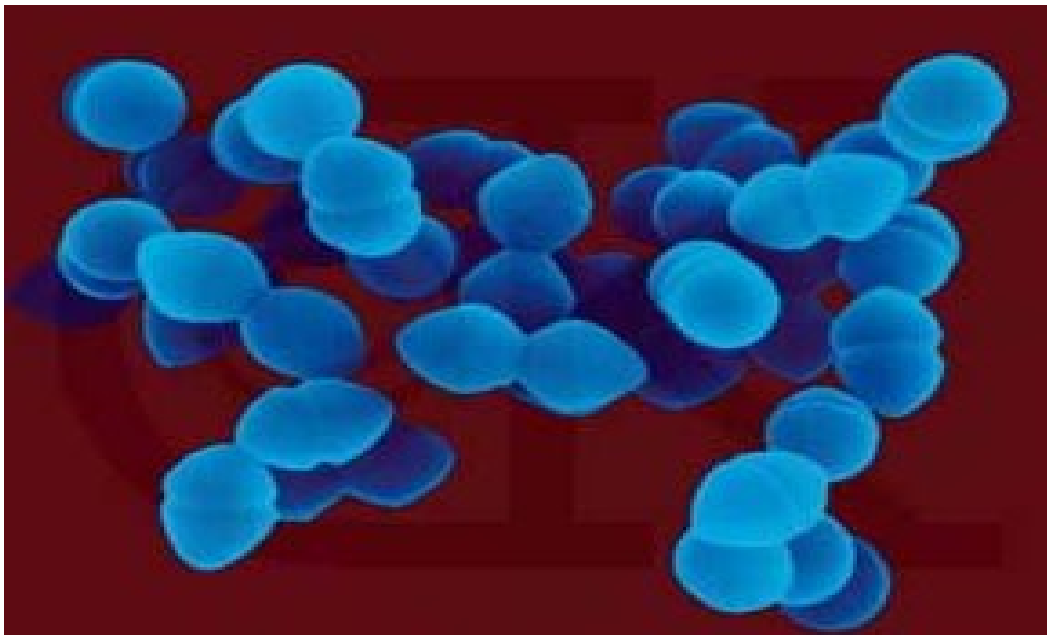


**Wisconsin Division of Public Health
Bureau of Communicable Diseases and Preparedness**

**Guidelines for Prevention and Control of
Antibiotic Resistant Organisms in Health Care Settings**

**September, 2005
PPH 42513**



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Purpose

These guidelines have been developed to assist health care organizations in developing and implementing comprehensive plans to manage patients, residents, and clients with antibiotic resistant organisms (ARO). These are only guidelines, not requirements of health care organizations for licensing or accreditation purposes. The Division of Public Health has no authority to enforce any portions of the guidelines. Regulatory agencies should recognize that each health care organization plan will vary according to services provided, the population served, and other unique characteristics of the institution.

This document replaces the 1998 guidelines, “Management of Patients with Antibiotic Resistant Organisms in a Variety of Health Care Settings.”

Background

The presence of antibiotic resistant organisms is a growing public health problem and is of particular concern for hospitalized patients and other consumers of health care. Data from the National Nosocomial Infections Surveillance System show that approximately 60% of *Staphylococcus aureus* isolates from ICU patients are resistant to methicillin and almost 30% of enterococci isolates demonstrate vancomycin resistance. Many Gram negative organisms are also becoming increasingly resistant to certain classes of antibiotics (e.g. *Pseudomonas aeruginosa* resistance to fluoroquinolones), although proportions of resistant Gram negative isolates are lower than proportions of resistant Gram positive isolates.

The Centers for Disease Control and Prevention (CDC) Seven Healthcare Safety Challenges Program includes a goal to reduce targeted antibiotic resistant bacterial infections by 50% in health care settings. Preventing infections, diagnosing and treating infections appropriately, optimizing antibiotic use, and preventing transmission in health care settings are the suggested strategies for meeting this goal.

Definitions

Colonization: condition in which a microorganism is present in or on the body but has not invaded into tissue and is not causing disease

Contact precautions: method of infection control designed to reduce the risk of acquisition of microorganisms that are transmitted by direct or indirect contact. The practice of contact precautions varies, depending on the type of health care setting, but may entail any or all of the following:

- placing patient in private room
- limiting patient movement outside of isolation room
- wearing gloves and gowns upon entry to isolation room
- cleaning and disinfecting or discarding all items before removal from isolation room

Extended spectrum beta lactamases (ESBLs): enzymes that produce resistance to third generation cephalosporins (e.g. ceftazidime, cefotaxime, and ceftriaxone) and monobactams (e.g. aztreonam) but do not affect activity against cephamycins (e.g. ceftiofur and cefotetan) or carbapenems (e.g. meropenem or imipenem)

Infection: condition in which a microorganism is present in or on the body, has invaded tissue, and is causing signs and symptoms of disease

Minimum inhibitory concentration (MIC): the lowest concentration of an antibiotic required to inhibit the growth of a microorganism

Standard precautions: method of infection control designed to reduce risk of transmission of infectious agents from both recognized and unrecognized sources. They are applied to all patients, regardless of diagnosis. They entail the use of personal protective equipment such as gowns, gloves, masks, face shields, and goggles when in contact with:

- blood
- all body fluids, secretions, and excretions (except sweat)
- non-intact skin
- mucous membranes

