

Sacred Cows: Infection Control Practices Across the Country

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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.

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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

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Format

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

4

(ARS) Who do we represent?


- Adult BMT
- Pediatric BMT
- Adult and Pediatric BMT

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(ARS) Who do we represent?

- Inpatient BMT
- Inpatient BMT/HemeOnc
- Outpatient BMT
- Outpatient BMT/HemeOnc

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Room Cleaning: As a Way to Prevent Infection

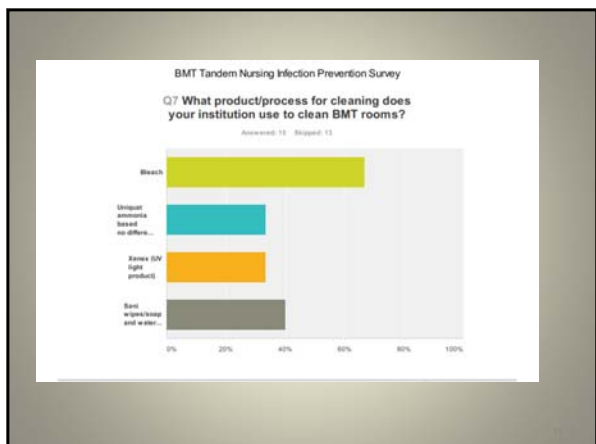
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SCHOOL OF MEDICINE

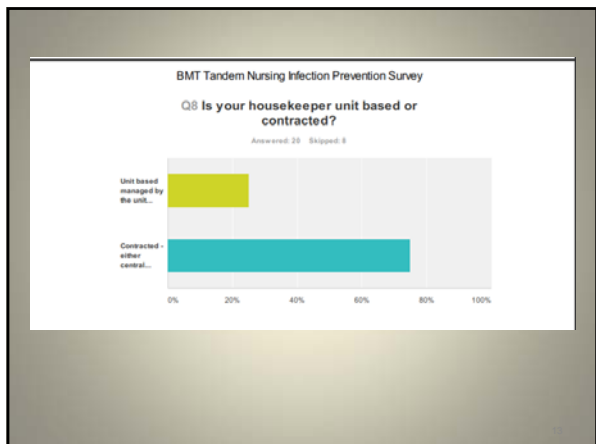
- ### Focus on:
- Background information
 - Room cleaning products
 - What to clean in the room
 - Is the housekeeper the key to preventing spread?

BJH Experience

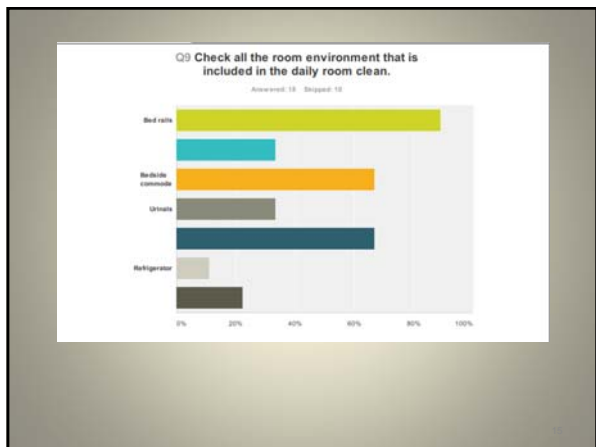
- (ARS) What products/process does your institution use to clean BMT rooms?
- Bleach
 - Uniquat Ammonia based
 - Xenex UV light
 - Sani wipes/soap and water



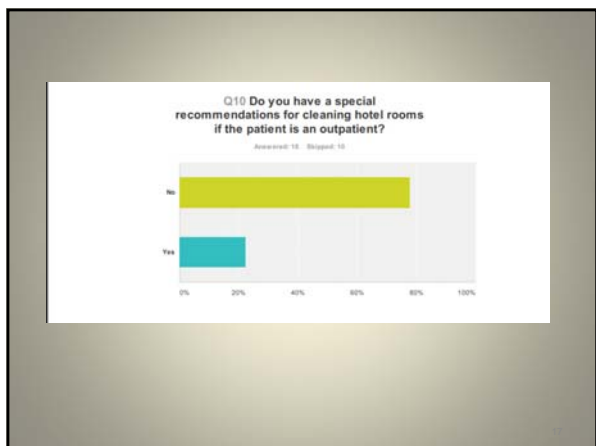
- (ARS) Is your housekeeper unit based or contracted?
- Unit based
 - Contracted



