



Discussion

MULTIDRUG-RESISTANT ORGANISMS (MDRO) MANAGEMENT GUIDELINES
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Management of Multidrug-Resistant Organisms in Healthcare Settings (2006)

KEY POINTS

Discussion of the Management of Multidrug-Resistant Organisms in Healthcare Settings (2006) guideline.

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Overview

This review demonstrates the depth of published science on the prevention and control of MDROs. Using a combination of interventions, MDROs in endemic, outbreak, and non-endemic settings have been brought under control. However, despite the volume of literature, an appropriate set of evidence-based control measures that can be universally applied in all healthcare settings has not been definitively established. This is due in part to differences in study methodology and outcome measures, including an absence of randomized, controlled trials comparing one MDRO control measure or strategy with another. Additionally, the data are largely descriptive and quasi-experimental in design (311). Few reports described preemptive efforts or prospective studies to control MDROs before they had reached high levels within a unit or facility. Furthermore, small hospitals and LTCFs are infrequently represented in the literature.

A number of questions remain and are discussed below.

Impact on other MDROS from interventions targeted to one MDRO

Only one report described control efforts directed at more than one MDRO, i.e., MDR-GNB and MRSA (312). Several reports have shown either decreases or increases in other pathogens with efforts to control one MDRO. For example, two reports on VRE control efforts demonstrated an increase in MRSA following the prioritization of VRE patients to private rooms and cohort beds (161). Similarly an outbreak of *Serratia marcescens* was temporally associated with a concurrent, but unrelated, outbreak of MRSA in an NICU (313). In contrast, Wright and colleagues reported a decrease in MRSA and VRE acquisition in an ICU during and after their successful effort to eradicate an MDR-strain of *A. baumannii* from the unit (210).

Colonization with multiple MDROs appears to be common (314, 315). One study found that nearly 50% of residents in a skilled-care unit in a LTCF were colonized with a target MDRO and that 26% were co-colonized with >1 MDRO; a detailed analysis showed that risk factors for colonization varied by pathogen (316). One review of the literature (317) reported that patient risk factors associated with colonization with MRSA, VRE, MDR-GNB, *C. difficile* and *Candida sp* were the same. This review concluded that control programs that focus on only one organism or one antimicrobial drug are unlikely to succeed because vulnerable patients will continue to serve as a magnet for other MDROs.

Costs

Several authors have provided evidence for the cost-effectiveness of approaches that use ASC (153, 191, 253, 318, 319). However, the supportive evidence often relied on assumptions, projections, and estimated attributable costs of MDRO infections. Similar limitations apply to a study suggesting that gown use yields a cost benefit in controlling transmission of VRE in ICUs (320). To date, no studies have directly compared the benefits and costs associated with different MDRO control strategies.

Feasibility

The subject of feasibility, as it applies to the extrapolation of results to other healthcare settings, has not been addressed. For example, smaller hospitals and LTCFs may lack the on-site laboratory services needed to obtain ASC in a timely manner. This factor could limit the applicability of an aggressive program based on obtaining ASC and preemptive placement of patients on Contact Precautions in these settings. However, with the growing problem of antimicrobial resistance, and the recognized role of all healthcare settings for control of this problem, it is imperative that appropriate human and fiscal resources be invested to increase the feasibility of recommended control strategies in every setting.

Factors that influence selection of MDRO control measures

Although some common principles apply, the preceding literature review indicates that no single approach to the control of MDROs is appropriate for all healthcare facilities. Many factors influence the choice of interventions to be applied within an institution, including:

- **Type and significance of problem MDROs within the institution.** Many facilities have an MRSA problem while others have ESBL-producing *K. pneumoniae*. Some facilities have no VRE colonization or disease; others have high rates of VRE colonization without disease; and still others have ongoing VRE outbreaks. The magnitude of the problem also varies. Healthcare facilities may have very low numbers of cases, e.g., with a newly introduced strain, or may have prolonged, extensive outbreaks or colonization in the population. Between these extremes, facilities may have low or high levels of endemic colonization and variable levels of infection.
- **Population and healthcare-settings.** The presence of high-risk patients (e.g., transplant, hematopoietic stem-cell transplant) and special-care units (e.g. adult, pediatric, and neonatal ICUs; burn; hemodialysis) will influence surveillance needs and could limit the areas of a facility targeted for MDRO control interventions. Although it appears that MDRO transmission seldom occurs in ambulatory and outpatient settings, some patient populations (e.g., hemodialysis, cystic fibrosis) and patients receiving chemotherapeutic agents are at risk for colonization and infection with MDROs. Furthermore, the emergence of VRSA within the outpatient setting (22, 23, 25) demonstrates that even these settings need to make MDRO prevention a priority.

