

Management of Multidrug-  
Resistant Organisms (MDRO)  
in Healthcare Settings  
CDC/HICPAC, October 2006  
Introduction and Highlights

State of Maryland

Department of Health and Mental Hygiene

Office of Epidemiology and Disease Control Programs

# PURPOSE OF THESE SLIDES

- These slides are intended for use in presentations to healthcare workers by other healthcare workers who are familiar with the CDC guidelines “Management of Multidrug-Resistant Organisms in Healthcare Facilities, 2006”

# Objectives

- After participating in this presentation, you will be able to:
  - List three examples of multidrug-resistant organisms encountered in healthcare settings
  - Indicate some of the factors that are associated with the increased incidence of MDROs
  - Describe some of the steps that a healthcare facility should take to control MDROs



# Initial Clarification

## ■ HICPAC –

- H e a l t h c a r e I n f e c t i o n C o n t r o l P r a c t i c e A d v i s o r y C o m m i t t e

## ■ CDC –

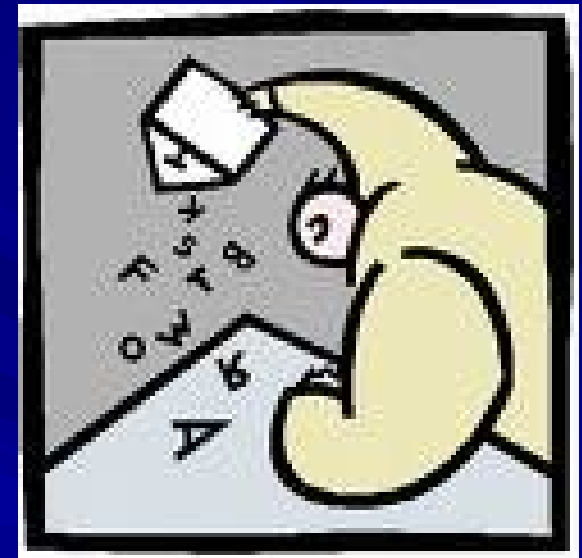
- C e n t e r s f o r D i s e a s e C o n t r o l a n d P r e v e n t i o n

## ■ DHQP

- T h e D i v i s i o n H e a l t h c a r e Q u a l i t y P r o m o t i o n  
(of the National Center for Infectious Diseases)

# Scope of Guidelines

- MDROs – Multidrug-resistant organisms
- Examples:
  - Methicillin-resistant Staphylococcus aureus (MRSA)
  - Vancomycin-resistant enterococci (VRE)
  - Multidrug-resistant Streptococcus pneumoniae (MDRSP)
  - MDR Gram-negative bacilli (MDR - GNB): *Klebsiella*, *Acinetobacter*, *Stenotrophomonas*, etc.



# Not included: Multidrug-Resistant Tuberculosis

- The MDRO guidelines specifically exclude discussion of limiting multidrug-resistant TB in health-care facilities, due to its distinct transmission mechanisms, and differences in control measures.
- TB Control guidance available in recently published:
  - CDC. MMWR. “Guidelines for Preventing the Transmission of *Mycobacterium tuberculosis* in Health-Care Settings”. (December 2005)



*M. tuberculosis*

# MDRO Control: Combination Strategy

- Tailor to needs of facility
- Assume that resistance development will continue to emerge
- Regularly review and monitor
- Revise controls as needed
- Support from leadership
- Provide needed resources (especially: IC, Lab, IT)



# MDROs Healthcare Impact

- Resistance increasing, esp. in acute care, but more generally in all care settings
- Patients with MDROs stay in hospital longer, at higher cost
- MDROs associated with more difficult to treat infections and higher mortality





# Patient and Facility Risk Factors

- Older patient / resident population
- Acute (vs. long-term) care
- Intensive care units (adult and pediatric/neonatal)
- Patient transfer among facilities increasing
- Certain patient populations / treatment modalities (e.g., hemodialysis)
- Community-acquired MDROs



# Trends in Resistance: *Staphylococcus aureus*

Era:	Early 1990s	Late 90s	2003
% MRSA	20-25%	50% (+)	59%

*%s of all S. aureus isolates*

# Trends in Resistance: Enterococci

Year	1990	1997	2003
% VRE	< 1%	15%	28.5%

*% of all enterococci isolates*

# Resistance Increasing in:

- *Streptococcus pneumoniae*
- *Klebsiella pneumoniae*
- *Pseudomonas aeruginosa*
- *Acinetobacter baumannii*
- *Escherichia coli*
- *Burkholderia cepacia*
- *Ralstonia picketii*
- *Stenotrophomonas maltophilia*

