Guidelines
for
Management of Patients With Multidrug-Resistant Organisms (MDROs)
for
Nebraska Hospitals
Long-term Care Facilities
Medical Care Facilities

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This updated document addressing multidrug resistant organisms is written by members of a task force of the Greater Omaha Area Chapter of the Association for Professionals in Infection Control & Epidemiology, Inc. with review and input from infectious disease physicians and other health professionals. These members represented Infection Control Practitioners from acute care hospitals and skilled care facilities, both rural and urban areas. Members of the task force are:

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Vision

The patients/residents/clients of healthcare facilities in Nebraska will receive the highest quality care regardless of the identification or presence of antibiotic resistant organisms, and their progress through the continuum of care will be facilitated. The spread of antibiotic resistant organisms will be minimized in Nebraska through excellent communication among healthcare facilities and the use of appropriate infection control measures.

Introduction

This document has been developed by a task force of Nebraska Infection Control Professionals from the Greater Omaha Chapter of Association of Professionals in Infection Control and Epidemiology (APIC) in cooperation with the Nebraska Department of Health and Human Services. Because of changing science and recommendations from organizations recognized for best practices, the task force has updated two previous written documents – Guidelines for the Control of MRSA (Methicillin Resistant *Staphylococcus aureus)* and Guidelines for Vancomycin Resistant *Enterococcus*. This revised document has included information for both of these organisms as well as recognition that control measures can be applicable to other antibiotic-resistant bacterial organisms. The task force envisions that the use of these best practices will standardize care and improve communication across the continuum of patient care.

The management of patients with multi-drug resistant organisms (MDROs) in the healthcare environment can become very confusing and convoluted. These guidelines are designed to provide the infection control professional (ICP) and their facilities with an educational resource to develop/revise their own institutional policies. This document provides the basic measures that outline best practices at this time. Institutions may implement more stringent control measures as directed by their Infection Control Committees. Decisions and practices related to MDROs should be founded on scientific evidence to prevent unnecessary fear, anxiety and overreaction. Communication is essential in early treatment, identification of risk factors, and promotion of infection control precautions in both the transferring and receiving institution. The measure of exclusion from admission to health care facilities is neither necessary nor reasonable. It is also not an acceptable practice to transfer a patient with a known MDRO, either infected or colonized, without notifying the receiving facility.

The guidelines in this document represent a consensus of opinions of the members of this task force. They are based on published best practices as well as practical and sound infection control interventions; however, they do not constitute official policy. We encourage all providers to become familiar with these guidelines that pertain to their practice setting.

Glossary of Terms and Abbreviations

MDRO: Multidrug-resistant organism

MRSA: Methicillin-resistant *Staphylococcus aureus*

VISA: Vancomycin-intermediate resistant *Staphylococcus aureus*

VRSA: Vancomycin-resistant *Staphylococcus aureus*

VRE: Vancomycin-resistant *Enterococcus*

Carrier:
A person who is colonized with a pathogen, especially MDROs. The organism may be present in the nares, sputum, urine, an open wound, in the stool or on the skin without clinical manifestations of disease. A carrier can transmit the organism to another person through direct contact, (usually hand contact) and indirect contact (e.g. call lights, door handles, telephones, etc.).

Cohort:
A group of patients/residents/clients with the same involved pathogen are physically grouped together and separated from the rest of the patient/resident/client population.

Colonization:
The presence of microorganisms at a body site without symptoms or clinical manifestations of illness or infection.

Decolonization:
Elimination of the carrier state through the use of antimicrobial agents. This decreases the risk of transmission to others, especially immunnocompromised or highly susceptible individuals.

Endemic:
A disease present in a community at all times.

Eradication:
Elimination of infections and/or colonization of MDROs in a healthcare facility through the implementation of infection control and hygienic measures and/or antimicrobial agents.

Contact Precautions:
Use of personal protective equipment, designed to prevent transmission of serious illnesses or epidemiologically important infections/colonization that are transmitted by contact with the patient or with items in the patient's environment.

Infection:
Invasion and multiplication of pathogens in tissue with the manifestation of clinical symptoms of infection, such as: increased white blood cell counts, fever, lesions, furuncles, drainage from open wounds, erythema, pain/tenderness, localized swelling and heat.

Health-care associated infection:
Infection that was not present or incubating at the time of admission to the health care facility (e.g., 48-72 hours after admission).

Contamination:
The presence of microorganisms on inanimate objects (e.g., clothing, surgical instruments) or in substances (e.g., water, food, milk.)

Disinfection:
A process that eliminates many or all microorganisms, except bacterial spores.

Low-level Disinfection:
Use of a cleaning agent that can kill most bacteria, some viruses, and some fungi. It can not be relied on to kill resistant microorganisms, such as tubercle bacilli or bacterial spores.

Intermediate-level Disinfection:
Use of a cleaning agent that inactivates *Mycobacterium tuberculosis*, gram-negative bacteria, most viruses and fungi, but does not necessarily kill bacterial spores.

Cleaning:
Removal of all foreign material (e.g., soil, organic material) from objects. It is normally accomplished with water, mechanical action, and detergents or enzymatic products. Failure to remove foreign matter from an object before the disinfection process is likely to render the disinfection process ineffective.

Outbreak/Epidemic:
The occurrence of infection higher than normally expected.

Pathogen:
A disease producing microorganism.

Standard Precautions:
Includes infection control practices and use of personal protective equipment (PPE) by healthcare personnel when having contact with all patients wherever healthcare is delivered, regardless of patient diagnoses or presumed infection status.

ADMISSION / DISCHARGE
(Patients with MDRO)

The presence of Multidrug-resistant Organisms (MDROs) such as Methicillin Resistant *Staphylococcus aureus* (MRSA) or Vancomycin Resistant *Enterococcus* (VRE) in persons (colonized or infected) warrants attention by the hospital or non-acute care facility in their admission and discharge. The admission or transfer of patients should not be affected by MDRO infection or colonization. This issue is of great practical significance in light of the current misinformation, fear and the natural inadequacies of complete, preventive control measures for infection and colonization. All healthcare facilities regardless of their specialty services must be prepared to implement appropriate infection control measures for patients infected or colonized with a MDRO or other resistant organisms.

It is inappropriate to deny admission to a person colonized or infected with a MDRO. A negative culture should not be a prerequisite for transfer to another facility. Such restrictions impact healthcare delivery by limiting access to desired levels of care and subsequently, prolong the length of stay, and increase overall costs. The movement of patients between different levels of care is facilitated by open lines of communication and the sharing of pertinent information to ensure quality and continuity of care. The infection control community, of a local or regional area, plays an integral role in ensuring that admissions, discharges, and transfers of patients with MDROs are facilitated and unhindered.

HOSPITAL ADMISSION

Admission Rationale:
Hospital admission because of a MDRO infection is appropriate in the medical plan of care. MDRO colonization does not, by itself, warrant a hospital admission. The treatment for infection with MDRO is usually accomplished in an acute-care setting. However, the treatment for an infection can be accomplished in a non-acute care facility or at home. Such decisions should be based on the clinical judgment of the attending physician.

Room Assignment:
A private room is preferred for MDRO infected or colonized patients. It is never acceptable to place a MRSA patient with a VRE patient. Patients colonized with the same MDRO can be placed with other colonized patients (cohort). If cohorting is not possible, the MDRO colonized patient can be placed with a non-colonized patient. The MDRO colonized patient should not be placed in a room with a patient who is a high risk for infection (i.e. a patient with a tracheostomy, gastrostomy tube, central line, urinary catheter, open wound, or who is immunocompromised). Examples of immunocompromised patients include those on chemotherapy or radiation, high dose steroids, with HIV infection, or with organ or bone marrow transplants. A private room is desirable to prevent direct or indirect contact transmission when the MDRO infected or colonized patient has poor hygiene habits, contaminates the environment, and/or cannot comply with precautions.

Infection Control:
Standard Precautions are used for all patients. Contact Precautions are used, in addition to Standard Precautions, for patients with MDROs whether infected or colonized (see Table 1) Compliance with infection control measures, including hand hygiene, is the cornerstone of an effective program.