- (ARS) 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



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



- Lets review the evidence (or lack there of)
- 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 10^5
- Nose 10^4
- Stomach 10^{0-4}
- Cdiff spores can live for months on contaminated surfaces and pass from patient to patient
 - All surfaces that are contaminated
 - Side rails, BSC, toilets, showers, tubs, 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)

Otter 2011; CDC guidelines

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 as the droplets fall and contaminate
 - Special air handling is not necessary

Pillars of Infection Control

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

Medical Devices and Degree of Risk

- Critical/High risk
 - Invasive 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
 - Pt personal items, ceilings, sinks, counters, drains
 - Cleaning with detergent and allowing to dry is often adequate

Otter 2011; CDC 2008

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 residues, and are not affected by water hardness
 - They are very active against viruses and are the disinfectant of choice for environmental decontamination following blood spillage from a patient with known or suspected blood-borne viral infection
- Uniquat
 - are positively compounds and they kill microbes by inactivation of energy-producing enzymes, denaturation of cellular proteins, and rupture of the cellular membrane.
 - QACs 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 inactivated 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 colonize the wound.
 - Single use sachets should be used
- Xenex- UV radiation cleaning robot. Has evidence to show it can terminally clean rooms with C-Diff and VRE with up to 30% reduction of contamination over bleach..
- Saniwipes/soap 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

(1)Shashank 2013; CDC 2008

Table 6.1 Antimicrobial activity of antiseptic agents

Group	Gram-positive bacteria	Gram-negative bacteria	Mycobacteria	Fungi	Viruses	Speed of action
Alcohols	+++	+++	+++	+++	+++	Fast
Chlorhexidine (2% and 4% aqueous)	+++	+++	+	+	+++	Intermediate
Hexachlorophane (2% aqueous)	+++	++	+	+	+	Intermediate
Iodine compounds	+++	+++	+++	++	+++	Intermediate
Iodophors	+++	+++	+	++	++	Intermediate
Phenol derivatives	+++	+	+	+	+	Intermediate
Triclosan	+++	++	+	–	+++	Intermediate
Quaternary ammonium compounds	+	++	–	–	+	Slow

Activity: +++ = 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



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Infection Control in the Ambulatory Setting

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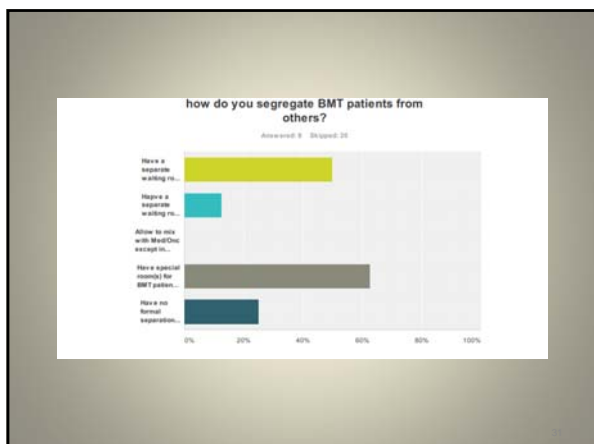
Limited Focus

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

Wash U/Siteman Cancer Center Experience

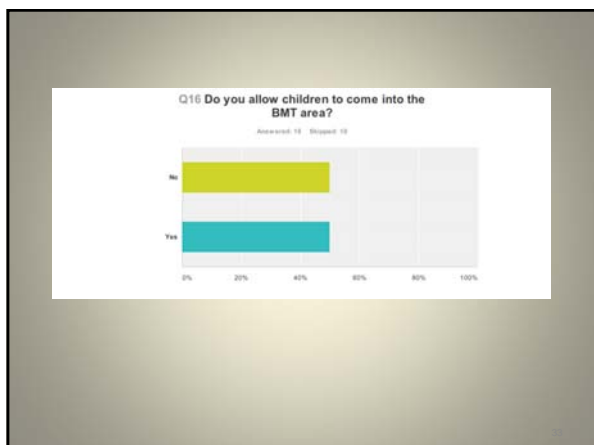
(ARS) If you have a mixed BMT and Oncology Infusion Center, how do you segregate BMT patients from others?