Differences of opinion on the optimal strategy to control MDROs. Published guidance on the control of MDROs reflects areas of ongoing debate on optimal control strategies. A key issue is the use of ASC in control efforts and preemptive use of Contact Precautions pending negative surveillance culture results (107, 321, 322). The various guidelines currently available exhibit a spectrum of approaches, which their authors deem to be evidence-based. One guideline for control of MRSA and VRE, the Society for Healthcare Epidemiology of America (SHEA) guideline from 2003 (107), emphasizes routine use of ASC and Contact Precautions. That position paper does not address control of MDR-GNBs. The salient features of SHEA recommendations for MRSA and VRE control and the recommendations in this guideline for control of MDROs, including MRSA and VRE, have been compared (323); recommended interventions are similar. Other guidelines for VRE and MRSA, e.g., those proffered by the Michigan Society for Infection Control ([This link is no longer active www.msiconline.org/resource_sections/aro_guidelines.]), emphasize consistent practice of Standard Precautions and tailoring the use of ASC and Contact Precautions to local conditions, the specific MDROs that are prevalent and being transmitted, and the presence of risk factors for transmission. A variety of approaches have reduced MDRO rates (3, 164, 165, 209, 214, 240, 269, 324). Therefore, selection of interventions for controlling MDRO transmission should be based on assessments of the local problem, the prevalence of various MDRO and feasibility. Individual facilities should seek appropriate guidance and adopt effective measures that fit their circumstances and needs. Most studies have been in acute care settings; for non-acute care settings (e.g., LCTF, small rural hospitals), the optimal approach is not well defined.

Two-tiered approach for control of MDROs

Reports describing successful control of MDRO transmission in healthcare facilities have included seven categories of interventions (Table 3). As a rule, these reports indicate that facilities confronted with an MDRO problem selected a combination of control measures, implemented them, and reassessed their impact. In some cases, new measures were added serially to further enhance control efforts. This evidence indicates that the control of MDROs is a dynamic process that requires a systematic approach tailored to the problem and healthcare setting. The nature of this evidence gave rise to the two-tiered approach to MDRO control recommended in this guideline. This approach provides the flexibility needed to prevent and control MDRO transmission in every kind of facility addressed by this guideline. Detailed recommendations for MDRO control in all

healthcare settings follow and are summarized in [Table 3 \(Tier 1\)](#). Table 3, which applies to all healthcare settings, contains two tiers of activities. In the first tier are the baseline level of MDRO control activities designed to ensure recognition of MDROs as a problem, involvement of healthcare administrators, and provision of safeguards for managing unidentified carriers of MDROs.

With the emergence of an MDRO problem that cannot be controlled with the basic set of infection control measures, additional control measures should be selected from the second tier of interventions presented in [Table 3 \(Tier 2\)](#). Decisions to intensify MDRO control activity arise from surveillance observations and assessments of the risk to patients in various settings.

Circumstances that may trigger these decisions include:

- Identification of an MDRO from even one patient in a facility or special unit with a highly vulnerable patient population (e.g., an ICU, NICU, burn unit) that had previously not encountered that MDRO.
- Failure to decrease the prevalence or incidence of a specific MDRO (e.g., incidence of resistant clinical isolates) despite infection control efforts to stop its transmission. (Statistical process control charts or other validated methods that account for normal variation can be used to track rates of targeted MDROs) (205, 325, 326).

The combination of new or increased frequency of MDRO isolates and patients at risk necessitates escalation of efforts to achieve or re-establish control, i.e., to reduce rates of transmission to the lowest possible level. Intensification of MDRO control activities should begin with an assessment of the problem and evaluation of the effectiveness of measures in current use. Once the problem is defined, appropriate additional control measures should be selected from the [second tier of Table 3](#). A knowledgeable infection prevention and control professional or healthcare epidemiologist should make this determination. This approach requires support from the governing body and medical staff of the facility. Once interventions are implemented, ongoing surveillance should be used to determine whether selected control measures are effective and if additional measures or consultation are indicated. The result of this process should be to decrease MDRO rates to minimum levels.

Healthcare facilities must not accept ongoing MDRO outbreaks or high endemic rates as the status quo. With selection of infection control measures appropriate to their situation, all facilities *can achieve* the desired goal and reduce the MDRO burden substantially.

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