HOSPITAL DISCHARGE

Upon completion of appropriate therapy for MDRO infection, and when clinical signs and symptoms have resolved (even if the patient still has a positive culture) a hospital discharge may be indicated. A patient colonized with a MDRO while hospitalized for another illness may be discharged when the physician deems it appropriate. In other words, a patient may be discharged from an acute care setting with a positive MDRO culture.

To Another Acute Care Facility/Setting:
Upon transfer, the hospital should notify any institution/agency in advance that the patient they are receiving is colonized with a MDRO. A negative culture should never be a requirement for transfer to another facility.

To Non-Acute Care Facility/Setting:
Upon transfer, the hospital should notify any institution/agency in advance that the patient they are receiving is colonized with a MDRO. A negative culture should never be required for transfer to another facility.

To Home Setting:
The patient/family should be provided the following information:

- Family member should be advised that healthy persons have very little risk of developing an infection due to a MDRO.
- Family members should wear gloves when handling secretions/excretions that are known to contain MDROs and should wash their hands with an antibacterial soap or a waterless alcohol-based hand antiseptic after glove removal. When gloves have not been used, family members should wash hands after providing direct care and before preparing food or eating as described in teaching material (Appendix 5).
- Patient and family/caregiver should wash hands frequently.
- Patient and family members should make all healthcare providers aware of the MDRO status.
- No special laundering procedures are necessary unless there is heavy soiling with body secretions. Bleach added to the wash cycle, when feasible, may be beneficial.
- Household disinfectants should be used on surfaces and items that may be contaminated by excretions/secretions or frequently touched.

The patient's family should understand that they rarely need to practice extraordinary infection control measures in the home beyond good handwashing and careful handling of soiled dressings. If there is a highly susceptible family member (e.g., diagnosed with cystic fibrosis, cancer, or who is immunocompromised) more extensive precautions might be in order and should be discussed with a physician prior to patient discharge.

NON-ACUTE CARE FACILITY ADMISSION

Admission Rationale:
An institution should not deny admission to a person colonized or infected with a MDRO. There should be no barriers to implementing sound infection control practices, regardless of the healthcare setting.

Under special circumstances, treatment for a MDRO infection can be accomplished in the non-acute care facility. This decision is based on clinical judgment of the attending physician and the capabilities of the institution. This should be negotiated between the discharging and receiving physicians and facilities.

Room Assignment:
A private room is preferred for MDRO infected or colonized patients but in this setting may not available. It is never acceptable to place a MRSA patient with a VRE patient. Patients colonized with the same MDRO can be placed with other colonized patients (cohort). If cohorting is not possible, the MDRO colonized patient can be placed with a non-colonized patient. The MDRO colonized patient should not be placed in a room with a patient who is a high risk for infection (i.e. a patient with a tracheostomy, gastrostomy tube, central line, urinary catheter, open wound, or who is immunocompromised). Examples of immunocompromised patients include those on chemotherapy or radiation, high dose steroids, with HIV infection, or with organ or bone marrow transplant. A private room is desirable to prevent direct or indirect contact transmission when the MDRO patient has poor hygiene habits, contaminates the environment, and/or cannot comply with precautions.

Infection Control:
Standard Precautions are used for all patients. Additional measures (i.e. Contact Precautions) are implemented on a case by case basis (i.e., unable to contain body fluids or signs and symptoms of infection). Compliance with infection control measures, including hand hygiene, is the cornerstone of an effective program.

DISCHARGE RECOMMENDATIONS:

To Another Non Acute Care Facility:
Upon transfer, the facility should notify any institution/agency in advance that the patient they are receiving is colonized with a MDRO. A negative culture should never be required for transfer to another facility.

To Acute Care:
Upon transfer, the facility should notify any institution/agency in advance that the patient they are receiving is colonized with a MDRO. A negative culture should never be required for transfer to another facility.

To Home:
The patient/family should be provided the following education:

- Family member should be advised that healthy persons have very little risk of developing an infection due to a MDRO.
- Family members should wear gloves when handling secretions/excretions that are known to contain MDROs and should wash their hands with an antibacterial soap or a waterless alcohol-based hand antiseptic after glove removal. When gloves have not been used, family members should wash hands as described above after providing direct care and before preparing food or eating.
- Patient and family/caregivers should wash hands frequently.
- Patient and family members should make all healthcare providers aware of the MDRO status.
- No special laundering procedures are necessary unless there is heavy soiling with body secretions. Bleach added to the wash cycle, when feasible, may be beneficial.
- Household disinfectants should be used on surfaces and items that may be contaminated by excretions/secretions or frequently touched.

The patient's family should understand that they rarely need to practice extraordinary infection control measures in the home beyond good handwashing and careful handling of soiled dressings. If there is a highly susceptible family member (e.g., diagnosed with cystic fibrosis, cancer, or who is immunocompromised) more extensive precautions might be in order and should be discussed with a physician prior to patient discharge.

SUMMARY of KEY ISSUES RELATED TO ADMISSIONS and DISCHARGES

The following statements summarize key issues regarding discharge/admission management of MDRO patients in acute and non-acute care facilities:

- MDRO status alone is not a reason to deny admission to a health care facility/setting.
- Private room assignment is preferred. Cohorting may be necessary in some circumstances, but never place MRSA and VRE patients in the same room.
- Colonization with a MDRO does not require the extension of hospitalization. Arrangements for discharge to home or a non-acute care facility can proceed as the patient's condition warrants.
- Compliance with infection control measures, including hand hygiene, is the cornerstone of an effective program.

READMISSION OF PATIENTS:

MDRO infected or colonized patients may be re-admitted to the same healthcare facility, regardless if it is acute or non-acute. All healthcare facilities should maintain records of such patients and be able to "flag" either the medical records or the computer system to alert the facility of the patient's MDRO status and any special isolation/precaution requirements.

PRECAUTIONS (ISOLATION) TO PREVENT TRANSMISSION OF MDROs

Generally Contact Precautions are recommended for the control of MDROs, colonized or infected. (Refer to the CDC- Guidelines for Isolation Precautions in Hospitals; The Centers for Disease Control and Prevention (CDC) is revising this document and the draft document is named "Guidelines for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings). Individual facilities may make modifications to the guidelines based on their setting.

Gloves are worn when entering the Contact Precautions room. Gloves should be changed in the course of providing care for the patient if there is contact with infective material that may contain high concentrations of multi-drug resistant microorganisms. Before removing gloves be sure to position any needed personal items (i.e., move call light closer to patient, move bedside stand closer to patient, open door, etc). Perform hand hygiene immediately after glove removal.

Gowns are worn if you anticipate that your clothing will have substantial contact with the patient, environmental surfaces, items in the patient's room, if the patient is incontinent, has diarrhea, an ileostomy, a colostomy, or wound drainage not contained by a dressing. Remove the gown before leaving the patient's environment. After gown removal, ensure that clothing does not contact potentially contaminated environmental surfaces to avoid transfer of microorganisms to other patients or environments.

Masks and eye protection are indicated if splashes or sprays of blood and body fluids are likely to be encountered to the eyes, nose and mouth (Standard Precautions).

Table 1 summarizes the MDRO isolation precautions for acute care and post-acute care.