- 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



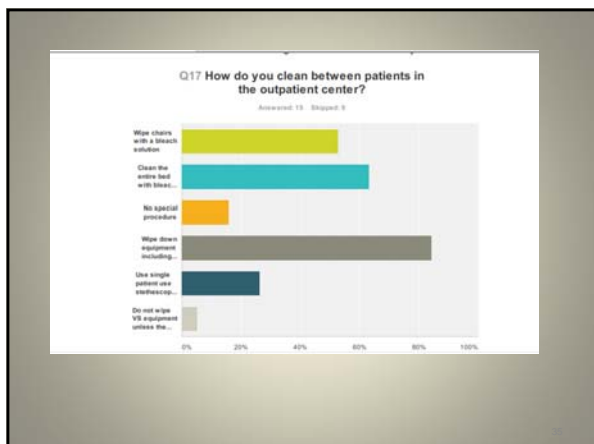
Do you allow children to come into your outpatient BMT area?

- No
- Yes



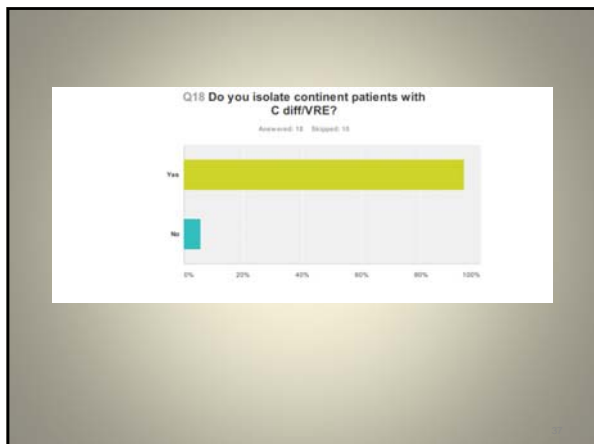
(ARS) Do you clean between patients in the outpatient center?

- Wipe chairs with a bleach solutions
- 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



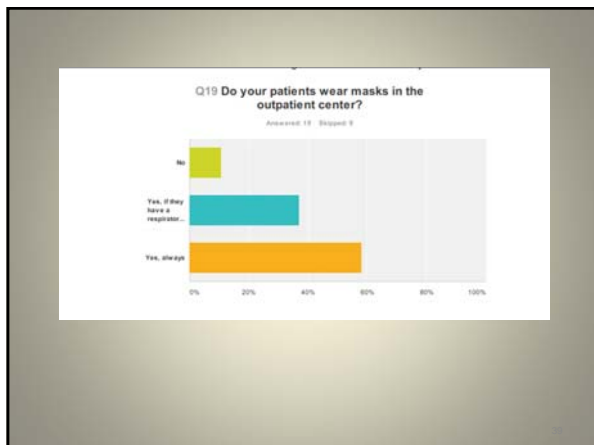
(ARS) Do you segregate continent patients with C.Diff/VRE?

- 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"

King, 2011; FACT guidelines 2013

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

Sutwicz 2013

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

Kuntz 2012

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.

Swawicz 2013; Kuntz 2012

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 ☺

CDC 2008; Mariarz, 2010

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

Mariarz, 2010

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.

CDC, 2011; Dykewicz, 2001; Tombljn 2009

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.



Screening Visitors

February 28, 2014
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Should Visitors be Screened? Definition of issue

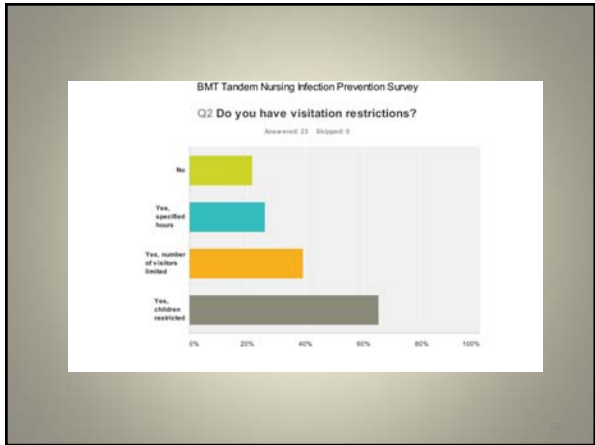
- Visitors are important to quality of life and a support system for our patients
- However, visitors can be the source of infection particularly respiratory viruses and other airborne pathogens
- How do you balance between protecting the patient and supporting their quality of life needs?