Epidemiology of Antibiotic Resistant Organisms

Types of Organisms

Antibiotic resistant organisms (ARO) of significance in health care settings include but are not limited to:

- Methicillin resistant *Staphylococcus aureus* (MRSA): an isolate of *S. aureus* with an MIC of ≥ 16 ug/ml when tested *in vitro* against methicillin
- Vancomycin Intermediate *S. aureus* (VISA): an isolate of *S. aureus* with an MIC of 4-8 ug/ml when tested *in vitro* against vancomycin
- Vancomycin Resistant *S. aureus* (VRSA): an isolate of *S. aureus* with an MIC of ≥ 16 ug/ml when tested *in vitro* against vancomycin
- Vancomycin Resistant Enterococcus (VRE): an isolate of *Enterococcus faecium* or *E. faecalis* with an MIC of ≥ 32 ug/ml when tested *in vitro* against vancomycin
- *Streptococcus pneumoniae* isolates resistant to penicillin or fluoroquinolones
- Gram negative bacilli (GNB) that produce ESBLs (e.g. *Klebsiella pneumoniae*, *E. coli*).
- GNB resistant to all but one class of antibiotics (each institution should determine which organisms are of epidemiologic importance in its patient population)
- GNB with intrinsic resistance to broad spectrum antibiotics (e.g. *Stenotrophomonas maltophilia*)

Sources

Colonized and infected patients, residents, and clients serve as reservoirs of ARO. This is especially true for MRSA and VRE. Health care workers have been occasional sources of ARO in outbreak situations.

The use of antibiotics also contributes to the rise of ARO by selecting organisms that have genetic mechanisms for resistance. Antibiotic selection is a main cause of development of resistant Gram negative organisms, although patient to patient spread is also a contributing factor.

Modes of Transmission

ARO are transmitted by direct physical contact between persons or by indirect contact with contaminated items and surfaces. The most common way ARO are transmitted in the health care setting is from patient to patient via the hands of health care workers. Hands can easily become contaminated when health care workers have close contact while caring for patients and residents who may have heavy bacterial growth from wounds and medical devices. Health care workers who may themselves be colonized rarely transmit ARO directly to patients. The risk of such transmission may increase in colonized health care workers with sinus or upper respiratory infections and in those wearing artificial nails.

There are common misconceptions about modes of transmission in patients with MRSA pneumonia or in those who have MRSA colonization in the sputum. Droplet transmission, that is the inhalation of respiratory droplets from someone who is coughing or sneezing, is an unlikely mode of transmission for MRSA. Thus droplet precautions, which include the use of surgical masks when in close proximity to an infectious person, are not required when in contact with MRSA patients. However if splashes or sprays of respiratory secretions onto health care workers' eyes, noses, or mouths are anticipated from any patient (regardless of ARO status), health care workers should practice standard precautions by wearing surgical masks and face shields or goggles.

Prevalence

Data from the National Nosocomial Infections Surveillance System (NNIS) indicate that from 1990 to 2002, the percent of resistant *S. aureus* isolates in ICU patients has increased from 25% to 57%, and the percent of resistant enterococci isolates has increased from less than 1% to 28%. Vancomycin-intermediate and vancomycin-resistant *S. aureus* (VRSA) have begun to emerge as well. Three isolates of VRSA have been identified in the US since 2002.

Gram negative resistant bacteria are also becoming more frequent in health care settings. NNIS data on *Klebsiella pneumoniae* isolates from ICU patients indicate an increase in the percentage of isolates resistant to third generation cephalosporins (i.e. ceftriaxone, cefotaxime, ceftazadime) from 2% in 1989 to approximately 12% in 1997. The percentage of *Pseudomonas aeruginosa* resistant to fluoroquinolones has increased fourfold to 16% in that same time period.

The prevalence of ARO is affected by various factors, including geographic location, type of health care setting, and patient population. Health care facilities located in urban areas generally have higher rates of resistant organisms than do those in rural areas. Tertiary care centers usually have a higher prevalence than smaller community hospitals. Infection rates from ARO tend to be lower in long term care facilities than in acute care hospitals, although colonization rates among long term care residents is high.

Each health care facility should determine the prevalence of clinically important ARO in its patient population to direct prevention and control resources to where most needed.

Morbidity and Mortality

Most resistant organisms are not usually more virulent than the susceptible counterparts and do not cause clinical symptoms or disease manifestations significantly different from susceptible organisms. However, infections due to resistant organisms, especially MRSA, are associated with greater morbidity, mortality, length of stay, and health care costs. This may be due to delayed diagnosis and treatment with antibiotics (e.g. vancomycin) that are not nearly as effective as antibiotics available for susceptible *S. aureus*. Antibiotics for resistant organisms are also generally more expensive and more toxic, making patient management more complex.

General Strategies for Reduction of ARO in All Health Care Settings

Administrative Measures

Reduction of the burden of ARO should be an institutional goal that is supported by administrative and managerial leadership. Administration should ensure that all necessary resources are available to the infection control program, and management personnel should promote, support, and exemplify infection control practices among their staff.