Table 1
Multi-Drug Resistant Organisms Isolation Precautions

	ACUTE CARE		POST-ACUTE CARE	
	MRSA	VRE	MRSA	VRE
STANDARD PRECAUTIONS	YES	YES	YES	YES
HAND HYGIENE	YES	YES	YES	YES
ROOM ASSIGNMENT (In all settings, patients with poor hygiene habits may need a private room)	PRIVATE ROOM if possible. If no private room available, place with patient who has MRSA. Never place MRSA positive patient with VRE positive patient (see appendix 1)	PRIVATE ROOM If possible. If no private room available, may place with other VRE patient. (see appendix 1)	PRIVATE ROOM if possible. If no private room available, place with patient who has MRSA. Never place MRSA positive patient with VRE positive patient (see appendix 1)	PRIVATE ROOM If no private room available, may place with other VRE patient. As a last resort, a VRE positive patient may be placed with a VRE negative patient but room assignment guidelines need to be followed (see appendix 1)
GLOVES	YES at all times when in the room	YES at all times when in the room	YES at all times when in the room	YES at all times when in the room
GOWNS	YES if in contact with patient or the environment	YES if in contact with patient or the environment	YES if soiling of uniform is likely or body fluids cannot be contained	YES if soiling of uniform is likely or body fluids cannot be contained
MASKS/FACE SHIELDS/EYE WEAR	YES if splattering is likely	YES if splattering is likely	YES if splattering is likely	YES if splattering is likely
DEDICATED EQUIPMENT	YES (when feasible)	YES (when feasible)	YES (when feasible)	YES (when feasible)
ACTIVITY OUTSIDE ROOM	In the acute hospital setting, movement and transporting of patients with MRSA/VRE should be limited. Patients should only leave their rooms for essential purposes. Body fluids must be contained appropriately while out of the room. Specific infection control precautions must be taken. (see Activity Outside the Room – page 14)		If body fluids can be contained and there are no clinical signs and symptoms of infection, patients with MRSA/VRE may join group activities, leave room for therapies/treatments, eat in the dining rooms, etc. Hand Hygiene should be done by the patient before leaving the room. (see Activity Outside the Room – page 14)	

Discontinuing Contact Precautions (Isolation) for MDRO Patients

The procedures for discontinuing contact precautions (isolation) may vary with the organism and with the facilities' policies. Patients with MRSA or VRE may remain colonized with the organism for extended periods of time or indefinitely. Other MDRO organisms may resolve more quickly. Consensus regarding criteria for discontinuing precautions (isolation) remains unresolved. However, best practice is to continue precautions (isolation) until consecutive negative cultures are obtained.

ACTIVITY OUTSIDE OF THE ROOM

Factors to consider when making decisions about infection control measures include:

- How much care the patient needs
- The amount of contact with body fluids
- The patient's ability to control secretions or excretions
- Patient's level of activity and mobility

Acute Care Setting

In the acute care setting, it is recommended that Contact Precautions (Isolation) be used for patients colonized or infected with MDROs.

Limiting the movement and transporting of patients with MDROs and ensuring that patients leave their room only for essential purposes reduces the risk of transmission of MDROs in the hospital setting. If transporting the patient is necessary, it is important that:

- Appropriate barriers are worn or used by the patient (i.e., masks if the patient has productive cough and poor compliance with respiratory etiquette, dressings that contain drainage).
- The patient wears a clean gown.
- Clean linen is in the wheel chair or on the cart.
- Personnel in the area receiving the patient should be informed of the arrival of the patient and the necessary precautions needed.
- Patients are informed of ways they can help in preventing the transmission of MDROs to others, (i.e., handwashing with antimicrobial soap or a "waterless" alcohol-based hand antiseptic before leaving the room).
- In general, gloves, gowns and masks should not be worn outside the room by staff members, especially in public areas.

These measures will help to reduce the risk of transmission of MDROs to other patients, personnel, visitors, and reduce the risk of contamination of the environment.

Post-Acute Care Setting

The facility is considered a home to residents who live there and a variety of precautions may be used. Effective hand hygiene and Standard Precautions are still the best methods of infection control. Long Term Care residents, showing signs and symptoms of an infection, should be restricted to their room using Contact Precautions (Isolation) until signs and symptoms are resolved. Residents colonized with MDROs should not be restricted from social or therapeutic group activities if their secretions can be contained. There is no scientific evidence that supports the restriction of colonized residents from group activities as an effective way to control the transmission of MDROs. If a colonized resident wants to leave their room, best practice should include assessing:

- The ability to contain the resident's secretions and excretions.
- The resident's ability to understand and follow basic hand hygiene guidelines.

Rehabilitation Setting

In a rehabilitation (rehab) setting many different disciplines are involved in the care of the patient on a daily basis. This unique setting treats patients who need many different types of equipment and who usually have more than one disability or illness at the time of admission. Many have been reported to have one or more infections upon admission to the rehab setting. Standard Precautions and good hand hygiene should be used with all rehab patients.

Encouraging patient mobility, direction of care and physical independence is important and may conflict with recommended Contact Precautions (Isolation). If a patient is known to be infected or colonized with MDROs, the interdisciplinary team including the Infection Control Practitioner (ICP) must review each case. This team will make decisions about care, point of service, and any needed restrictions that will be placed on the patient. Examples may include:

- Signs and symptoms of infection.
- The ability to contain the patient's secretions and excretions.
- The patient's ability to understand and follow basic hand hygiene guidelines.

Educating the patient, family and team members about MDRO restrictions will facilitate compliance. This will allow for increased independence and mobility.

Hand Hygiene

Hand hygiene (hand washing with soap and water or use of alcohol-based hand gel/foam) is the single most important factor in preventing and controlling the spread of MDROs. Studies support that the hands are noted to acquire germs from patients and/or contaminated environments. Germs are then transferred to other people and environmental items that are touched. Antibacterial (antimicrobial) soap or alcohol-based hand gel/foam is preferred for hand washing when caring for patients with MDROs, especially when they are in Contact Precautions (Isolation). Several studies noted that plain (non-antimicrobial) soap used in handwashing with VRE patients failed to remove pathogens from the hands of healthcare workers.

Alcohol-based (60%-95%) waterless hand sanitizer products are also effective. In vitro studies denote alcohol-based products to be highly effective against a broad spectrum of bacteria, including MDRO, fungi and some viruses. Studies have also indicated that these products increase healthcare worker compliance with hand hygiene practices. These hand sanitizers are more accessible than soap and water and take less time to use.

Antimicrobial-impregnated wipes (towelettes) may be considered as an alternative for plain soap and water. Caution should be noted with the wipes/towelettes. Studies have noted the wipes/towelettes are not as effective and are not a substitute for alcohol-based antiseptics or antimicrobial soap. Studies have also noted that alcohol, chlorhexidine, iodophore, and other antiseptic agents have poor activity against spores, such as *Clostridium difficle* and *Baccillus anthracis.* Friction with soap and water is recommended to remove the spores from the healthcare workers hands. Monitoring compliance of hand hygiene practices is an important prevention strategy.

Nothing under a set of gloves, be that skin or another set of gloves, should be considered clean. All pairs of gloves should be removed after one use and hands washed. The practice of double-gloving to avoid hand hygiene activities is not an acceptable practice. A health care worker (HCW) should not wear two sets of gloves to perform two different tasks, one dirty and one clean. For example, the HCW should not perform pericare, remove the outside set of gloves and then proceed to administer oral medication. This example is an unacceptable practice. A new pair of gloves and hand hygiene is required between dirty and clean tasks/procedures.

Providing recommended hand hygiene supplies to patients/residents is another important preventative strategy. Patients/residents and significant others should receive education (verbal, written, graphical) on when to perform hand hygiene and the correct method. This education needs to be reinforced periodically. Hand hygiene for patients/residents should, at a minimum, be completed after using the toilet, before eating, and before leaving the assigned room. If the patient/resident can not complete this task independently and/or consistently, the staff needs to be educated on assisting these patients/residents. Again, monitoring compliance is an important factor in prevention.

When to complete hand hygiene task for HCW:

- before direct contact with patients
- before eating
- before donning sterile gloves for insertion of a central intravenous catheter
- before performing procedures with invasive devices that do not require a surgical procedure
- after contact with patient's intact skin
- after contact with body fluids or excretions, mucous membranes, non-intact skin, and wound dressings, even if not visibly soiled
- after contact with inanimate objects, including medical equipment, in immediate vicinity of the patient
- after removing gloves
- after using restroom
- after touching contaminated body site, and before moving to clean body site during patient care.

How to complete hand hygiene task correctly:

Soap and water are used when the hands are visibly soiled/contaminated. Several studies noted that plain soap did not remove bacteria on hands as well as antimicrobial soap. When caring for patients/residents/clients with MDRO infection or colonization, an antimicrobial soap is recommended for hand hygiene. Studies have found that jewelry on the hands harbor a high concentration of germs. Therefore, special attention should be taken when performing hand hygiene if jewelry is worn. In addition, artificial fingernails have been reported in infectious outbreaks to harbor germs, even with hand hygiene practices. Paper towels are preferred as a means of drying hands. Cloth towels (hand or roll-type) in health care facilities are not recommended.

