is imperative
- Indirect:
  - Transmission of microbes through something else
  - Equipment
  - Environment
  - Environmental cleaning and hand hygiene
- Droplet (the most common - flu and other upper respiratory virus)
  - Heavy particles and thus only go about 3 feet
  - Ways to prevent:
    - Ensure at least 3 feet between people
    - Surgical masks
    - Environmental cleaning at the droplets fall and contaminate
    - Special air handling is not necessary

Medical Devices and Degree of Risk

- Critical/High risk
  - Implant devices (i.e. IV and urinary catheters)
  - Sterile
- Semi critical or intermediate risk
  - Laryngoscopes; esophageal probes, endoscopes
  - Sterile
- Non critical or low risk
  - Come in contact with the patients skin
  - BP cuffs, pulse ox probes, thermometer probes
  - Basic cleaning is recommended with possible disinfection if in contact with contaminated skin
- Minimal risk items
  - Not in direct contact with patients and will usually have low number of microbes and have low risk of transmitting disease
  - In personal items, ceilings, sinks, counters, drains
  - Cleaning with detergent and allowing to dry is often adequate

<table>
<thead>
<tr>
<th>Group</th>
<th>Gram-positive bacteria</th>
<th>Gram-negative bacteria</th>
<th>Mycobacteria</th>
<th>Virus</th>
<th>Viruses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Chlorohexidine (2% and 4% solutions)</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Hexachlorophene</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Isopropyl alcohol</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Methanol</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Ethanol</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Phenol</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>Intermediate</td>
</tr>
</tbody>
</table>

Antibacterial agent: +++ = Good; ++ = Moderate; + Poor; - = no activity or insufficient activity.
Unit Based Housekeeper Vs. Contracted

- Unit based is more connected to the staff and patients
- They can be a part of the PI plan and see the stats
- Evidence is slim but suggests that this approach may improve outcomes.

Zuberi, 2011

Basic Premises Based on Guidelines, Experts and some evidence

- The environment is a harbor for infectious diseases
- To date the most consistent evidence suggests bleach is the best product to kill the most organisms
- All high touch surfaces should be cleaned
- May need to make suggestions for changes in cleaning for hotel rooms/homes
- Unit based housekeepers may improve the quality of the cleaning

Infection Control in the Ambulatory Setting

Wash U/Siteman Cancer Center Experience

Limited Focus

- Segregation Practices
- Environmental Cleaning: Focus on Cdiff
- Patient Protection
  - Children and Masks

(ARS) If you have a mixed BMT and Oncology Infusion Center, how do you segregate BMT patients from others?

- Have a separate waiting room from Med/Onc
- Have a separate waiting room for infusions
- Allow to mix with Med/Onc except in special circumstances (e.g. trach patients and those with infections are not put with BMT)
- Have special room(s) for BMT patients instead of open room with chairs
- Have no formal separation process
Do you allow children to come into your outpatient BMT area?

- No
- Yes

(ARS) Do you clean between patients in the outpatient center?

- Wipe chairs with a bleach solution
- Clean the entire bed with bleach and change linen between each patient
- No special procedure
- Wipe down equipment, including infusion pump, between patients
- Use single patient use stethoscope/BP cuff
- Do not wipe equipment unless the patient has known infection and/or at end of day

(ARS) Do you segregate continent patients with C.Diff/VRE?

- Yes
- No
(ARS) Do your patients wear masks in the outpatient center?
- No
- Yes if they have a respiratory infection
- Yes, always

Segregation of BMT patients
- A FACT Criteria
- Recommended in the ASBMT infection control guidelines 2009
- Little evidence to support this
- Mostly is “Expert Opinion”

C-Diff: Not Just in the Hospital
- One epidemiologic study showed that 56% of Cdiff + patients were in the ambulatory care centers
- Only patients with diarrhea are tested for Cdiff
  - Strong level of evidence
  - Thus if the patient has formed stool, do they need to be considered a risk?
- Current APIC recommendations are to D/C precautions
  - when the patient does not have diarrhea
  - 2+ days after diarrhea continues
  - At discharge
- Up to 40% of pts still had Cdiff on their skin 9 days after diarrhea stopped

Data on Cdiff Prevention in Ambulatory
- Most of this is implied and not clearly outlined for this population
  - If no diarrhea, really don’t need to isolate and can clean as normal
  - If patient has diarrhea, the environment should be cleaned to prevent the spread/outbreak
Cleaning the outpatient center

- To prevent the spread of infection, cleaning with bleach and/or a product that will rid the environment of infectious material is also necessary.
- Most of the data on outpatient cleaning is from the CDC guidelines and utilizes common sense, best practice approach.

Which Mask to Wear

- Surgical
  - Droplet protection
  - Should not touch the outside of the mask. Yuck!
  - Should be changed as soon as possible and when noticeably moist no longer filters-usually 20-40 minutes
- N95
  - Airborne
  - Mold spores
  - Fit testing
  - Make sure the patient can breathe

Basic Premises Based on Guidelines, Experts and some evidence

- The outpatient setting harbors microorganisms as well as the hospital
- Modes of transmission are different and precautions are often different
- All high touch surfaces (different in outpatient) should be cleaned with something that will remove the most virulent
- Screening and acting to prevent the spread of infection should help minimize outbreaks
  - Wearing masks during high risk time frames
  - Assuring that everyone follows the guidelines set out may be the best way to prevent the spread of infection.