# Public Health Response

Educate, Assist, Monitor,  
Assure Quality of Care


# Prevent Infections

- Enhance clinical practices:
  - Catheter management
  - Care of intubated patients
  - Accurate, rapid diagnosis
  - Judicious selection & use of antibiotics

# Steps to Control Transmission

- Improved hand hygiene
- Active surveillance cultures in certain settings
- Pre-emptive contact isolation on admission in acute care
- Education
- Enhanced environmental cleaning
- Improved communication between facilities

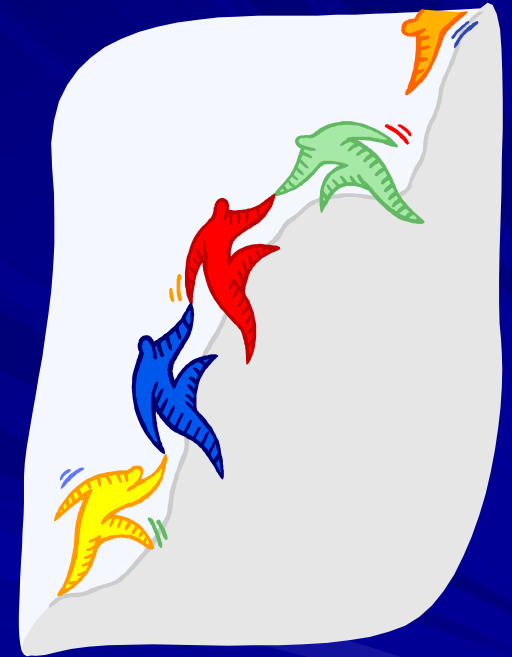
# Review, Rethink, Revise, Repeat: *an ongoing improvement protocol*

- 
1. Assess situation.
  2. Review current control steps.
  3. Modify control measure(s) to enhance effectiveness.
  4. Implement modified control measure(s).
  5. Go to Step 1.



# Factors in MDRO Control

- Team approach
- Support from IC; Lab; IT
- Persistence [at times for several years]
- Multiple concurrent control steps
- Periodic review of progress and of HCW compliance



*Note: > 100 reports of MDRO control efforts have been published.*

# The 7 Habits of Successful Healthcare Facilities

(For MDRO Control)



# Structures & Systems: Administrative Support

- **Human Resources**
  - Trained Infection Control Professionals
  - Healthcare worker staffing needs
  - Training
  - Compliance Monitoring
- **Support for system changes**
  - Communications
  - Rapid laboratory testing
- **Facilities & environmental changes**
  - Hand hygiene facilities
  - Environmental cleaning
- **Fiscal and political needs**
- **Written plan of implementation**

# 2

## Education

- Encourage behavior change
  - Understand the MDRO situation – feedback
  - Support and promote desired behavior(s)
- Examples:
  - Hand hygiene
  - Surveillance results
  - Antibiotic selection / use
- Involvement of nursing, other HCW staff
  - Including medical staff



# Judicious Use of Antibiotics

- Attention to antibiotic ordering patterns
  - (IT, pharm and medical staff support)
  - Expert/peer review
- Limiting formulary choices
  - Prior-approval programs
- Automatic stop orders
  - Physician reminder systems  
(lab and pharm support)
- Reviewing drug firms' sales efforts on antibiotic prescribing patterns

# 4

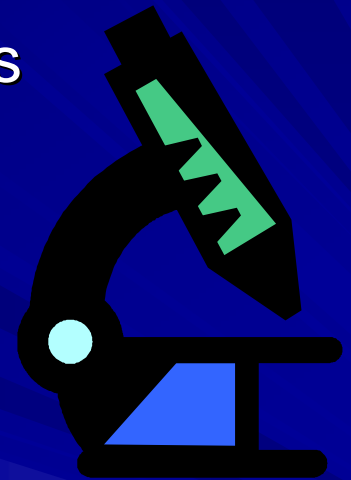
## MDRO Surveillance & ASC

- Active surveillance cultures (ASC)
  - Purpose: Identify colonization with MDROs
  - Effect: go beyond “routine” cultures
- Uses
  - Identify colonized patients
  - Enhance surveillance to study emergence of new MDROs in facility
  - Employ with (pre-emptive) contact / barrier precautions to decrease MDRO transmission
- Role of ASC Debated
  - More important than hand hygiene or cohorting?
  - Studies to date not definitive re: value