Handwashing Procedure (see appendix 5 for handwashing teaching sheet):

- use soap and warm running water
- wet hands with water **before** applying soap
- rub soap (use friction) between fingers and hands for at least 15 seconds
- rinse hands well under a stream of water
- dry hands thoroughly, using disposable paper towels
- turn off faucet with a paper towel, do not use bare hands
- consider using a paper towel to turn door knob when leaving the patient/resident's precaution (isolation) room
- apply hand lotion/cream to replenish the oils in the skin (verify compatibility with antibacterial chemical in soap and latex in gloves)

Liquid, bar, leaflet or powdered forms of soap are acceptable for plain soap applications. When bar soap is used, the soap holder/container must facilitate water drainage away from bar to allow air drying of soap.

Alcohol-based, waterless hand sanitizer product:
These products are used when hands are not visibly soiled. Alcohol is a poor cleansing agent; therefore, it should not be used for soiled hands. Alcohol also has a drying effect on the skin. Many alcohol-based products have added emollients (oils) to the chemical make-up of the product to address this issue. Apply hand lotion/cream to replenish the oils in the skin.

Procedure (follow manufacture's recommendations)

- do NOT wet hands; this may dilute the effectiveness of the alcohol
- dispense gel/foam into palm of hand or fingers (amount as directed by manufacturer; enough to wet the hands completely)
- spread gel/foam over both hands and up wrists (about ½" above wrist)
- rub gel/foam vigorously over hand and wrist surfaces until DRY
- repeat if recommended by manufacturer

Environmental (Housekeeping) Practices and Equipment

Standard, consistent environmental practices are important in preventative approaches to managing patients/residents/clients with MDROs. Environmental cleaning and disinfecting assists in preventing cross-transmission of resistant microorganisms to people and to additional environmental items. Education to staff on MDRO relationship to contaminated environments and cross-transmission is critical to compliance of practices.

Epidemiological studies have noted that contamination of items within the MDRO patient rooms occurs. These microorganisms have been recovered from bedrails, telephones, call lights, faucet handles, door knobs, chairs, wheelchairs, rectal/oral/ear-probe electronic thermometers (especially the handle), over-the-bed tables, blood pressure cuffs, computer keyboards and mouse, pagers, and stethoscopes.

Disinfectants:
Non-critical items (items that come in contact with intact skin) or surfaces contaminated with resistant organisms do not require any special procedures for cleaning and disinfecting. Visibly soiled items need to be cleaned, using soap and water or a detergent solution, before disinfection. Hospital-grade intermediate or low-level disinfectants approved by the Environmental Protection Agency (EPA) are recommended. Many commercial products meet these requirements. Examples include: bleach (200 ppm: scant teaspoon of bleach in 1 quart of water)), ethyl or isopropyl alcohol (70-90%) and hydrogen peroxide (3-6%). Phenolic disinfectants (such as Lysol and Pine Sol) and quaternary ammonium products may also be used. It is important to follow the manufacturer's recommendations for mixing, contact time and duration so that the chemical remains active (check expiration date on container and expiration date after mixing). Note that if bleach is used, it must be mixed fresh daily. Bleach may be caustic to some metals and discolor fabrics; use bleach with caution.

Dusting/Disinfecting Environmental Surfaces:
Regular, routine cleaning and disinfection of environmental surfaces and items is important in reducing cross-transmission of MDROs. The frequency of these activities needs to be based on assessment of each facility's environment. "Wet" dusting with disinfecting solution for precaution/isolation rooms may also be beneficial. This practice contains and manages dust particles. It also reduces the bioburden (concentration) of the resistant organisms on environmental items and surfaces. The duration of the disinfecting solution and cleaning cloth use needs to be assessed. Continued use of the same solution and cloths over time may allow these items to become over-burdened with germs. Once this occurs, the killing effect of the chemical is hindered. Common practice is to use the solution, cloth and mop head for only one precaution/isolation room (do not reuse them on another room). Stricter and more frequent environmental cleaning and disinfecting practices should be considered during an outbreak or cluster of MDRO cases.

Toilets and commodes used by MDRO infected or colonized patients/residents/clients should be cleaned when visibly soiled and disinfected daily with an EPA approved product. Hydrotherapy tubs/bathtubs should be disinfected after each patient/resident use. Facilities should follow equipment manufacturer's recommendations on types of disinfectants; facilities should follow manufacturer's recommendations on mixing, contact time and expiration date(s) of disinfectant. The disinfecting solution level needs to cover the jets during disinfection. The jets should be operational to circulate the solution.

Trash:
Trash is considered dirty, contaminated and non-biohazardous. For these reasons, protective barriers (i.e., gloves) are recommended for the process of collecting and discarding trash. Wash or sanitize hands after glove use. It is preferred to place dressings and items contaminated with body fluids in a small bag before putting them in regular trash. No special precautions are necessary for MDRO trash, such as double bagging. Discourage all persons from searching through trash. Items with blood and body fluids that drip, are pourable, or flake upon drying should be discarded in a biohazardous-labeled container/bag.

Linen/Clothing:
Soiled linen should be contained/bagged at the location of use. No special precautions are necessary for MDRO patients/residents dirty linen, such as double bagging. Use waterproof bags to contain fluids to prevent/reduce contamination of the environment and people. Do not sort or rinse soiled linens with body substances in patient care areas. Follow the health care facility's laundry procedures and use water temperature and chemicals as recommended by manufacturer. Facilities should follow local or state health department regulations for laundering. Linen handlers should wear protective barriers to prevent contamination from soiled linens. Wash or sanitize hands after glove use. Bleach may be added to wash cycle if linens are heavily soiled with body fluids.

Dishes/Food Serving Items:
No special precautions are needed in washing and drying items used by patients with MDRO infection or colonization. All used dishes are considered contaminated/dirty. Do not allow other people to use utensils or eat off MDRO infected or colonized patients/residents/clients serving dishes/tray. If patient's meals are served on a tray in the room, the used tray and dishes can be removed from the room and placed directly in the food cart. The cart/dishes will go through a sanitation process in the kitchen. Wash hands after placing dirty tray in the cart. Disposable dishes are not necessary. Do not take the patient's water pitcher out of the precaution (isolation) room to be refilled. Instead, bring a disposable container (i.e., paper cup) of ice into the room, and fill the pitcher from the sink in the patient's room.

Patient/Resident Equipment:
Dedicated equipment for patients/residents/clients with MDRO infection or colonization is recommended. Examples would include stethoscope, blood pressure cuff, thermometer and weight scale. If supply inventory is an issue, the items should be cleaned with soap and water or detergent solution if visibly soiled and always disinfect them before they are removed from the patient/residents room and prior to another person's use.

Home Care Items:
Because of the potential for environmental contamination, the health care worker should use barrier precautions as deemed necessary. For example, the nursing bag should be protected from the environment by a barrier. Only take into the home the essential amount of needed supplies. Dedicated equipment is ideal (see Equipment section).

Microbiology/Laboratory Practices

Background:
Staphylococcus aureus (*S. aureus)*, a gram positive coccus, is distinguished in the laboratory setting by its tendency to form grape-like clusters under microscopic examination and by its positive result on coagulase testing. It grows rapidly under either aerobic (oxygen) or anaerobic (without oxygen) conditions.

Though *S. aureus* was first identified in 1880, penicillin, the first known antibiotic effective in treating the organism, wasn't discovered until 1928. Hospital-based strains quickly developed resistance to penicillin in the 1940s and 1950s. In 1959, the first semi-synthetic penicillin, methicillin, was produced by altering the chemical composition of penicillin. Two years later, the first methicillin resistant *S. aureus* (MRSA) strains were reported.

In the past three decades, the prevalence of MRSA strains has steadily increased in hospitals in the United States and abroad. National Nosocomial Infections Surveillance (NNIS) data collected by the Centers for Disease Control and Prevention (CDC) in the early to mid-1980's indicated that MRSA was limited mainly to relatively large urban medical centers and that rates were 5% to 10%. Smaller, non-referral centers were relatively free of MRSA, with prevalence rates well below 5%. By the 1990s, the rates among these smaller (<200-bed) community hospitals had increased to 20% and twice that rate was found in the larger urban centers. More recent surveillance data from NNIS indicate that rates have continued to rise, with the prevalence of MRSA isolates from intensive care units approaching 50% by the end of 1998. Unless this upward trend is reversed, the prevalence rate of MRSA in United States hospitals likely will reach 50%. At these high rates, the emergence of correspondingly high rates of MRSA strains in the community are anticipated. Reports of infection and colonization by strains of MRSA in children have been documented. Unlike hospital strains, which typically are resistant to multiple antibiotics and can be shown by typing schemes to be related to other hospital strains, these so-called community strains have tended to be susceptible to other antibiotic classes and often are resistant only to beta-lactam antibiotics. Typing by pulsed-field gel electrophoresis (PFGE) also suggests that these strains are distinctive. Based on experience with other resistant *S. aureus* strains, prevalence of MRSA among community isolates may be as high as 25% within the next 5-10 years.