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)

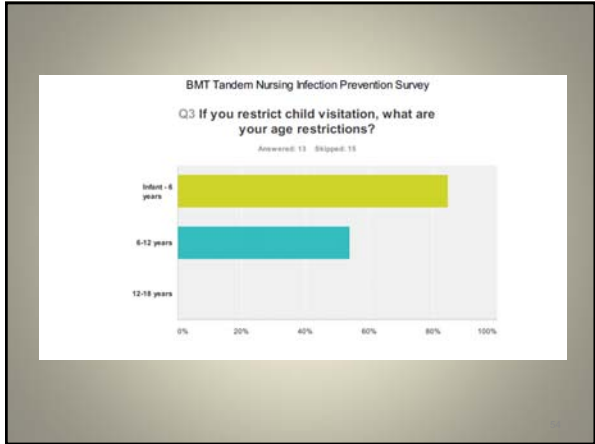
(ARS) Do you have visitation restrictions?

- No
- Specified hours
- Number of visitors
- Children



(ARS) Restrictions of Children Visiting

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



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

Christie CD et al, Infect Control Hosp Epidemiol 2009; 34 (10): 556-63
 Munoz PM et al, Infect Control Hosp Epidemiol 2002; 27 (10): 958-72
 Whimbey E et al, Clin Infect Dis 1996; 22 (5): 778-82
 Hall CB et al, Clin Infect Dis 2006; 43(3): 299-6

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)

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

Vaccine	ACIP recommendation	Supporting Data	Visitor restrictions
Oral polio vaccine	Contraindicated	Established risk of vaccine associated polio in ICH following secondary transmission	Not used in the United States. IPV
Varicella Zoster	Can be given	Cases of secondary transmission but mild disease, none in transplant recipients	None unless recipient develops rash (should be covered)
MMR	Can be given	One probable case of secondary transmission	No restriction
Live-attenuated Influenza	Avoid	Reports of secondary transmission 22 cases in 2.5 million vaccinees. None in ICH	Theoretical concern, avoid contact with patients in PE for 7 days
Small pox (vaccinia) DoD	Contraindicated	Contact transfer of virus from vaccine site (via clothing, linen, direct contact)	Avoid visitation until complete scarring at site of inoculation (~ 2-3 weeks)

Kamboj M, Infect Control Hosp Epidemiol. 2007 Jun;32(6):702-7

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



Protective Environment

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, M.D.
New York, New York

An environment that is germ free and a patient who is germ free have been goals in managing immunocompromised patients, especially those who are neutropenic. Such a germ-free environment, inside and out, can be achieved in laboratory animals after considerable manipulation, including delivery by cesarean section. This is rarely indicated or achieved in humans, but investigators have tried to decrease the numbers of organisms on the outside of patients (both environmental and on the skin) and to do the same with the inside—or at least to selectively decrease the organisms most likely to invade from mucous membranes and the gastrointestinal tract. Most studies of protected environments have included patients who receive prophylactic oral nonabsorbable antibiotics, prophylactic systemic antibiotics, or oral absorbable antibiotics (selective decontamination). Another variable that needs to be considered is the use of sterile food—included in some studies, not used in others, and not mentioned in still others. No studies have used the only appropriate control, which is the same laminar airflow room, but with the airflow turned off and without gowns, masks, or gloves, only assiduous hand-washing. The same staff should care for the control patients as well as those in protected environments. In addition, control patients in some studies have been clearly different in the

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MSKCC - Protective Environment

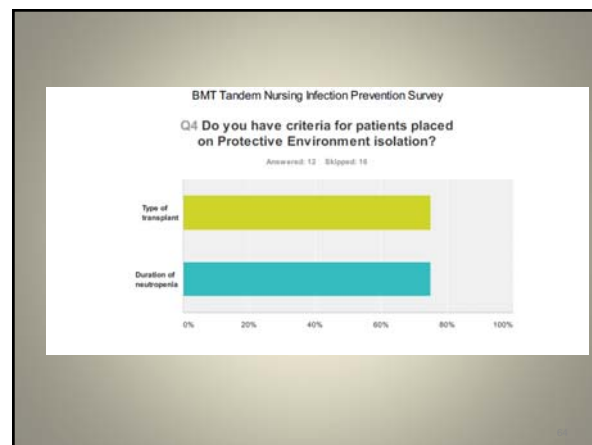
Patient population	Start	End
Pediatric	Day of admission for HSCT	Duration of hospitalization
Adult (allogeneic)	Day of admission for HSCT	Duration of hospitalization
Adult (autologous)	Day of admission for HSCT	Duration of hospitalization