# MDRO Surveillance

- Support for susceptibility testing
  - Needs: Lab, IT, IC teamwork
  - “Sentinel event” approach to new MDROs
  - Molecular typing of MDRO isolates
- Enhanced susceptibility reports
  - Pathogen specific
  - Facility or unit-specific
  - Provider-specific (for feedback)
- Incidence Monitoring - Selected Pathogens
  - By unit; by provider (per 1000 patient-days)



# MDRO Surveillance Questions

- Still unanswered:
  - Proper timing of ASC?
  - Site(s) and protocol(s) for obtaining cultures
  - Pathogen-specific training
  - Coordination with contact precautions?
  - HCW surveillance cultures?
    - Usually **not needed** unless HCWs are epidemiologically linked to MDRO transmission.







# Infection Control Precautions

- Current NIH study in progress\* to see which precautions are most valuable in controlling MDRO transmission.
- Emphasize standard precautions

■ *Note: Adverse effects of isolation on patient*

\* *CDC/HICPAC MDRO Guidelines, p. 22*



# Infection Control Precautions

- Acute Care: Contact precautions (CP) for all patients known to be colonized/infected with MDRO
- Long Term Care: Review individual patient clinical situation. If unable to control secretions/excretions, put on CP. Otherwise, standard precautions.
- Ambulatory & home health – Use standard precautions.

# Other Infection Control Steps

- Cohorting of patients
- Cohorting of staff
- Use of designated beds or units for patients with MDROs
- Unit closure (rare)



# Duration of Contact Precautions

- Problem: prolonged colonization
- Problem: MDRO shedding intermittent
- Problem: NO recommendations for discontinuing contact precautions
- DHMH recommendation:

Discontinue contact precautions in acute care when culture negative or upon discharge.

Discontinue in long term care when resident can control/cover secretions and excretions. This is an individual decision.

# 6

## Environmental Control Measures

- Dedicate medical equipment to room
  - E.g., blood pressure equipment
- Assign selected cleaning personnel to affected healthcare unit
- Increased cleaning focused on
  - High touch items (bedrails, charts, phones, doorknobs)
  - Bedside commodes
- Monitoring of compliance with cleaning and disinfection procedures

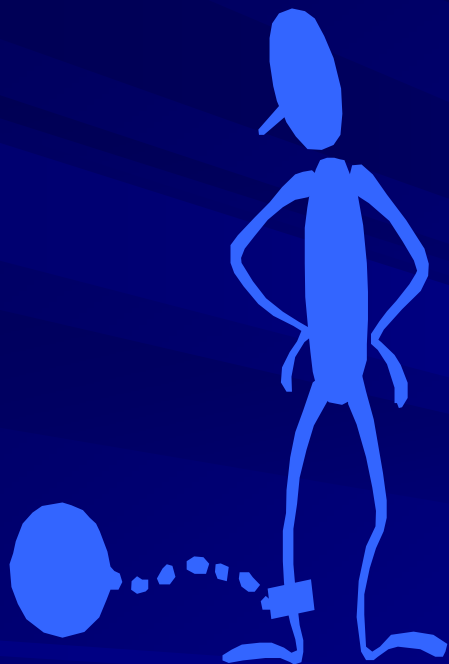




# Decolonization of MDRO

- Most successfully achieved with MRSA
  - Less likely to succeed with VRE
  - Rarely reported for MDR - GNB
- Limiting factors:
  - Availability of surveillance cultures
  - Need for follow-up cultures
  - Occurrence of
    - Recolonization,
    - MRSA strain was resistant to mupirocin, or
    - Emergence of resistance during decolonization
- HCW decolonization not usually needed

# Limits of CDC/HICPAC Guidelines



- Limited current evidence
  - Need for additional studies
  - Small hospitals, LTCFs not well studied
- Few reported prospective efforts to control MDROs
- Cost, feasibility studies needed