VISA - Vancomycin-intermediate-resistant *Staphylococcus aureus*
VRSA - Vancomycin-resistant *Staphylococcus aureus*

Reports in the 1990s indicated that the susceptibility of *S. aureus* to vancomycin was changing. In May 1996, the first documented infection with VISA was reported in a patient in Japan. Subsequently, infections with VISA strains have been reported in patients from the United States, Europe, and Asia. Although healthcare-associated spread of VISA strains has not been observed in United States hospitals, one report from France suggests that spread has occurred in a hospital, and spread of heteroresistant *S. aureus* strains has occurred in Japan and Hong Kong. In July and October of 2002, the first two VRSA infections were reported in patients from the United States. Both VRSA isolates contained the vancomycin resistance gene, vanA, commonly

found in vancomycin-resistant *enterococci*. To date, all VISA and VRSA isolates have been susceptible to other Food and Drug Administration (FDA) approved drugs.

As of March 2004, eight cases of infection caused by VISA and three cases of infection caused by VRSA have been reported in the United States.

Colonization vs. Infection:
Humans are natural reservoirs for *S. aureus* (both resistant and sensitive) and asymptomatic colonization is far more common than infection. Colonization indicates the presence of the organism without symptoms of illness. Colonization of the nasopharynx, perineum, skin folds, or in open wounds, such as pressure ulcers, may occur shortly after birth and may recur anytime thereafter. General population carriage rates are 25% to 50%; higher rates are observed in injection drug users, persons with insulin dependent diabetes, patients with dermatologic conditions, patients with long term indwelling intravascular catheters, and health care workers. Colonization may be transient or persistent and can last for years. MRSA colonization is not an indication for hospital admission, prolonged hospital stays or refusal of admission to a long term care facility. MRSA is not a "super bug" and is no more likely to cause serious infection than antibiotic susceptible *S. aureus*.

An infection is defined as tissue invasion with subsequent clinical symptoms. Infections caused by *S. aureus* (both resistant and sensitive) include but are not limited to cellulitis, pustules, furuncles, carbuncles, impetigo, bacteremia, endocarditis, wound infections and less commonly pneumonia. It also produces toxins which can cause gastroenteritis (following ingestion of contaminated foods) and in rare instances, toxic-shock syndrome.

Laboratory Detection of MRSA/VISA/VRSA:
Research shows that staphylococcal resistance to oxacillin/methicillin occurs when an isolate carries an altered penicillin-binding protein, PBP2a, which is encoded by the mecA gene. The alteration of the penicillin-binding protein does not allow the drug to bind well to the bacterial cell, causing resistance to β-lactam antimicrobial agents.

When resistance was first described in 1968, methicillin was commonly used to test and treat infections caused by *S. aureus*. Now methicillin is no longer the agent of choice; oxacillin and nafcillin are widely used. However, the acronym MRSA is still used by many to describe these isolates because of its historic role.

Strains of *S. aureus* that are oxacillin and methicillin resistant (MRSA), are also resistant to all β-lactam agents, including cephalosporins and carbapenems. MRSA isolates are often multiply resistant to other commonly used antimicrobial agents, including erythromycin, clindamycin and tetracycline.

MRSA Laboratory Workup
When culturing invasive sites (tracheostomies, pressure ulcers, gastric tube [g-tube] sites, wounds, dermatitis, etc.), the site should first be gently cleansed with a sterile gauze sponge moistened with saline. Using a sterile moistened swab, gently swab the site with a rolling motion. Be sure to swab the area beyond any pus or destroyed tissue. Culturing the pus or

destroyed tissue may result in a false negative result because these dead cells may not contain live bacteria. Transport the specimen in a transport media according to the manufacturer's directions. Gloves should be worn when collecting cultures.

Cultures being processed for a clinical infection work up (versus screenings) should have full sensitivity testing performed according to the laboratory's protocols. When used correctly, broth-based and agar-based tests usually can detect MRSA. Oxacillin screen plates (agar plate containing 6 mcg/ml of oxacillin and Mueller-Hinton agar supplemented with NaCl (4% w/v; 0.68 mol/L) can be used as a back-up method.

Accurate detection of oxacillin/methicllin resistance can be difficult due to the presence of two subpopulations (one susceptible and the other resistant) that may coexist within a culture. All cells in a culture may carry the genetic information for resistance but only a small number can express the resistance in vitro. This phenomenon, termed heteroresistance, is a problem for clinical laboratory personnel because cells expressing resistance may grow more slowly than the susceptible population. This is why National Committee for Clinical Laboratory Standards (NCCLS) recommends incubating isolates being tested against oxacillin, methicillin or nafcillin at 35 degrees centigrade for a full 24 hours before reading.

In 1999, NCCLS set sensitivity breakpoints for *S. aureus*. These are different than those set for coagulase-negative *staphylococci*.

S. aureus	**MIC**	**Zone Sizes**
Oxacillin Susceptible	< or equal to 2 mcg/ml	> or equal to 13 mm
Oxacillin Intermediate	No intermediate MIC	11-12 mm
Oxacillin Resistant	> or equal to 4 mcg/ml	< or equal to 10 mm

More sophisticated tests can be used to identify resistance. Amplification tests like those based on the polymerase chain reaction (PCR) can detect the mecA gene. During an outbreak situation, the laboratory should save all isolates for further phage/plasmid typing or chromosome analysis.

VISA/VRSA Laboratory Workup

Most isolates of *S. aureus* are susceptible to vancomycin minimum inhibitory concentration (MIC), < 0.5 mcg/ml. MIC is the least amount of antibiotic needed to kill the bacteria in a laboratory setting. In contrast, VISA isolates have vancomycin MIC's of 8-16 mcg/ml. As of November 2004, only three resistant (vancomycin MIC > 32 mcg/ml) isolates have been documented in the United States.

Not all routine susceptibility testing methods can detect VISA/VRSA isolates. Disk diffusion (Kirby Bauer) testing and MicroScan rapid panels currently cannot detect these isolates. In addition, the current version of Vitek software may not report vancomycin MICs above 4 mcg/ml for *Staphylococci* other than *S. hemolyticus*. In general, MicroScan conventional panels and Etest can detect *Staphylococci* with decreased susceptibility to vancomycin when the tests are incubated for a full 24 hours before reading.

Culturing of HCWs/Patients and the Environment

- Routine culturing of HCWs and the environment is not recommended.

- Culturing may be considered in the presence of noted outbreaks and or clusters of MRSA positive cultures among patients as defined by pulse-field gel electrophoresis (PFGE) or other biotyping methods.

- Some Infectious Disease physicians and the Board of the Society for Healthcare Epidemiology of America (SHEA) are advocates of an aggressive approach with VRE/MRSA and recommend routine surveillance cultures on all patients in the presence of endemic MDROs in the hospital. As of 2004, there is not consensus on the SHEA recommendations. This topic continues to be discussed by Healthcare Infection Control Practices Advisory Committee (HICPAC) as they work on the draft "Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings".

Management of an Outbreak

Definition of MDRO Outbreak/Epidemic:
When a facility has an initial case of MRSA or VRE, it is an outbreak by definition. However, the common definition of an outbreak is: several (e.g. 3 or more healthcare-associated infection [HAI] cases of MDRO which are epidemiologically associated by person, time or place), or a substantial increase in the number of cases in a facility. Each facility must decide the criteria to define an outbreak in their institution.

Upon the recognition of an outbreak of MRSA or VRE in a facility, actions should be taken to quickly contain the outbreak and resolve it. If these actions are unsuccessful, calling the local or state health department for consultation/assistance with an MDRO outbreak is essential. In the State of Nebraska, outbreaks of MDROs are reportable.