1. A representative from administration should be included as a member of the institution infection control committee [required for acute care facilities under Wisconsin Admin. Code HFS 124.08(02)(b)].
2. Rates of compliance with hand hygiene recommendations and appropriate use of personal protective equipment among patient care staff should be routinely monitored, with regular performance feedback given to staff, managers and administrative personnel.
3. The institution infection control plan should include adherence to other infection control guidelines, which will help reduce the risk of acquiring infections from ARO and other health care acquired infections. Such guidelines include CDC guidelines for environmental infection control, hand hygiene, isolation, and prevention of surgical site infections, urinary tract infections, catheter associated blood stream infections, and pneumonia.
4. The organization should provide education for staff on the sources of ARO, how they are spread in health care facilities, the significance of ARO infections in patients, and how to prevent and control the spread of ARO. Patients with ARO infection or colonization should be educated on good hand hygiene practices and other strategies for preventing the spread of ARO within institution.
5. Inter-facility cooperation should be encouraged by development of regional strategies that can be applied consistently across the continuum of care in all health care facilities in a geographical location.

Prudent Use of Antibiotics

Collaboration among infection control, pharmacy, administrative, laboratory, and medical staff is necessary to develop effective programs to ensure appropriate use of antibiotics. Such programs should aim to:

1. Promote use of narrow spectrum antibiotics. Health care providers should be encouraged to culture infection sites whenever possible to facilitate replacement of empiric, broad spectrum treatment with more targeted, narrow spectrum therapy.
2. Promote the appropriate use of vancomycin in particular. Over-use of this drug is implicated in the emergence of vancomycin resistant enterococci and vancomycin resistant *S. aureus*. Providers should be encouraged to follow the CDC recommendations for prudent vancomycin use (see appendix).
3. Develop institutional specific antibiograms for distribution to health care providers.
4. Include quality improvement steps to reduce contamination of culture specimens to help reduce treatment of contamination vs. infection. Providers should also be educated on how to recognize contamination or colonization and be discouraged from treating these conditions with antibiotics.
5. Limit the use of broad spectrum, new, or more potent antibiotics by implementing formulary restrictions, pre-approved indications, stop orders, and education.
6. Audit the use of targeted antibiotics in the institution.

Surveillance

Surveillance activities identify the sources of ARO, determine prevalence, monitor rates of transmission in the health care facility, and determine host risk factors for carriage of ARO.

Surveillance activities include:

1. Analyzing clinical culture data to monitor trends in the proportion of isolates that are ARO.
2. Maintaining of line lists of known infected and colonized patients.
3. Obtaining cultures of all high risk patients on admission to detect colonization or infection with certain ARO.
4. Performing point prevalence culture surveys to identify host risk factors for colonization or infection with an ARO or for determining trends in the rates of resistant isolates in the institution.
5. Culturing health care workers linked to an outbreak and/or potential environmental reservoirs to identify sources of ongoing transmission.

All health care organizations should implement a surveillance program that includes steps 1 and 2. The implementation of additional surveillance activities depends on the epidemiology of ARO and risk factors in the patient population. The remaining steps should be considered when:

- an organism previously not seen in the facility is detected, OR
- when endemic rates of ARO are high (e.g. above 30%) or are increasing, OR
- when ongoing transmission or outbreaks have not been brought under control.

Surveillance for Vancomycin Intermediate *S. aureus* (VISA) and Vancomycin Resistant *S. aureus* (VRSA)

Evidence that *S. aureus* has become less susceptible to vancomycin began to be reported in the 1990s. The first documented case of VISA infection was reported in 1996 in a patient in Japan. Since then infections with VISA have been reported in patients from the US, Europe, and Asia. VRSA infections have also been reported in three patients in the US since 2002. Although there is currently no evidence of transmission in health care settings, surveillance to detect these very difficult to treat organisms should be implemented in inpatient settings.

1. *S. aureus* isolates for which the vancomycin MICs are ≥ 4 ug/ml should be saved and forwarded immediately to the Wisconsin State Laboratory of Hygiene (WSLH) for further testing.
2. Health care facilities should notify the local public health department immediately when a patient has a laboratory confirmed VISA or VRSA infection.
3. Public health staff, in cooperation with the health care facility, should identify and categorize contacts of the patient (see guidelines at www.cdc.gov/ncidod/hip/ARESIST/visa_vrsa_guide.pdf).
4. The index patient and contacts should be cultured to evaluate whether transmission has occurred.
5. Further management of patients and their contacts with VISA or VRSA should be done according to the guidelines, and in conjunction with public health staff.

Decolonization

Eradication of MRSA colonization does not have long term success and the routine use of 2% intranasal mupirocin as a decolonizing agent increases the risk of emerging antibiotic resistance. In addition, the optimum methods of decolonization have not yet been established. Therefore, decolonization is not recommended as a routine component of controlling ARO. The decision to decolonize should be based on whether a patient would benefit clinically or upon determination that ongoing transmission would be reduced.

1. Determine benefits of decolonization on a case by case basis. If possible, consult with infectious disease specialists or hospital epidemiologists to determine appropriateness of decolonization.
2. Decolonizing health care workers should be considered only when there is epidemiologic evidence they are sources of ongoing transmission.
3. If decolonization is attempted, additional strategies should be implemented to increase the chances of successful eradication of MRSA:
 - a) identify and treat all colonized sites
 - b) reduce bacterial load (e.g. adequate drainage, debridement, device removal).
 - c) consider close contacts such as household contacts as possible sources of re-colonization and determine need to decolonize them
4. There are no recommendations for decolonizing persons with VRE or Gram negative ARO.

