BEST PRACTICES IN MDRO SCREENING AND CONTROL

August 15, 2012

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Disclosures

• Dr. Van Enk has no financial disclosures or conflicts of interest related to this presentation
Introduction

• Infections caused by multidrug-resistant organisms are perceived to be serious problems in the management of infectious diseases
• There are proven ways to prevent and control the spread of these infections
• Addressing the challenge of multidrug-resistant organisms in healthcare requires collaboration between the laboratory and infection prevention department
Outline

• What is a multidrug-resistant organism (MDRO) and why are they important?
• Best-practice approaches or steps to address MDROs
• An important laboratory--infection prevention collaboration; active surveillance
• Designing the best MDRO approach for your setting
Objectives

- Participants will be able to **list** the most significant multidrug resistant pathogens, their reservoirs, and how they are transmitted.
- Participants will be able to **select** the best practices to reduce the risk of MDRO infections for their practice setting.
- Participants will be able to **implement** proven methods to reduce the risk of MDRO infections.
What are MDROs?

- The definition of a multidrug resistant organism is surprisingly unclear
  - Resistant to at least two complete classes of antibiotics (all beta-lactams or all aminoglycosides)
  - Resistant to the drug of choice (methicillin-resistant *S. aureus* or vancomycin-resistant enterococci)
  - Not antibiotic resistant but hard to kill for other reasons (*Clostridium difficile*)
  - Epidemiologically significant
What are MDROs?

• There is a consensus around what should be considered MDRO, at least for now
  • Methicillin-resistant *Staphylococcus aureus*; MRSA
  • Vancomycin-resistant enterococci (by the vanA mechanism); VRE
  • Extended-spectrum beta-lactamase-producing enteric Gram negatives; ESBL
  • Carbapenem-resistant Gram negatives
  • Highly resistant Acinetobacter and other non-fermenter strains
  • *Clostridium difficile*
Why are we so concerned with MDROs?

- Antibiotic-resistant bacteria are not necessarily more virulent, but resistance has many negative consequences
  - Patient outcomes are worse; acuity, mortality, length of stay, complications, toxicity of alternative antibiotics required
  - Cost per episode of care is increased
    - Antibiotic cost, length of stay, cost of special precautions
  - MDROs are transmissible; their presence in some patients poses a risk to other patients
How common are MDROs and where are they?

• Most multidrug resistant bacteria are variants of strains that are normal human flora that happen to be resistant phenotypes
  • MRSA, VRE, enteric Gram negatives, C. difficile
• The highly-resistant non-fermenters typically have an environmental source like water
  • Acinetobacter, Pseudomonas, Stenotrophomonas
How common are MDROs and where are they?

- MRSA is normally carried in the nose of about 5% of the population
- VRE is normally carried in the GI tract of at least 5% of the population
- *C. difficile* is carried in the GI tract of 1-3% of the population
- Prevalence of MDRO enteric Gram negatives?
What factors influence the prevalence of MDROs?

- Resistance is not an advantage to bacteria unless they are exposed to antibiotics
- The single biggest factor is antibiotic exposure, direct or indirect
  - The patient takes antibiotics directly
  - The patient consumes antibiotics in their food or consumes food with antibiotic-resistant bacteria in it
  - The patient lives or works in an environment where antibiotics are used (family, group settings, healthcare, agriculture)
What do experts say we should do about MDROs?

- All the professional groups related to infection prevention, infectious disease, and patient care quality have published guidelines on control of MDRO infections.
- All the recommendations start with a risk assessment; measure how big a problem you have (incidence and prevalence) and if it is increasing.
Society for Healthcare Epidemiology of America (SHEA)

- 2003; the first guidelines, very thorough, strongly recommend active surveillance cultures

The Centers for Disease Control and Prevention

• Management of Multidrug-Resistant Organisms In Healthcare Settings, 2006
• Considered the definitive guidelines but admit that some issues are unresolved
The Joint Commission

- 2012 National Patient Safety Goal number 07.01.01
- “Use proven guidelines to prevent infections that are difficult to treat”
- Nine elements of performance
- [http://www.jointcommission.org/standards_information/npsgs.aspx](http://www.jointcommission.org/standards_information/npsgs.aspx)
National Healthcare Safety Network (NHSN)