Management of an Outbreak:
When an outbreak is recognized, immediately notify administration and employees. An outbreak is no reason to close the non-acute care facility or hospital to new admissions. The facility should not be prevented from discharging patients/residents/clients, provided the guidelines for admissions/discharges are followed.

Immediately review standard precautions and contact precautions and verify compliance with infection control measures (e.g., hand hygiene, cleaning and disinfecting equipment and environment). Reinforcement of the basic measures, or initiation of more stringent measures (e.g., cohorting) may need to be taken.

Identify additional infected or colonized patients/residents/clients/staff through continued surveillance cultures.

- All patients, in the unit or units where cases have occurred, should be simultaneously cultured. Culture sites should be appropriate for the organism involved in the outbreak. Cultures for MRSA should be obtained from both nares, and other sites as indicated (e.g., any open wounds). Cultures for VRE should be obtained from the rectum, and other sites as indicated (e.g., any open wounds). A hospital or reference laboratory may be consulted to interpret the results and assist in determining if pulse field gel electrophoresis (PFGE) testing should be done.

- Employees should only be cultured if it is epidemiologically implicated in the transmission (i.e., a healthcare provider is identified as a common link among culture-positive patients). Appropriate sites for culturing MRSA are nares and other sites as indicated (e.g., open wounds). Cultures for VRE should be obtained from rectum and other sites as indicated (e.g., open wounds). An epidemiologically implicated culture-positive caregiver should be counseled regarding infection control measures and any deficiencies in techniques should be corrected immediately. More definitive control measures, such as removal of the employee from the care of high-risk patients, may be considered if the initial steps fail.

During an outbreak when initial control measures are unsuccessful, control measures may be expanded to include cohorting. (All patients with the same involved pathogen should be physically grouped together and separated from the rest of the patient/client population.). Ideally, employees assigned to the cohort should work with the cohort patients/clients only.

If healthcare providers must care for patients outside the cohort, meticulous hand hygiene must occur before leaving the cohort area. Jewelry should be restricted. Equipment must be dedicated to the cohort area and not used outside the cohort area (e.g., stethoscopes, electronic blood pressure machines or thermometers, blood glucose monitoring equipment, electronic lifts, bandage scissors, etc.)

Decolonization of patients/residents/clients or employees is not routinely recommended. This has not been proven to be an effective control measure, because recolonization usually occurs.

Epidemiologic Investigation:
An internal working group should be organized to investigate the outbreak. Additionally, assistance may be sought from physicians specializing in infectious diseases or infection control, from certified infection control professionals, a reference laboratory or state health department representatives. The local and state health departments must be notified of the outbreak. Facts concerning the outbreak, such as the severity of the epidemic, methods of transmission, prevention and control measures, should be clearly communicated to all personnel of the facility. A written report of the outbreak should be completed promptly after the investigation is complete.

The epidemiologic investigation should include the following data:

- Patient/resident/client identifier (including age, sex and race)
- Location in the institution (before and after cohorting)
- Diagnosis, especially those conditions with negative impact on patient/resident/client immune status
- Date of admission and recent hospitalizations
- Culture dates, sites and results
- Date when precautions (isolation) were initiated in the facility
- Treatments given, especially antimicrobial therapy
- Healthcare providers involved in the care of the culture-positive patient
- Summary of interventions and outcomes

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APPENDICES

Appendix 1

Roommate Placement Checklist for MDRO (Multi Drug Resistant Organisms)

(for facilities without the option of a private room)

Questions to ask about the MDRO Patient/Resident:

** If the answer is "yes" to **any** of the following, placement with a MDRO-negative roommate **is not** indicated.*

Yes	No	
□	□	Does the patient/resident have non-intact skin, open wounds, stasis ulcers, decubiti, burns, or indwelling devices (i.e. IV, Foley catheter, G-tube, wound suction or dialysis catheter)?
□	□	Does the patient/resident have long-term fecal or bladder incontinence (i.e., body wastes not fully contained in stoma, catheter bag, or incontinence diaper)?
□	□	Does the patient/resident have other drainage that is not contained?
□	□	Is the patient/resident unwilling or unable to cooperate in strategies to contain his/her body secretions?
□	□	Is the patient/resident cognitively impaired in ways that may allow MDRO transmission?

Questions to ask about the roommate:

If the answer is "yes" to **any of the following questions, placement with MDRO-positive roommate **is not** advised.*

Yes	No	
□	□	Does the roommate have non-intact skin, open wounds, stasis ulcers, decubiti, burns, or indwelling devices(i.e. IV, Foley catheter, G-tube, wound suction or dialysis catheter)?
□	□	Is the roommate significantly immuno-compromised (i.e., neutropenic or on oral steroids or chemotherapy)?
□	□	Is the roommate known to be colonized with a different MDRO (i.e., MRSA, VRE)?
□	□	Is the roommate unable to cooperate in the proposed infection control measures?
□	□	Is the roommate cognitively impaired in ways that my prohibit compliance with precautions?

Resource: Hospital Infection Control/Sept'1999: "Infection control methods used to stall VRE spread."

Appendix 2

Patient and Family Education about MRSA

What is MRSA?
MRSA stands for methicillin-resistant *Staphylococcus aureus. Stahpylococcus aureus* (staph) is a bacteria commonly found on the skin of healthy people. Sometimes staph can get into the body and cause an infection. Methicillin was an antibiotic commonly used to treat staph infections. It was a very good treatment for most staph infections, but some staph bacteria have developed resistance to methicillin and can no longer be killed by this antibiotic. These resistant staph bacteria are called MRSA. A person can be a MRSA carrier (colonized), which means the bacteria are present on or in the body without making the person sick, or a person can have an active MRSA infection, which means the bacteria are present on or in the body and are making the person sick.

Where is MRSA found?
MRSA can be found on the skin, in the nose, in blood, and urine.

Who gets MRSA?
MRSA infection can develop in patients who are old, very sick, who have open wounds(such as a bedsore), or a tube going into their body (such as a urinary catheter). Today, more people in the community are becoming carriers (colonized) of MRSA.

Is MRSA treatable?
Yes. A few antibiotics can still kill the resistant bacteria, and are used to treat MRSA infections. Persons who are MRSA carriers (colonized) usually do not need treatment.

Can MRSA spread?
Yes. MRSA is almost always spread by touching, and not through the air. Touching the person with MRSA or touching anything he has touched may spread the bacteria. Hospitals usually take extra precautions to prevent the spread of MRSA, such as putting the patient with MRSA in a private room, or in a room with persons who also have MRSA. All persons, including family/visitors, entering the room should wear gown and gloves and complete good hand hygiene when leaving the patient's room.

Will extra precautions be taken every time I am admitted to the hospital?
When you are admitted to a hospital, tell your healthcare provider if you have had or currently have MRSA. Hospitals have guidelines to assist them in deciding if extra precautions need to be taken. The guidelines may include culturing your nose and possibly other body sites.

What should I do when I go home?
Healthy people have very little risk of getting MRSA. If you are healthy, then it is okay to be in the same room with a person who has MRSA. Casual contact, such as touching or hugging, is also okay, but remember to wash your hands before leaving the patient's home. Persons who are very ill or have trouble fighting infection should avoid contact with the body fluids (urine, stool,

drainage) of the person with MRSA, and limit physical contact to no more than casual contact. They should also wash their hands after physical contact with a person who has MRSA.

The following practices are recommended for the care of a person with MRSA at home:

- Wash your hands after caring for the person with MRSA.
- Clean the hard surface areas of the person's room and bathroom and personal items with a disinfectant or a fresh solution of a teaspoon of bleach in one quart of water.
  Note: Bleach discolors clothing, fabrics, and carpeting. The bleach solution needs to be mixed fresh daily.
- Wear gloves if you touch body substances (blood, urine, wound drainage) and wash your hands after taking off and throwing away the gloves.
- The person with MRSA should have their own personal towel and washcloth that no one else uses.

If you are going into the hospital, it is *very* important for you to let the hospital admitting staff know that you have MRSA. Also tell the nurses and doctors that you have MRSA.

Can my pet get MRSA?
There is a chance that your pet can become carriers of MRSA, but this should not cause any health problems for them.