Infection Control Measures in Health Care Settings

Infection control measures used to prevent transmission of ARO will depend on the type of health care facility and the prevalence of ARO in the facility. These measures are based on the following premises:

- ARO are spread by direct and indirect contact in health care facilities.
- Persons who are colonized with ARO without active infections can be sources of transmission but will not be identified unless collection of screening cultures is practiced. An infection control program that combines active surveillance cultures on high-risk patients with contact precautions of ARO positive patients has been shown to reduce the prevalence of ARO in health care facilities. Health care facilities with high endemic rates of ARO infections or with demonstrated transmission should consider the addition of surveillance cultures to prevention strategies.
- A large proportion of persons with histories of ARO colonization or infection are either permanently or intermittently colonized. Past histories of one or more negative cultures from previously colonized or infected patients does not guarantee that they will remain free of ARO.
- It has been shown that large proportions of long term care residents may be colonized with ARO. Since it may not be feasible to identify all colonized residents in long term care settings, all residents should be treated as if they are potentially colonized. At the same time, long term care facilities must be recognized as community settings, where increased risks of disease transmission are accepted in return for necessary social interactions of residents, staff, family, and visitors.
- Transmission of ARO in a health care facility is an indicator that other organisms are also being transmitted, and infection control measures need to be evaluated for lack of effectiveness and adherence. As a corollary, strict adherence to effective infection control measures should help reduce health care associated transmission of many organisms in addition to targeted ARO.

Infection Control Measures for ARO in Acute Care Settings

1. Observe standard precautions on all patients.
2. Implement the use of alcohol gel as the preferred product for staff hand hygiene (when hands are not visibly soiled).
3. Place patients with active ARO infections on contact precautions until cultures of the infected and colonized sites are negative after patient has been off antibiotics for at least 48 hours. Since re-acquisition of ARO is possible, patients who have been removed from isolation should be re-tested periodically (e.g. every 5 to 7 days during hospital stay) to determine whether they should be returned to contact precautions. Contact precautions include:
 - a) Placing patients in private rooms, when possible. If not possible, place in room with a patient that has the same ARO or with a patient at low risk of acquiring an ARO infection (e.g. no surgical incisions, no open wounds or indwelling devices, not immunocompromised, able to follow instructions for taking precautions). Consult with the infection control staff for assistance in patient placement when private rooms are not available.
 - b) Limiting movement of patients outside their rooms to necessary transport only.
 - c) Wearing gowns and gloves upon entry to contact isolation rooms.
 - d) Cleaning and disinfecting items before removal from isolation rooms or discarding disposable items in contact isolation rooms.
4. Place any patients with uncontrolled body secretions or wound drainage on contact precautions (regardless of ARO status) until drainage is controlled.
5. Maintain a line list of patients with a history of ARO colonization or infection and place patients on line list on contact precautions upon every admission. If cultures of colonized and/or infected sites are obtained and are negative for ARO, the patient may be removed from contact precautions. Subsequent cultures should be taken every 5-7 days during the hospital stay to detect re-acquisition of ARO. If subsequent cultures become positive for ARO at any site, the patient should be returned to contact precautions.
6. Patients should be instructed to wash hands before leaving the room or be assisted if necessary. Clothing or hospital gowns should be clean and free of body fluids before transport.
7. Notify other facilities of history of ARO in patients at the time of transfer.
8. Follow routine environmental procedures for cleaning/disinfection using a US Environmental Protection Agency (EPA) registered, hospital approved disinfectant.

Additional Measures for Special Circumstances

If endemic rates of infection from ARO are high or increasing, if transmission is ongoing, or if a new ARO is detected, additional infection control steps should be considered:

1. Implementing universal gloving for all patients on the affected unit (i.e. wearing of disposable non-latex gloves whenever health care workers enter any occupied patient room).
2. Cohorting of staff to reduce the number of health care worker contacts with patients who have ARO.
3. Closing affected units to new patients.
4. Using active surveillance cultures to identify patients with ARO colonization or infection. This may need to be done on all patients on an affected unit, all patients considered at risk of carrying ARO, or on all patients admitted to the facility, depending on the epidemiology of ARO in the facility. Patients should be placed empirically in contact precautions until negative surveillance culture results are obtained (see Figure 1).
5. Collecting environmental cultures to identify reservoirs causing transmission. This should be done only in consultation with infection control and hospital epidemiology personnel.
6. Contacting local or state public health departments for advice and arrangement for molecular typing.
7. Using 2% intranasal mupirocin to decolonize patients and health care workers implicated in transmission of MRSA. Consult with infection control and hospital epidemiology staff before attempting to decolonize.