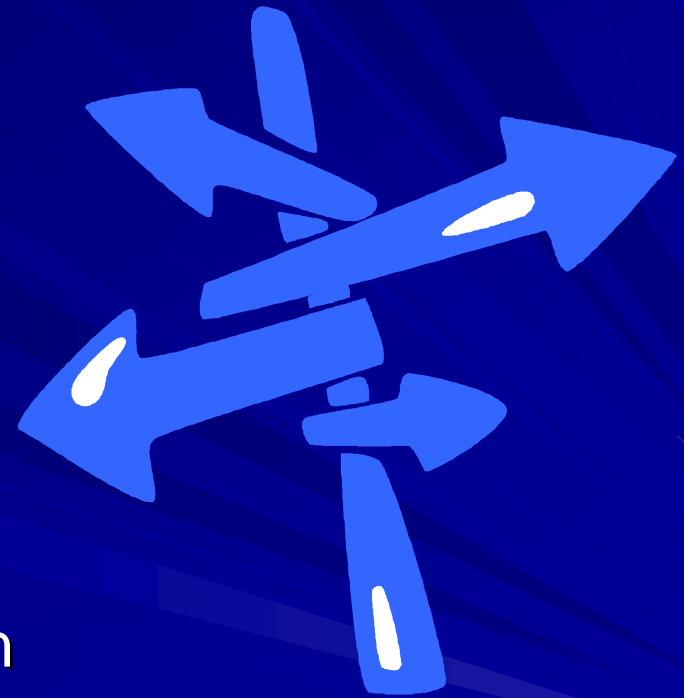
# CDC/HICPAC MDRO Recommendations



# Selecting MDRO Control Measures

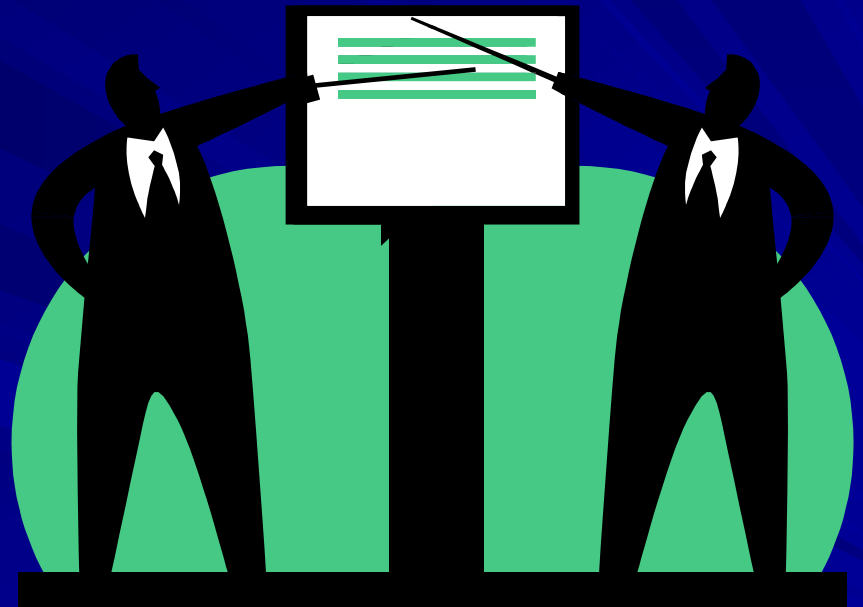
## ■ Factors:

- Facility Experience
  - MRSA problem?
  - GNB problem?
  - New or lingering problem?
- Patient Risk Factors and Type(s) of Care
  - High-risk patients
  - Special care units (ICUs, Burn units)
  - (Remember: outpatient settings, too!)



# MDRO Controversy

- Varying opinions
  - ? Effect of CA-MRSA
- Options:
  - SHEA guideline (2003)
  - Michigan Society for Infection Control
- Reduction in MDRO from either option



# CDC/HICPAC Recommendations

- “ *... Individual facilities should seek appropriate guidance and adopt effective measures that fit their circumstances and needs.*”  
(CDC/HICPAC Guidelines, p. 30)
- Select MDRO control measures based on:
  - Facility Assessment
  - Prevalence of MDRO
  - Feasibility

# CDC/HICPAC Recommendations

- Use two-tiered approach
  - First Tier: Baseline activities for all settings
  - Second Tier: More intense and focused MDRO control efforts not resolved / prevented by first tier efforts
- Triggers to escalate to second tier:
  - Identification of MDRO in high-risk patients or unit
  - Failure to reduce MDRO despite first tier efforts.


# Both Tiers Address:

1. Administrative measures & adherence monitoring
2. MDRO education
3. Judicious use of antimicrobials
4. Surveillance
5. Infection control precautions
6. Environmental measures
7. Decolonization

# CDC/HICPAC Recommendations

- Tier 1: Baseline activities, all settings
  - Ensure MDRO recognition
  - Involve healthcare administrators
  - Manage unidentified MDRO carriers
- Note:
  - Certain Tier 1 recommendations are specific to certain healthcare settings: hospitals; LTCFs; ambulatory care; hemodialysis units

# CDC/HICPAC Recommendations

- Tier 2: (If MDRO problems not resolved / controlled by Tier 1 efforts)
    - Assess / identify problem ←
    - Evaluate current measures' effectiveness
    - Select and implement appropriate additional control measure(s)
    - Continue to monitor; back to
  - Tier 2 Recommendations rarely healthcare setting-specific
- 

# CDC/HICPAC Recommendations

## ■ After Tier 1 & 2: Continue Surveillance:

- “ ... Ongoing surveillance should be used to determine whether selected control measures are effective and if additional measures or consultation are indicated. The result of the process should be to decrease MDRO rates to minimum levels.