Handwashing:
Handwashing is the single most effective step in preventing the spread of germs and infection. Germs, which cause infection, often travel from person to person simply through touching. Anyone who has seen a family member come down with a cold or flu can tell you how easy it is for infections to spread from person to person. Handwashing with soap and water or a alcohol based "waterless" hand sanitizer helps to remove disease-causing germs before they enter the body or are spread to another person. It is your responsibility to prevent passing germs to family members, visitors, and yourself.

To protect yourself and others, be sure to:

- Wash your hands often – remember, clean hands are key to infection control.
- Wash your hands after removing gloves.
- Wash your hands after touching items that are dirty and may have germs on them.
- Wash your hands after using the rest room, blowing your nose, or covering a sneeze.
- Wash your hands before you eat, drink or prepare or handle food.
- Ask your visitors to wash their hands before and after having contact with you in order to prevent the spread of germs.
- Wash your hands if you get blood or any other body fluids on them.
- Wash your hands after handling soiled or contaminated items such as dressings, clothing, linen, tissues, etc.

Appendix 3

Patient and Family Education about VRE

What is VRE?
VRE stands for Vancomycin-resistant *Enterococcus. Enterococcus* is a bacteria that normally lives in the gastrointestinal tract (stomach and bowels), female genital tract (vagina), mouth, throat, and on the skin around the anal area, and may cause infection in other parts of the body. Large amounts of *Enterococcus* are normally found in the feces (stool) of humans. Vancomycin is a very effective antibiotic used to treat *Enterococcal* infections. VRE are bacteria that have developed resistance to vancomycin, and can not be killed by this antibiotic. Serious infections may be difficult to treat. People can be carriers (colonized) of VRE, which means that they have it in their intestine or on their skin without making them sick, or they can have an active VRE infection, in their urinary tract, wound, lungs or blood that is making them sick.

Who gets VRE?
If you are healthy, and living in the community, your chances of becoming infected with VRE are low, even if you have been in contact with someone with VRE (for example, at work). You may be more at risk if you have been treated previously with frequent doses of vancomycin. Patients who have trouble fighting infection are also at greater risk of getting sick from VRE.

How are VRE infections treated?
Healthy people who are carriers (colonized) of VRE do not need treatment. Serious VRE infections, while they are difficult to manage, may still be treated with high doses of vancomycin-like antibiotics. Some new antibiotics may also be effective.

Can VRE spread?
Yes. The most common way VRE is spread is by contact with an infected person, usually with the hands. A much less common way it can be spread is by contact with environmental surfaces that have been contaminated by the infected person (such as the hand railing, faucets, or handles). Preventing the spread of VRE is very important. The most important thing you can do to prevent the spread of VRE is to wash your hands. Wash the hands before eating, drinking, smoking, or applying personal care products, and after you use the toilet using soap and water or an alcohol based instant “waterless” hand sanitizer. Hospitals usually take extra precautions to prevent the spread of VRE, such as putting the patient with VRE in a private room, or in a room with a person who also has VRE. Also, clean environmental surfaces like hand rails, faucets and handles with a disinfectant or a fresh solution of a teaspoon of bleach in one quart of water (or, one teaspoon of bleach in one gallon of water). All persons, including family/visitors, entering the room should wear gowns and gloves and complete good hand hygiene when leaving the patient’s room.

What should you do when you go home?
If you do not have any symptoms of an infection, you do not pose a health risk to your family, co-workers, or the general public, and you should continue with your normal activities. If you have symptoms of a VRE infection, your doctor will give you the treatment you need.

If you are a carrier (colonized) with VRE, it is also important for you to wash your hands regularly. Using an antibacterial soap or an alcohol instant "waterless" hand sanitizer may help stop the spread of VRE when touching surfaces with your hands.

The following practices are recommended for the care of a person with VRE at home:

- Wash your hands after caring for the person with VRE.
- Clean the hard surface areas of the person's room and bathroom and personal items with a disinfectant or a fresh solution of a teaspoon of bleach in one quart of water.
  Note: Bleach discolors clothing, fabrics, and carpeting. The solution needs to be mixed fresh daily.

If you are going into the hospital, it is *very* important for you to let the hospital admitting staff know that you have VRE. Also inform your doctors and nurses.

Handwashing:
Handwashing is the single most effective step in preventing the spread of germs and infection. Germs, which cause infection, often travel from person to person simply through touching. Anyone who has seen a family member come down with a cold or flu can tell you how easy it is for infections to spread from person to person. Handwashing with soap and water or an alcohol based "waterless" instant hand sanitizer helps to remove disease-causing germs before they enter the body or are spread to another person. It is your responsibility to prevent passing germs to family members, visitors, and yourself.

To protect yourself and others, be sure to:

- Wash your hands often – remember, clean hands are key to infection control.
- Wash your hands after removing gloves.
- Wash you hands after touching items that are dirty and may have germs on them.
- Wash your hands after using the rest room, blowing your nose, or covering a sneeze.
- Wash your hands before you eat, drink or prepare or handle food.
- Ask your visitors to wash their hands before and after having contact with you to protect against the spread of germs.
- Wash your hands if you get any blood or other body fluids on them.
- Wash your hands after handling soiled or contaminated items such as dressings, clothing, linen, tissues, etc.

Appendix 4

PREVENTING THE SPREAD OF VANCOMYCIN RESISTANCE

Report from the Hospital Infection Control Practices Advisory Committee

- ❖ The report recommended the prudent use of vancomycin by clinicians.

➢ Situations in which the use of vancomycin is <u>appropriate or acceptable</u>:

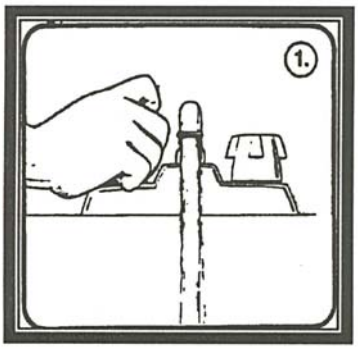
- Treatment of serious infections due to beta-lactam resistant gram-positive organisms. Clinicians should be aware that vancomycin may be less rapidly bactericidal than beta-lactam agents for beta-lactam susceptible staphylococci.
- Treatments of infections due to gram-positive organisms in patients with serious allergy to beta-lactam antibiotics.
- When antibiotics-associated colitis (AAC) fails to respond to metronidazole therapy or if AAC is severe and potentially life-threatening.
- Prophylaxis, as recommended by the American Heart Association, for endocarditis following certain procedures in patients at high risk for endocarditis.
- Prophylaxis for surgical procedures involving implantation of prosthetic materials or devices at institutions with a higher rate of infections due to MRSA or Methicillin-resistant Staphylococcus epidermidis. A single dose administered immediately before surgery is sufficient unless the procedure lasts more than six (6) hours, in which case the dose should be repeated. Prophylaxis should be discontinued after a maximum of two (2) doses.

➢ Situations in which the use of vancomycin should be <u>discouraged</u>:

- Routine surgical prophylaxis.
- Empiric antimicrobial therapy for a febrile neutropenic patient, unless there is strong evidence at the outset that the patient has an infection due to gram-positive organisms (e.g., inflamed exit site of Hickman catheter) and the prevalence of infections due to beta-lactam resistant gram-positive organisms (e.g., MRSA) in the hospital is substantial.
- Treatment in response to a single blood culture positive for coagulase-negative staphylococcus, if other blood cultures drawn in the same time frame are negative, i.e., if contamination of the blood culture is likely. Because contamination of blood cultures with skin flora, e.g., *Staph epidermidis*, may cause vancomycin to be inappropriately administered to patients. Phlebotomists and other personnel who obtain blood cultures should be properly trained to minimize microbial contamination of specimens.
- Continued empiric use for presumed infections in patients whose cultures are negative for beta-lactam resistant gram-positive organisms.
- Systemic or local prophylaxis for infection of colonization of indwelling central or peripheral intravascular catheters or vascular grafts.
- Selective decontamination of the digestive tract.
- Eradication of MRSA colonization.
- Primary treatment of antibiotic-associated colitis (AAC).
- Routine prophylaxis for very low-birth-weight infants.
- Routine prophylaxis for patients on continuous ambulatory peritoneal dialysis.