Infection Control Measures for ARO in Nursing Homes

1. Observe standard precautions on all residents.
2. Implement the use of alcohol gel as the preferred product for staff hand hygiene (when hands are not visibly soiled). If dispensers of alcohol gel products cannot be mounted in certain areas due to resident safety concerns, consider using small individual-use bottles that can be carried by staff.
3. Promote hand hygiene for all residents. Assist residents who are not able to practice hand hygiene independently.
4. Promote measures that ensure skin integrity of residents (US DHHS, Agency for Health Care Policy and Research: Pressure Ulcers in Adults: Prediction and Prevention, May, 1992). Use appropriate aseptic techniques during wound care and care of indwelling devices. These sites may be areas of heavy bacterial growth and are risk factors for ARO.
5. Place residents with active ARO infections in contact isolation until signs and symptoms of infection have resolved. Residents may be removed from contact precautions once symptoms have resolved. Contact precautions includes:
 - a) placing residents in private rooms, when possible. If not possible, place in room with a resident that has the same ARO or with a patient at low risk of acquiring an ARO infection (e.g. no surgical incisions, no open wounds or indwelling devices, not immunocompromised, able to follow instructions for taking precautions).
 - b) wearing of gowns and gloves upon entry to contact isolation rooms.
 - c) cleaning and disinfecting items before removal from isolation rooms or discarding disposable items in contact isolation rooms.
6. Limiting movement of residents outside their rooms should depend on whether they have uncontained wound drainage or body secretions (regardless of ARO status). Residents may leave their rooms and participate in social activities if wound drainage and body secretions are contained. Residents should be instructed to wash hands before leaving the room or be assisted to do so if necessary. Clothing should be clean and free of body fluids before leaving the room.
7. Any resident with uncontained body secretions or wound drainage (regardless of ARO status) should have limited movement outside his/her room until secretions/drainage can be contained.
8. Notify other facilities of history of ARO in patients at the time of transfer.
9. Follow routine environmental procedures for cleaning/disinfection with EPA registered, hospital approved disinfectants.
10. Nursing homes may not refuse to admit a resident solely on the basis that the resident is infected or colonized with an ARO unless the resident cannot be placed with an appropriate roommate. Infection control staff from both the transferring facility and the nursing home should be a part of placement planning for patients being transferred to long term care facilities. Long term care ombudsmen may provide assistance in mediating disputes when planning for admission of a resident with ARO history. Contact:

**Board on Aging and Long Term Care
1402 Pankratz Street Suite 111
Madison, WI 53704
608-246-7013
F: 608-246-7001 or 7002**

Additional Measures for Special Circumstances

If ongoing transmission is not controlled by above measures or infection rates with ARO are increasing consider additional infection control measures:

1. Implementing the practice of universal gloving when entering all resident rooms.
2. Implementing the use of gowns when health care workers are performing tasks that bring their body surfaces in close contact with any resident (bathing, turning in bed, etc.)
3. Cohorting of staff to reduce the number of health care worker contacts with residents who have ARO.
4. Identifying sources of transmission by collecting surveillance cultures on residents and health care workers with an epidemiologic link to the outbreak.
5. Collecting environmental cultures to identify reservoirs causing transmission. This should be done only in consultation with infection control personnel.
6. Contacting local or state public health departments for advice and arrangement for molecular typing.
7. Using 2% intranasal mupirocin to decolonize residents and health care workers implicated in transmission of MRSA. Consult with infection control staff and infectious disease clinicians before attempting to decolonize.

Infection Control Measures for ARO in Ambulatory Care Settings

1. Observe standard precautions on all patients.
2. Implement the use of alcohol gel as the preferred product for staff hand hygiene.
3. Place all patients with uncontrolled body secretions or wound drainage on contact precautions (regardless of MRSA status).
 - a. Wear gloves and gown when examining patient or when in contact with potentially contaminated items in the examination room.
 - b. Clean and disinfect surfaces and items (using an EPA registered, hospital approved disinfectant) in the exam rooms that were in contact with the patient before use by next patient.
 - c. Consider scheduling appointments at end of day or during less busy times for patients requiring contact precautions. Place in examination room upon arrival or as soon as possible.
 - d. Notify ancillary departments to which patients are being sent that contact precautions must be observed.
4. Patients with skin or soft tissue infections of unknown etiology may have community acquired MRSA, especially when lesions resemble a "spider bite." They should be placed empirically on contact precautions as soon as possible after arriving in facility.
5. Notify other facilities of history of ARO in patients at the time of transfer.
6. Provide education for patients with ARO on how to reduce transmission to household contacts (e.g. Division of Public Health Fact Sheet on MRSA and VRE).

Infection Control for ARO in Outpatient Dialysis Centers

Chronic hemodialysis patients are important reservoirs of ARO, especially VRE. In addition, three of the five patients from whom VISA was first isolated were dialysis patients. Other clinically important ARO commonly found in dialysis patients include MRSA and resistant strains of *Pseudomonas aeruginosa*, *Stenotrophomonas maltophilia*, and *Acinetobacter* species.

Special care must be taken in hemodialysis centers to prevent transmission of ARO.

1. Observe standard precautions for all patients.
2. Implement the use of alcohol gel as the preferred product for staff hand hygiene.
3. Patients should wash hands before entering the dialysis station.
4. Wear gown and disposable gloves when performing patient care or working in the dialysis station.
5. Place patients colonized or infected with ARO in dialysis stations with as few adjacent stations as possible.
6. Discard patient care items or clean and disinfect before removing from dialysis station.
7. Unused medications, including multiple dose vials, and supplies such as syringes should be discarded, not returned to a common clean area or used on other patients.
8. Prepare medications in a clean central area away from dialysis stations. Do not carry multiple dose vials from station to station.
9. Do not use common medication carts to deliver medications to each patient or carry multiple dose vials and other supplies in pockets. If trays are used to deliver medications to individual patients, they must be cleaned between each patient.
10. Clean and disinfect external surfaces of dialysis machines and all items and surfaces in dialysis stations between each patient using an EPA registered hospital approved disinfectant.
11. Follow manufacturer recommendations for reprocessing dialyzers between each patient.
12. If dialysis staff know a patient with ARO history or current infection are being admitted to another health care setting, they should notify the receiving facility of that history so appropriate precautions can be taken.