What is the Evidence on Wearing a Mask?

- Most of the evidence is “expert opinion”
- There is some evidence that mask wearing will reduce the risk of outbreaks of virus/upper respiratory infections in BMT-small scale studies.
- The type of mask is mainly the surgical mask

Children in the Ambulatory Setting

- Most data suggests that screening is the best way to prevent the spread of infection in the outpatient setting
- Again most data is expert recommendation from the CDC and ASBMT ID subcommittee.
Should Visitors be Screened?

Definition of issue

- Visitors are important to quality of life and a support system for our patients
- However, visitors can be the source of infection particularly respiratory viruses and other airborne pathogens
- How do you balance between protecting the patient and supporting their quality of life needs?

(ARS) Do you have visitation restrictions?

- No
- Specified hours
- Number of visitors
- Children

(ARS) Restrictions of Children Visiting

- Infant to 6 months
- 6-12 years
- 12-18 years

MSKCC BMT visitation policy

- Passive screening – signage
- Active screening for community respiratory viruses (year around)
- Discouraged from bringing in infants and young children who are unable to follow standard infection control precautions (Guidelines refer to visitors able to follow hand hygiene and isolation guidelines)
What is the evidence?

- Visitors have been identified as a source of infections e.g. Pertussis, TB, Influenza and other respiratory viruses
- There is no data specific to age
- Effective methods for visitor screening have not been studied

Safety of administering live vaccines to household contacts of transplant recipients and visitor restrictions

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>ACIP recommendation</th>
<th>Supporting data</th>
<th>Visitor restrictions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral polio vaccine</td>
<td>Contraindicated</td>
<td>Established risk of vaccine associated cases in ICH following secondary transmission.</td>
<td>Not used in the United States. IPV</td>
</tr>
<tr>
<td>Varicella Zoster</td>
<td>Can be given</td>
<td>Cases of secondary transmission but mild disease, none in transplant recipients.</td>
<td>None unless recipient develops rash (should be covered)</td>
</tr>
<tr>
<td>MMR</td>
<td>Can be given</td>
<td>One probable case of secondary transmission.</td>
<td>No restriction</td>
</tr>
<tr>
<td>Live attenuated influenza</td>
<td>Avoid</td>
<td>Reports of secondary transmission: 22 cases in 2.5 million vaccinees. None in ICH.</td>
<td>Theoretical concerns, avoid contact with patients in PE for 7 days</td>
</tr>
<tr>
<td>Small pox (vaccinia) Smallpox</td>
<td>Contraindicated</td>
<td>Contact transfer of virus from vaccine site (via clothing, linen, direct contact)</td>
<td>Avoid isolation until complete scarring at site of inoculation (~9-12 weeks)</td>
</tr>
</tbody>
</table>

Published Guidelines for visitor restrictions

- All visitors should be screened for potentially infectious conditions WHO SHOULD DO THIS?
  - Respiratory illness
  - VZV like rash
- All visitors must be able to follow appropriate hand hygiene and isolation precautions
- All visitors should be screened for recent receipt of live vaccines (especially those who stay overnight)

Should Visitors be Screened? Conclusion

- No evidence exists to guide a recommendation
- Screening of visitors is loosely recommended but no operational approach has been developed
- Visitors remain critical to recovery of patients
- Visitors with symptoms should always be advised to stay home

Does Protective Environment Protect? Definition of issue

- Protected environment (PE) has been an infection control measure that has been standard practice for BMT since the 1960’s
- Associated with substantial cost both financial and psychological to the patient
- Recent trials have shown that patients may be safely cared for in the ambulatory setting – most of their time is spent at home, outside any protective environment
Donald Armstrong, MD, (MSKCC) 1984

Protected Environments Are Discomforting and Expensive and Do Not Offer Meaningful Protection

Donald Armstrong, MD
New York, New York

An environment that is germ-free and a patient who is germ-free have been goals in managing hematopoietic patients, especially those who are neutropenic. Such a germ-free environment, inside and out, also demands a laboratory atmosphere after transplantation, including shielding by extensive windows. This is contrary to habits of isolation in surgery, but surgical isolation has failed to provide effective protection for patients, whether they are neutropenic or not. The environment can be contaminated on the inside—by air, or by transfer of personnel, or by contamination of the patient’s skin or clothes, or by contamination of the personnel. The environment can also be contaminated by sterile air, which can be introduced directly into the patient, or by the personnel. When the environment is contaminated, the patient’s isolation is of no value. When the environment is not contaminated, the patient is of no value.

61

(ARS) Do you have criteria for patients placed on Protective Environment isolation?

• Type of transplant
• Duration of neutropenia

(ARS) What does Protective Environment mean in your institution?