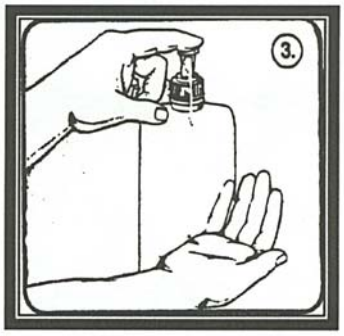
REFERENCE: Federal Register (May 17, 1994) CDC Preventing the Spread of Vancomycin Resistance

Appendix 5
HANDWASHING PROCEDURE

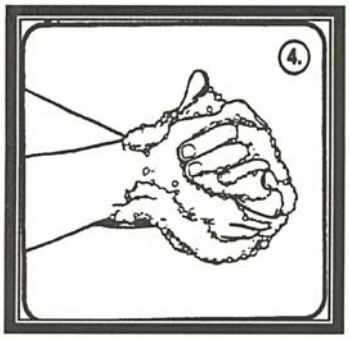


1. Adjust water temperature.

2. Moisten hands



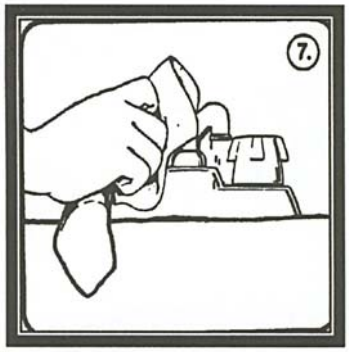
3. Dispense 1 pump of cleanser into hands.



4. Rub hands together vigorously for at least 15 seconds creating a rich lather.

5. Rinse hands starting from the wrists.

6. Dry hands thoroughly with paper towel.



7. Using a paper towel on faucet handles, turn water off.

Hand should be washed:
- Before eating, drinking, applying cosmetics
- Before changing contact lenses
- After using restrooms
- Before leaving clinical work areas
- After contact with body fluids or excretions, wound dressings, or patient skin
- After changing gloves or other protective wear
- After contact with objects, including medical equipment, that is in the immediate vicinity of the patient

Appendix 6

Figure. Donning and Removing Personal Protective Equipment (PPE)

DONNING PPE

Type of PPE used will vary based on the level of precautions required, e.g., Standard and Contact, Droplet or Airborne Isolation Precautions

GOWN

- Fully cover torso from neck to knees, arms to end of wrist, and wrap around the back
- Fasten in back at neck and waist

MASK OR RESPIRATOR

- Secure ties or elastic band at middle of head and neck
- Fit flexible band to nose bridge
- Fit snug to face and below chin
- Fit-check respirator

GOGGLES/FACE SHIELD

- Put over face and eyes and adjust to fit

GLOVES

- Extend to cover wrist of isolation gown

SAFE WORK PRACTICES

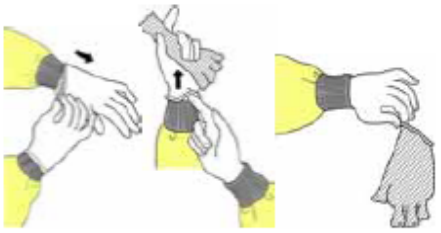
- Keep hands away from face
- Limit surfaces touched
- Change when torn or heavily contaminated
- Perform hand hygiene

REMOVING PPE

Remove PPE at doorway before leaving patient room or in anteroom; remove respirator outside of room

GLOVES

- Outside of gloves are contaminated!
- Grasp outside of glove with opposite gloved hand; peel off
- Hold removed glove in gloved hand
- Slide fingers of ungloved hand under remaining glove at wrist



GOGGLES/FACE SHIELD

- Outside of goggles or face shield are contaminated!
- To remove, handle by "clean" head band or ear pieces
- Place in designated receptacle for reprocessing or in waste container

GOWN

- Gown front and sleeves are contaminated!
- Unfasten neck, the waist ties
- Remove gown using a peeling motion; pull gown from each shoulder toward the same hand
- Gown will turn inside out
- Hold removed gown away from body, roll into a bundle and discard into waste or linen receptacle

MASK OR RESPIRATOR

- Front of mask/respirator is contaminated – DO NOT TOUCH!
- Grasp bottom then top ties/elastics and remove
- Discard in waste container

HAND HYGIENE

Perform immediately after removing all PPE!

taken from HICPAC Draft Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings.

Appendix 7

INFECTION CONTROL GUIDELINES

Minimum Precautions for <u>ALL</u> Patients (Standard Precautions)

For patients with draining skin and decubiti lesions at any site:

- Cover lesions whenever possible.
- Contain visibly soiled dressings or linen in the appropriate leak proof container or bag.
- Wear gloves when touching drainage and wash hands well before and after gloving.
- Wear gowns only if soiling of clothing is likely. Do not wear gowns outside the patient's room.
- If a patient is undergoing hydrotherapy for wound care of his lesion or decubitus, careful routine disinfection with an EPA approved disinfectant is indicated. Physical Therapy staff must follow appropriate precautions when caring for the patient and when cleaning equipment.

For patient with urinary catheters:

- Change catheters when necessary, such as when they become crusted or clogged.
- Use a closed drainage system. Keep drainage bags off the floor, but below the level of the patient's bladder.
- Use a separate graduate container for each patient, and thoroughly clean it after each use. Avoid touching the catheter bag or drainage spout to the side of the graduate container.
- Cleanse the patient's perineal area daily and as necessary. Wear gloves during this procedure. Avoid tension or movement of the catheter.
- Wash hands well after manipulating the catheter system and after removal of gloves.

For patients with respiratory symptoms:

- Teach the patient to cough into a tissue and provide a bag for tissue disposal.
- Wear masks when in close contact with the patient (i.e. when suctioning or giving mouth or tracheostomy care).
- Use good hand washing after removing gloves.

Appendix 7 (cont)

INFECTION CONTROL GUIDELINES

Precautions for MDRO Colonized/Infected Patients

For patients with MDRO colonization/infection of skin lesions and decubiti:

- Cover lesions whenever possible.
- Contain visibly soiled dressings or linen in the appropriate waterproof container or bag.
- Wear gloves when touching drainage and wash hands well before and after gloving.
- Wear gowns only if soiling of clothes is likely. Do not wear gowns outside the patient's room.
- Masks are not necessary.
- If a patient is undergoing hydrotherapy for wound care of their lesions or decubitus, careful routine disinfection with an EPA approved disinfectant is indicated. Physical Therapy staff must follow appropriate precautions when caring for the patient and when cleaning equipment.

For patients with MDRO colonization/infection of the urinary tract:

- Use standard precautions.
- Use good handwashing and wear gloves.
- Masks are not needed.
- Wear gowns only if soiling of clothes is likely.

For patients with MDRO colonization/infection of the respiratory tract:

- Wear masks only if the patient is coughing or when performing suctioning procedures.
- Wear gowns only if clothes are likely to become soiled.
- Practice good handwashing and wear gloves when handling respiratory secretions.

General recommendations for patients colonized with MDRO:

- The physician will make the decision whether or not to treat the patient colonized with MDRO. However, treatment for colonization is seldom indicated because MDRO is difficult to permanently eradicate.

Dishes:

- Disposable dishes are unnecessary.
- Never allow patients to eat food from another patient's tray.

Linen:

- All soiled linen should be bagged at the location where it is used. It should not be sorted or rinsed in the patient care area. Linen that is heavily soiled with moist body substances that may soak through a linen bag must be placed in a waterproof bag to prevent leakage. Linen handlers must wear barrier protection, which includes gloves, and take special precautions with soiled linen by bagging to prevent leakage. Soiled linen does not need to be washed separately.

Trash:

- Routine waste from all patient rooms is considered dirty, not infectious.
- Persons assigned to handle trash should wear gloves, wash hands, and report all accidents. It is important that all persons be discouraged from searching through trash (e.g. for aluminum cans). Contaminated dressings should be placed in a leakproof bag and tied before placing in the trash receptacle
- Infectious waste shall be defined and treated according to the Nebraska Department of Health Regulations and appropriate local regulations.

Housekeeping:

- Daily, routine cleaning must be done in all patient areas to reduce bacterial load. Cleaning must be done with a disinfectant registered with the EPA and performed in a sanitary manner in all rooms regardless of the presence of MDRO. Equipment should be routinely cleaned, disinfected or sterilized per hospital policy.