Infection Control for ARO in Home Health/Home Hospice Settings

1. Observe standard precautions for all patients.
2. Implement the use of alcohol gel as the preferred product for staff hand hygiene.
3. The decision to use contact precautions on patients with histories of colonization or active infections should be made on a case by case basis. If risk of transmission is increased by uncontrolled body fluids or home environmental factors, consider using contact precautions:
 - a. Wear gowns and disposable gloves when performing patient cares, touching items and surfaces in the immediate patient environment, and when performing general household cleaning.
 - b. Use dedicated or disposable patient care items when possible. Re-usable items should be cleaned and disinfected before removing from the home, or bagged for processing at a central location before using on other patients.
 - c. Items such as the nursing bag and other equipment used for patient care should be protected from contaminated surfaces with disposable paper barriers or cleaned and disinfected before carrying them out of the home.
4. If home health staff knows that patients with ARO are being admitted to acute or long term care facilities, they should notify the receiving facility of the patient's ARO history.
5. Family members and other household contacts should be instructed to follow measures to reduce transmission in the household:
 - a. Patients should be instructed to practice good hand hygiene. If actively infected with ARO, patients should use separate cloth hand towels from family members, or use disposable paper towels to dry hands.
 - b. The use of alcohol gel should be considered as an effective and convenient method of hand hygiene for patients with active ARO infections.
 - c. Family members and other household contacts should be instructed to wash hands after contact with the patient, any body fluids, and potentially contaminated surfaces and items.
 - d. Anyone coming in contact with body fluids while giving patient care should wear disposable gloves and wash hands after removing gloves.
 - e. Linens and clothing heavily soiled with wound drainage or body secretions should be washed separately in hot water and detergent or in lukewarm water with detergent and bleach, then dried in a hot (180° F) dryer.
 - f. Surfaces and items touched frequently by patients in the home should be disinfected often with a household disinfectant such as Lysol® or a 1:10 bleach solution.

Infection Control for ARO in Adult Day Care, CBRF, and Assisted Living Settings

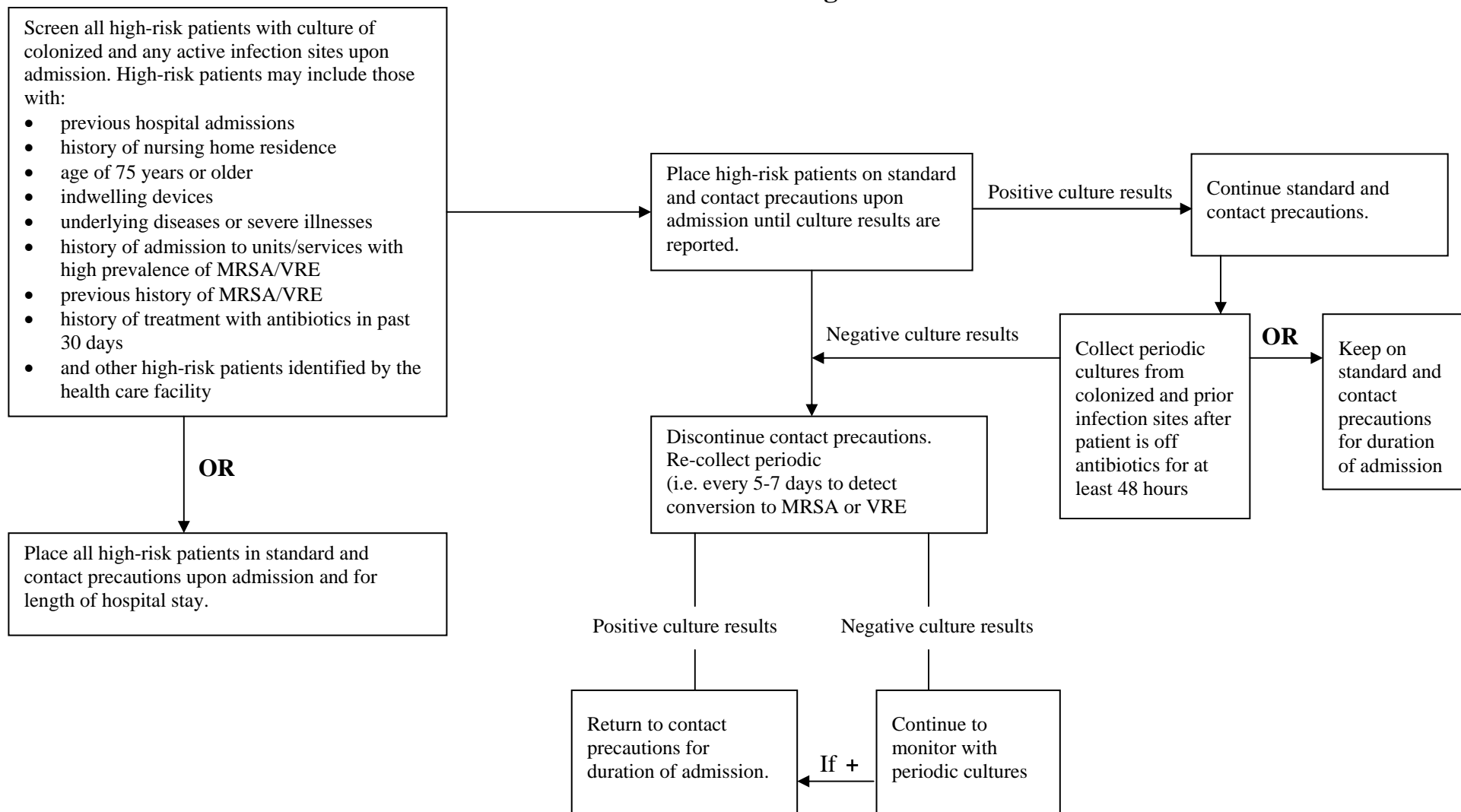
1. Observe standard precautions for all clients.
2. Implement the use of alcohol gel as the preferred product for staff hand hygiene.
3. Promote hand hygiene for all clients able to comply. Assist clients who are not able to practice hand hygiene independently. Clients should wash hands:
 - a. after using rest room
 - b. after coughing or sneezing into tissue or hands
 - c. before eating
 - d. before leaving their rooms
 - e. before participating in social activities
4. Clients with active infections of ARO should be placed in private rooms, if possible. If not possible, place in room with client with same ARO (do not place client with MRSA with a client with VRE) or a client at low risk of acquiring ARO infection (e.g. non-surgical, no open wounds or indwelling devices, not immunocompromised, able to follow instructions for taking precautions).
5. If wound drainage or other body secretions infected with ARO can be contained, residents with active infections may leave their rooms and participate in social activities. Residents should be instructed to wash hands before leaving the room or be assisted to do so if necessary. Clothing should be clean and free of body fluids before leaving the room.
6. Clients with uncontrolled wound drainage or body secretions should have limited movement outside their rooms.
7. If a client with active infection or history of ARO will be admitted to another facility, give notice to the receiving facility that precautions are required when managing the client.
8. Medical equipment, patient care items, furnishings and other items in rooms with ARO residents should be discarded or cleaned and disinfected before removing from the rooms.
9. Follow routine environmental procedures for cleaning/disinfection with EPA registered, hospital approved disinfectants.
10. The American with Disabilities Act prohibits denial of admission to persons solely on the basis that they are infected or colonized with an ARO unless appropriate placement is not possible. If clients are being transferred from another facility, infection control staff should assist in placement planning. Long term care ombudsmen may provide assistance in mediating disputes when planning for admission of a resident with ARO history. Contact:

**Board on Aging and Long Term Care
1402 Pankratz Street Suite 111
Madison, WI 53704
608-246-7013
F: 608-246-7001 or 7002**

Infection Control for ARO in Pre-Hospital Transport

1. Personnel should observe standard precautions when handling all persons being transported.
2. The discharging facility should alert transport staff when a person known to be infected or colonized with an ARO is being transported so they can take appropriate precautions.
3. The person being transported should wash hands before entering the transport vehicle. If unable, staff from the discharging facility should provide assistance.
4. Wound drainage and body fluids should be contained as much as possible prior to transport. Clothing or hospital gowns should be clean and free of body fluids.
5. Transport staff should wear gloves when giving patient care during transport. Gowns should also be worn to protect skin and clothing if contact with body surfaces occurs.
6. Wheelchairs or other equipment used for transport should be cleaned and disinfected after use.
7. Follow procedures for cleaning and disinfecting transport vehicles, used durable equipment and other non-disposable patient care items used during transport. Use an EPA registered hospital approved disinfectant according to manufacturer instructions.
8. Transport staff should convey to receiving facility that patients require contact precautions.

Figure 1
Use of Cultures and Isolation for Control of MRSA and VRE
in Acute Care Settings



Appendix: Recommendations for Vancomycin Use in Health Care Settings

From: "Recommendations for Preventing the Spread of Vancomycin Resistance," Hospital Infection Control Practices Advisory Committee, MMWR 44 (RR12); 1-13, 9/22/1995

1. Situations in which the use of vancomycin is appropriate or acceptable:

- For treatment of serious infections caused by beta-lactam-resistant gram-positive microorganisms. Vancomycin may be less rapidly bactericidal than the beta-lactam agents for beta-lactam-susceptible staphylococci (23, 24).
- For treatment of infections caused by gram-positive microorganisms in patients who have serious allergies to beta-lactam antimicrobials.
- When antibiotic-associated colitis fails to respond to metronidazole therapy or 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 (25).
- Prophylaxis for major surgical procedures involving implantation of prosthetic materials or devices (e.g., cardiac and vascular procedures {26} and total hip replacement) at institutions that have a high rate of infections caused by MRSA or methicillin-resistant *S. epidermidis*. A single dose of vancomycin administered immediately before surgery is sufficient unless the procedure lasts greater than 6 hours, in which case the dose should be repeated. Prophylaxis should be discontinued after a maximum of two doses (27-30).