- The national database for healthcare-associated infections
- Member organizations report data monthly
- Collects data on MDRO infections, does not publish prevention guidelines
Institute for Healthcare Improvement

- A consumer and payer-driven advocate for quality
- “Change Package” recommends active surveillance testing
Association for Professionals in Infection Prevention (APIC)

- Publishes individual “Elimination Guides” for each MDRO
- Generally follow the 2006 CDC guidelines
- [http://www.apic.org/Practice-Guidance/elimination-guides](http://www.apic.org/Practice-Guidance/elimination-guides)
Infectious Disease Society of America (IDSA)

- Includes chapters on preventing MRSA and C. difficile infections
Can we prevent MDROs from emerging?

- Antibiotic resistance is normally found in wild-type bacteria due to genetic diversity and the need to survive in a mixed microbial environment, but is often present at a low level.
- Emergence of resistance to certain antibiotics in the setting of antibiotic use is a result of selective pressure.
- Over-use or inappropriate use of antibiotics needlessly increases selective pressure and causes resistance to increase.
- An important part of prevention of MDROs is antibiotic stewardship.
Can MDROs be controlled in the hospital?

- Yes, proven methods described in published guidelines include common steps
- Described as a **bundled** approach; no one thing works by itself, you have to do them all well or keep escalating until the problem goes away
  - Problem; you don’t ever know for sure which of the bundled steps was most important
- CDC describes a 2-tiered approach; do the first bundle of interventions based on a risk assessment, then move to more aggressive things if you don’t have success
Can MDROs be controlled or eliminated in the hospital?

1. Hand Hygiene
2. Contact Precautions
3. Active Surveillance
4. Education of staff and patients/family
5. Enhanced environmental cleaning
6. Optimal communication between key players
7. Optimize antibiotic use
8. Some might add decolonization
How do we know if we have MDROs in a patient population?

• Two surveillance strategies

1. Monitor routine culture results
   • No extra work or expense
   • Detects only MDROs causing infection; the “tip of the iceberg”
   • General rule; colonization rate is four times the number of infections

2. Active surveillance culture or testing for colonized asymptomatic people
   • Detects colonization, not just infection
   • Lots of extra work and expense
Laboratory methods of active surveillance testing

- All methods take time and resources
- You must plan and budget before you start your surveillance program
- Three types
  - **Routine culture**
    - Culture on normal media followed by susceptibility testing; a phenotypic test
    - Takes 36-48 hours
    - No new media or techniques, but will increase labor
Laboratory methods of active surveillance testing

• **Selective culture medium with chromogenic indicator**
  • Selects for the species, the resistant phenotype has a unique color
  • Culture and susceptibility combined into one
  • More sensitive
  • Takes 24 hours
  • Each medium detects only one type of MDRO; how many do you want to do?
Laboratory methods of active surveillance testing

- **Molecular methods**
- Use nucleic acid amplification to detect low numbers of a genotype in a specimen
- Some are 2-hour tests
- Most expensive
- Specimen sources are limited by FDA approval
Large-scale examples of active surveillance

- State-wide programs
  - Illinois California, New Jersey, Pennsylvania
  - All patients screened for MRSA by nasal swab on admission
  - Outcomes?
- Department of Veterans Affairs system
  - MRSA bundle began in 2007
  - Nasal active surveillance, contact precautions, hand hygiene, institutional culture change
  - MRSA nosocomial infections dropped from 1.64/1000 patient days to 0.62
Questions to ask before you start active surveillance

- Who do we want to survey?
  - All patients or focused
- What MDROs do we want to survey for?
- How many patient body sites do we want to survey?
- How long do we want to survey?
  - Forever or for a defined period
- Survey on admission or also periodically?
  - Prevalence only or also incidence (hospital-acquisition)
- Who pays?
  - Considered quality improvement
- What to do with the information?
Must you screen all patients?

Yes

- Completeness; if you don’t, you will miss some positive patients
- You can calculate the actual prevalence in your patient group
- Easy; you don’t have to risk-stratify each patient

No

- Costs more
- Each MDRO has risk factors you can use as criteria to increase yield and exclude low-risk patients
- You can’t really be sure you are catching all the colonized patients anyway
Should we try to decolonize MDRO-colonized people?