• Private room
• Private room with positive air handling
• Private room with HEPA filtration
• No private room required
(ARS) Patients in Protective Environment

- Are able to walk in the hallway
- Wear protective clothing when leaving the room
- Wear masks when being transported

What exactly is “Protective Environment”?

- >12 air exchanges/hour
- HEPA filter with 99.97% efficiency
- Directed air flow across the patient bed
- Positive air pressure
- Well sealed rooms without air leak
- Self closing doors

Protective Environment: What’s the evidence?

- Studies of aspergillosis outbreaks associated with construction demonstrate the need for PE
- Protective environment – including air quality control, prophylactic antibiotics, hand hygiene, and barrier isolation – significant reduction in all cause mortality
  — BUT antibiotic prophylaxis main component necessary for effect

Does Protective Environment Protect? Conclusions

- No evidence that the Protective Environment adds to the benefit conferred by prophylactic antibiotics
- Standard infection control approaches remain essential, including for patients managed as out-patients
- It is not clear that the cost and the bother of PE, decrease in visits by staff as well as increased symptoms of depression and anxiety in the patient result in better patient outcomes.

Skin Antisepsis – Chlorhexidine bathing

Lenise Taylor, MN, RN, AOCNS
Heme Malignancies/BMT CNS
Seattle Cancer Care Alliance
University of Washington Medical Center
Background

- Emphasis on reducing/eliminating nosocomial infections has led healthcare to find methods to reduce those infections
- One method is to reduce skin flora that may contribute to infections
- Intensive care units have used chlorhexidine skin antisepsis to reduce CLABSI and MRSA in their patients
- How does this translate to the BMT and Heme Onc population?

SCCA/UWMC Experience

- Vancomycin resistant enterococcus (VRE) infections needed to be reduced
- ICU’s were already using CHG bathing
- Challenge was to adapt procedure to our self-care patients
  - Implemented use of 2% CHG skin wipes after shower or bath
- Reduction in VRE cases but CLABSI remained an issue
  - Inconsistent use of wipes ->
  - Add 4% chlorhexidine soap for independent shower
- Continued reduction in VRE cases and reduction in CLABSI

(ARS) Do you require chlorhexidine bathing for your patients?

- Yes
- No

(ARS) If you require CHG bathing, what restrictions do you have?

- None
- Chlorhexidine allergy
- Open wounds
- Radiation therapy
- Currently receiving thiotepa
- Other

Do you require chlorhexidine bathing for your patients?

If you do require CHG bathing, what restrictions do you have?
Evidence

- Use of Chlorhexidine wipes reduces CLABSI in MICU
- Use of Chlorhexidine wipes reduces VRE infection in MICU
- Minimal reports of skin irritation or allergic reactions
- Little evidence exists for exclusion

Recommendations

- Daily chlorhexidine bathing likely to reduce
  - Multi drug organism infections
  - Central line infections
- Unlikely to cause severe skin reactions
- More collection of data is needed

Background

- Decrease introduction of bacteria to body from exogenous sources, especially diet
- “Sterile” cooked foods, no raw fruits or vegetables
- With LAF beds, attempted gut decontamination
- Variety of names with a variety of definitions:
  - Neutropenic
  - Low Microbial
  - Immunocompromised
- Variation in time of implementation and population to which applied

(ARS) Do you require a special diet for your patients?

- Yes
- No

Do you require a special diet for your patients?

[Graph showing the number of responses: Yes: 20, No: 5]
If you do require a special diet, what type?

- Neutropenic
- Immunosuppressed
- Low Microbial

If you do require a special diet, what type?

Neutropenic/Low Microbial Diet

- No raw or uncooked foods
  - All raw vegetables
  - Most raw fruits (except those with thick skins)
  - Eggs, meat and fish must be fully cooked
- Pasteurized milk, cheese, yogurt and dairy products
  - Excludes yogurt with live active cultures and mold-ripened cheeses
  - Lunch meat is allowed if it is in a vacuum sealed container, not from deli counter
- Avoid salad bars
- Avoid well water

(ARS) Based on these definitions, if your institution requires a special diet, is it...

- Neutropenic
- Immunosuppressed

Immunosuppressed/compromised Diet

- Follows principles of safe food handling
  - Deli foods excluded
- Dairy
  - Nonpasteurized products, cheeses with molds, and cheese with chili peppers excluded
- Meats, fish and eggs should be cooked until well done
- Fruits and vegetables allowed
  - Must be washed
  - Nuts must be roasted
  - Non-pasteurized juices excluded

Why does this matter?

- Neutropenic diet may actually increase risk of infection
- Excluding foods for patients undergoing treatment may decrease caloric intake
- Adherence is difficult to track with increasing numbers of outpatient BMT patients
Recommendations

- Follow safe food handling practices
- Diet should be continued post transplant
  - 3 months for Autologous patients
  - Until all immunosuppressive drugs are discontinued for Allogeneic patients
- No raw or undercooked meats
  - Hot dogs and deli meats should be cooked to steaming
- No raw or undercooked eggs or seafood
  - Including sauces containing these
- Fruits and vegetables
  - “If you can’t wash or peel it, don’t eat it”
  - All should be washed, including prepackaged/prewashed foods