2. Situations in which the use of vancomycin should be discouraged:

- Routine surgical prophylaxis other than in a patient who has a life-threatening allergy to beta-lactam antibiotics (28).
- Empiric antimicrobial therapy for a febrile neutropenic patient, unless initial evidence indicates that the patient has an infection caused by gram-positive microorganisms (e.g., at an inflamed exit site of Hickman catheter) and the prevalence of infections caused by MRSA in the hospital is substantial (31-37).
- Treatment in response to a single blood culture positive for coagulase-negative staphylococcus, if other blood cultures taken during 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., *S. epidermidis*) could result in inappropriate administration of vancomycin, phlebotomists and other personnel who obtain blood cultures should be trained to minimize microbial contamination of specimens (38-40).
- Continued empiric use for presumed infections in patients whose cultures are negative for beta-lactam-resistant gram-positive microorganisms (41).
- Systemic or local (e.g., antibiotic lock) prophylaxis for infection or colonization of indwelling central or peripheral intravascular catheters (42-48).
- Selective decontamination of the digestive tract.
- Eradication of MRSA colonization (49,50).
- Primary treatment of antibiotic-associated colitis (51).
- Routine prophylaxis for very low-birth weight infants (i.e., infants who weigh less than 1,500 g {3 lbs 4 oz}) (52).
- Routine prophylaxis for patients on continuous ambulatory peritoneal dialysis or hemodialysis (48, 53).
- Treatment (chosen for dosing convenience) of infections caused by beta-lactam-sensitive gram-positive microorganisms in patients who have renal failure (54-57).
- Use of vancomycin solution for topical application or irrigation.

Sample Orders for Vancomycin Use

Name _____
Med Rec Number _____
Room Number _____
Prescribing MD _____
Date ordered _____

Instructions:

To be completed by the MD or nurse prior to dispensing vancomycin.

Send completed form to ()

If the reason for prescribing vancomycin does not meet one of the criteria below, the pharmacist will contact the physician for a suggested alternative agent.

All vancomycin use is monitored by () and reviewed by ().

Vancomycin Use Guidelines:

The following are situations in which the use of vancomycin is appropriate and acceptable according to CDC published guidelines.

They have been approved by the medical executive committee.

Please check the appropriate justification for use:

- _____ 1. For treatment of serious infections due to beta-lactam resistant organisms (should be supported by culture and sensitivity results)
- _____ 2. For treatment of infections due to Gram positive organisms in patients with serious allergy to beta-lactam antimicrobials (penicillin and cephalosporins)
- _____ 3. When antibiotic-associated colitis (ACC) fails to respond to metronidazole therapy or if ACC is severe and potentially life-threatening
- _____ 4. Prophylaxis as recommended by the American Heart Association for endocarditis following certain procedures in patients at high risk for endocarditis
- _____ 5. Prophylaxis for major surgical procedures involving implantation of prosthetic materials or devices, e.g. cardiac and vascular procedures and total hip replacement, in institutions with high rates of infections from MRSA. A single dose administered 2 hours before surgery is sufficient unless the procedure lasts more than 6 hours, in which case the dose should be repeated. Prophylaxis should be discontinued after a maximum of 2 doses

Comments: _____

Signature: _____

References

Boyce, JM, Opal, SM, Potter-Bynoe, G, Mederios, AA - Spread of MRSA in a hospital and after exposure to a health care worker with chronic sinusitis - *Clin Infect Dis* 1993; 17: 496-504

Boyce JM, Pittet, D - Guideline for hand hygiene in health care settings: recommendations of the HICPAC and the HICPAC/SHEA/APIC/IDSA hand hygiene task force. *MMWR* 2002; 51(RR16): 1-45

Centers for Disease Control and Prevention - Campaign to prevent antimicrobial resistance in healthcare settings: why a campaign? Atlanta, GA: Centers for Disease Control and Prevention; 2001. Available at www.cdc.gov/drugresistance/healthcare/problem/htm

Centers for Disease Control and Prevention - HICPAC draft guidelines for isolation precautions: preventing transmission of infectious agents in healthcare settings, Appendix B: management of multi-drug resistant organisms. June 14, 2004 Federal Register

Centers for Disease Control and Prevention - Investigation and control of vancomycin- intermediate and -resistant *Staphylococcus aureus* (VISA/VRSA): a guide for health departments and infection control personnel. Atlanta, GA. 2004. www.cdc.gov/ncidod/hip/ARESIST/visa_vrsa_guide.pdf.

Centers for Disease Control and Prevention - Recommendations for preventing infections among chronic hemodialysis patients - *MMWR* 2001; 50 (RR-05):1-43

Centers for Disease Control and Prevention - *Staphylococcus aureus* resistant to vancomycin - United States, 2002 - *MMWR* 2002; 51(26): 565-567

Garner JS, Hospital Infection Control Practices Advisory Committee - Guideline for isolation precautions in hospitals - *Infect Control and Hosp Epidemiol* 1996; 17: 53-80, and *Am J Infect Control* 1996;24:24-52.

McNeil, SA, Mody, L, Bradley, SF - Management of asymptomatic colonization and outbreaks of infection in long term care. *Geriatrics*; 2002; 57: 16-27.

Muto, CA, Jernigan, JA, et al - SHEA Guideline for preventing nosocomial transmission of multi-drug resistant strains of *Staphylococcus aureus* and enterococcus - *Infection Control and Hospital Epidemiology* 2003; 24:362-378

National Nosocomial Infections Surveillance System Report - data summary from January 1992 through June 2004 - *American Journal of Infection Control* 2004; 32: 475

Ostrosky, BE et al. Control of vancomycin-resistant enterococcus in health care facilities in a region. *New England Journal of Medicine* 2001; 344: 1427-1433.

Safdar, N, Maki, DG - The commonality of risk factors for nosocomial colonization and infection with antimicrobial-resistant *Staphylococcus aureus*, enterococcus, gram negative bacilli, *Clostridium difficile*, and candida. *Annals of Internal Medicine* 2002; 136: 834-844.

Wisconsin Division of Public Health - Management of patients with antibiotic resistant organisms in a variety of health care settings. Madison, WI. 1998