- It is possible to decolonize people who are colonized with MRSA, but difficult
  - Often not feasible in a hospital admission
  - Some will lose it naturally anyway
- There are no proven methods to eliminate VRE or Gram negative enteric bacteria from the GI tract of colonized people
- Obviously, if the MDRO is causing an infection, you should treat the infection
What are standard precautions?

- The same for **all patients**
- Several elements, but some are relevant here
- Hand hygiene
- Disinfecting equipment taken from room to room
- Staff wear appropriate personal protective equipment for the risk
- Staff education
- Proper waste disposal
What are special precautions?

- Special precautions include contact, droplet and airborne
- MDRO patients require **contact precautions** beyond standard precautions
- The MDRO is present on the patient, everything the patient touches, and everything that staff touches in the room
- Staff wear personal protective equipment; a gown to cover clothing and gloves for hands
- Private room or cohorted with another positive patient
Should active surveillance be used to 1) place or 2) remove special precautions?

• Some hospitals use active surveillance to place patients in contact precautions if the test is positive
  • Requires a rapid test or it will be too late

• Isn’t that backwards? A better approach might be to put them in precautions on admission and take them out if the test is negative
Is active surveillance effective?

- Active surveillance is useful to control outbreaks
- Active surveillance alone, without interventions, is pointless
- Studies do not show that routine active surveillance adds value without other process improvements and there is great debate among hospital epidemiologists as to the effectiveness of active surveillance outside of the outbreak setting
Is active surveillance ethical?

Recently some have looked at active surveillance from the perspective of medical ethics:

The unintended adverse effects of putting colonized patients in special precautions

- Reduction in patient care contact (up to 50%)
- Increase in feeling of isolation, anxiety, depression, and loss of control in the patient
- Prolonged length of stay and slower rehabilitation
- Increased rate of falls, pressure ulcers, fluid and electrolyte disorders, incomplete charting
- Difficulty in placement after discharge
- Longer wait in the Emergency Department for admission
Is active surveillance ethical?

- The ethical conflict between the privacy of the individual and the risk to the population
  - When do you have a right to know my normal flora?
- Who pays the financial cost of surveillance?
  - Active surveillance is not for the benefit of the colonized patient; it benefits and protects the non-colonized patients around them
  - Active surveillance gives us data to measure our processes
  - The patient should not pay for hospital performance improvement activities
- Social justice; the poor and urban hospitals bear a disproportionate share of the burden
Should healthcare workers be surveyed for MDROs?

• There are no authoritative recommendations to routinely screen healthcare staff for colonization
• Such screening may be a part of an outbreak investigation at later stages (second tier interventions)
• There are no work restrictions for colonized staff beyond normal standard precautions in the absence of an outbreak
Is focusing on MDROs the right approach?

- Outbreaks and emerging incidence of MDROs in a hospital or community are indicators of bad processes.
- It may be more productive to focus on and measure the processes directly (hand washing, room cleaning, antibiotic utilization) rather than a surrogate measure.
- We should be concerned with reducing our patients’ risk of all infections, not just MDROs.
- The proposed interventions to control MDROs are appropriate for all patients, not just those colonized with MDROs.
Advice

• If your hospital has private rooms, your hand hygiene and use of standard and special precautions are optimal, you are optimizing your use of antibiotics, you clean equipment between patients, and you do not have high or increasing rates of MDRO infections, the additional benefit of active surveillance to detect asymptomatic colonization is minimal.

• I would not start an active surveillance program just because others are doing it.
Advice

• Perform a risk assessment for MDRO risk; if you detect a higher than expected prevalence or incidence or increasing incidence, implement the MDRO bundle first before you start a large active surveillance program

• Do active surveillance in a focused, temporary and goal-directed way, not a fishing expedition

• If you decide to do active surveillance, be prepared to pay the cost
Conclusions

• Hospital infection preventionists should assess their patients’ risk of MDRO infections; data that come from the laboratory

• Communication between the laboratory and the infection prevention department is essential to controlling MDROs

• Hospitals should thoroughly think through the issues before beginning an active surveillance program for MDROs and involve the laboratory in these discussions