Other

- HCW and visitors must wear masks and gloves
- Minimize out of room exposure
- Patient wears mask when transported

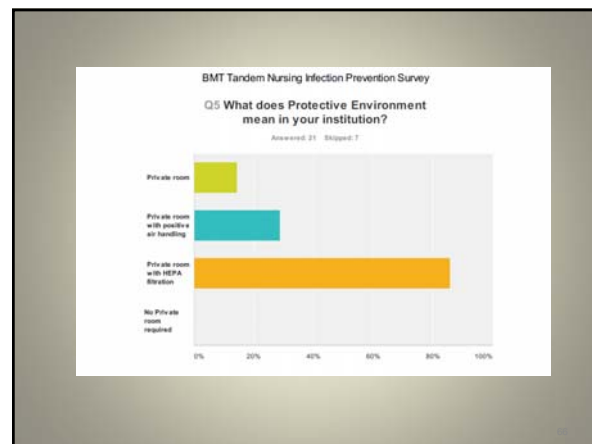
(ARS) Do you have criteria for patients placed on Protective Environment isolation?

- Type of transplant
- Duration of neutropenia



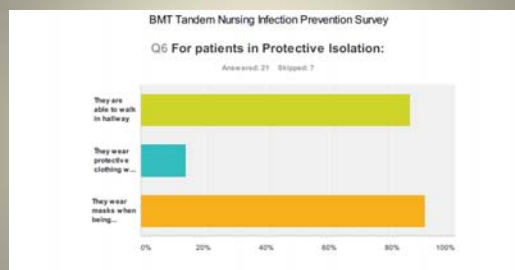
(ARS) What does Protective Environment mean in your institution?

- 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

Bennet T, et al. Clinical Infectious Diseases (2007)
 Hayes-Latter P, et al. Bone Marrow Transplantation (2005)
 Russell J, et al. Bone Marrow Transplantation (2004)
 Yalow D, et al. Bone Marrow Transplantation (2009)
 Schlemmer G, et al. The Lancet (2009)
 Paul M, et al. Acta Haematologica (2011)
 Dadd G, et al. Journal of Pediatric Oncology Nursing (2003)

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.

Morgan D, et al. AIC 2009 Mar 27 (1) Pg 33

Skin Antisepsis – Chlorhexidine bathing

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 Heme Malignancies/BMT CNS
 Seattle Cancer Care Alliance
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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 antiseptics to reduce CLABSI and MRSA in their patients
- How does this translate to the BMT and Heme Onc population?

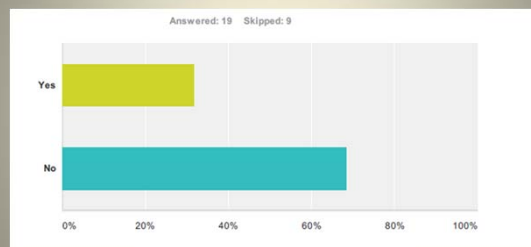
SCCA/UWMC Experience

- 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

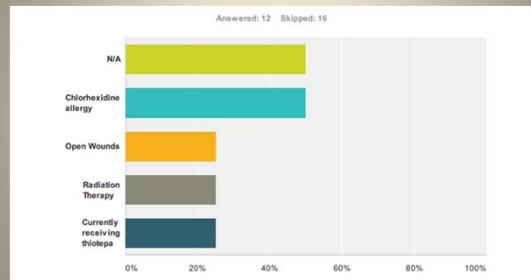
Do you require chlorhexidine bathing for your patients?



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

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

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

Infection prevention through Diet



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

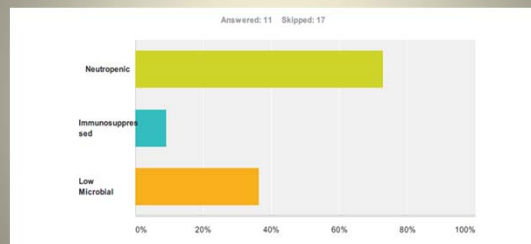
Do you require a special diet for your patients?



(ARS) 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

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

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

- Neutropenic
- Immunosuppressed

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

TIME FOR DISCUSSION AND QUESTIONS

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