## ■ And a reminder:

- “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.”



# CDC/HICPAC Table 1

- (P. 70) Characterize reports from 1982 – 2005 concerning MDROs in healthcare
- Most from academic settings
- Most from hospitals or specialty units
- 2/3 related to outbreaks
- Most less than one year of subsequent monitoring after intervention.

# CDC/HICPAC Table 2

- (P. 71) Characterize control measures described in reports from 1982 – 2005 by type of MDRO
- Top 4 control measures for leading MDROs:
  - MDR – GNB: Contact precautions; surveillance cultures; education of staff, patients or visitors; Hand hygiene
  - MRSA: Surveillance Cultures of patients; Contact precautions; Decolonization; Hand hygiene
  - VRE: Surveillance cultures of patients; Contact precautions; Extra cleaning and disinfection; Education of staff, patients or visitors.

# CDC/HICPAC Table 3

- (P. 72 – 73) Tier 1 and Tier 2 recommendations, summarizing pages 33 – 47
- Each Tier organized by area:
  - Administrative measures & adherence monitoring
  - MDRO education
  - Judicious use of antimicrobials
  - Surveillance
  - Infection control precautions
  - Environmental measures
  - Decolonization

Ready for some practice?

Examples of Real Situations

# Exercise 1: Hospital MRSA

- [Based on DHMH files]
- Situation (1/3):
  - Hospital X, in a suburban / rural Maryland jurisdiction, serves several other jurisdictions. Hospital X has several intensive care units.
  - Adult ICU and Cardiac Step-down Unit each notice increase MRSA cases over two months. Now MRSA cases total eight different patients with several deaths. Exact role of MRSA infection in death unknown.

# Exercise 1: Hospital MRSA

## ■ Situation (2/3):

- Hospital has existing infection control program
- Lab records show no recent outbreaks on other units. No general increase in *S. aureus* infections have been noted.
- Patients are mostly post-MI and post-surgical cases. No other MDRO problems known. Rare VRE noted by lab over past several years.
- No temporal clustering noted in MRSA cases.
- Medical, ancillary and nursing staff care for patient on both intensive care units.

# Exercise 1: Hospital MRSA

## ■ Other facts (3/3):

- First case from this unit was admitted from local LTCF for r/o FUO. Labs: MRSA in blood culture.
- First and three other outbreak cases patients of same physician (internist, major admitter).
- Hospital administration was reluctant to contact LHD; LHD has asked SHD for guidance. Hospital asks SHD, LHD not to term this an “outbreak”.

## ■ How should the hospital proceed?

- Which if any Tier 1 or 2 control measure(s) needed?

# Exercise 2: LTCF VRE

- [Based on DHMH files.]
- (Small cluster of VRE in wounds on one unit of multi-unit LTCF.)
- DON objects to cost of changes in facility's usual procedure implemented by former IC nurse (recently resigned). DON is current head of facility's infection control program.
- Little more is known.



# Exercise 2: LTCF VRE

- How should LHD proceed?

# Exercise 3: Hospital MDR-GNB

- [Based on DHMH files.]
- (Large academic tertiary care center with many specialty and high-intensity of care units reports that over past several years, a particular strain of *Serratia marcescens* has been tracked by the Microbiology supervisor as a MDR GNB.
- Most isolates from patients in burn center or adult ICU.
- More recent some *Serratia* isolates show resistance to all antibiotics except imipenem.)
- Not reported because *Serratia* is not reportable in jurisdiction by laboratories or healthcare providers

# Summary (1)

- The new CDC guideline for Multidrug-Resistant Organisms in Healthcare Settings, 2006 suggests that each healthcare setting needs to have its own written strategy/plan for addressing these organisms

# Summary (2)

- Regardless of the setting, each facility/setting should have in writing an implementation plan that addresses the following items:
  - **Structures & Systems (Administrative Support)**
  - **Education**
  - **Antibiotic Use**
  - **Surveillance and Active surveillance cultures**
  - **Infection Control Precautions**
  - **Environmental Control Measures**
  - **Decolonization of MDROs**

# QUESTIONS

