

Best Practices for MDRO Management in LTC

Dolly Greene RN,CIC

Director of Clinical Services & Education

Diagnostic Laboratories & Radiology

Objectives

- Participants will be able to:
 - Understand which organisms are referred to as multi-drug resistant organisms (MDROs) and are considered to be a threat to residents and our entire healthcare system
 - Explain the role of the laboratory in alerting nursing staff when an MDRO has been identified so appropriate precautions can be implemented
 - Describe best practices of infection prevention and control which can be utilized to prevent development or spread of these MDROs
 - Understand how to manage isolation and cohorting of residents

Multidrug Resistant Organism¹ (MDRO)

- Some multidrug-resistant organisms (MDRO) have their own acronym e.g. MRSA, VRE, ESBL, CRE (*Methicillin-resistant Staphylococcus aureus*, *Vancomycin-resistant Enterococcus*, extended spectrum beta-lactamase, *Carbapenem-resistant Enterobacteriaceae*)
 - These are organisms that are resistant to one or more antibiotic or class of antibiotics
 - *There are strains of Clostridium difficile that are multi-drug resistant*²
 - New MDROs continue to develop e.g. New Delhi metallo-beta-lactamase (NDM)
- An MDRO can be any organism that develops resistance and is only **sensitive** to 2 or fewer antibiotics
- Some organisms are known to have an inherent resistance to most antibiotics (Acinetobacter)

1. Management of Multi-drug-Resistant Organisms in Healthcare Settings, 2006. <http://www.cdc.gov/hicpac/pdf/MDRO/MDROGuideline2006.pdf> Last accessed July 7, 2016.

2. Tenover FC, Tickler IA, Persing DH. Antimicrobial-resistant strains of Clostridium difficile from North America. Antimicrobial Agents and Chemotherapy June 2012; 56 (6): 2929-2932. <http://aac.asm.org/content/56/6/2929.full> Last accessed August 9, 2016

Significance of MDROs

- Antibiotic resistance is a global problem³
 - The World Health Organization has labeled these bacteria as “nightmare bacteria” which pose a “catastrophic threat” to people all over the world²
- Residents who have infections caused by an MDRO are harder to treat due to fewer drugs now available^{1,3}
- MDRO infections require longer treatment periods, more costly treatment regimens, may cause extended hospital stay and can result in greater disability³

3. Antibiotic Resistance Threats in the United States, 2013. <http://www.cdc.gov/drugresistance/pdf/ar-threats-2013-508.pdf> Last accessed July 15, 2016

3 Categories of Concerned Threats³

- The Centers for Disease Control (CDC) has prioritized bacteria into 3 categories: Urgent, Serious, Concerning:

Urgent Threat	Serious Threat	Concerning Threat
<ol style="list-style-type: none"> 1. <i>Clostridium difficile</i> 2. CRE 3. Drug-resistant <i>Neisseria gonorrhoeae</i> 	<ol style="list-style-type: none"> 1. Multi-drug resistant <i>Acinetobacter</i> 2. ESBL 3. Drug-resistant (DR) <i>Campylobacter</i> 4. VRE 5. MRSA 6. Drug-resistant <i>Streptococcus pneumoniae</i> (SP) 7. Drug-resistant Tuberculosis 8. DR <i>Pseudomonas aeruginosa</i> 9. DR Shigella 10. DR <i>Salmonella Typhi</i> 11. DR non-typhoidal <i>Salmonella</i> 	<ol style="list-style-type: none"> 1. Vancomycin resistant <i>Staphylococcus aureus</i> (VRSA) 2. Erythromycin-resistant Group A <i>Streptococcus</i> 3. Clindamycin-resistant Group B <i>Streptococcus</i>



Minimum Estimates of Morbidity & Mortality from MDRO Infections³

MDRO	Infections included in Case/Death estimates	Estimated annual number of cases in U.S.	Estimated annual number of deaths in U.S.
MRSA	Invasive infections (both healthcare & community)	80,000	11,000
VRE	Healthcare-associated infections (HAI) in hospitalized patients (not in long term care)	20,000	1300
ESBL	HAI caused by E.coli (EC) and Klebsiella pneumoniae (KP) with hospital onset	26,000	1700
CRE	HAI caused by EC & KP with onset in hospital patients	9300	610
Streptococcus pneumoniae (SP) (full resistance to clinically relevant drugs)	All infections	1,200,000	7000

Four Core Actions to Fight MDRO Infections³

- Preventing infections and preventing the spread of resistance (Infection control practices)
- Tracking resistant bacteria (surveillance activities)
- Improving the use of antibiotics (stewardship program)
- Promoting the development of new antibiotics and developing new diagnostic tests for resistant bacteria (e.g. PCR tests with more timely turnaround-time)



Laboratory Role

- Is there a laboratory process in place for alerting facility when a multidrug resistant organism is isolated?
- Provide messaging on urine culture reports as reminders that 30%-50% of residents in LTC may be colonized or have asymptomatic bacteriuria. **Culture report to be correlated with resident's clinical condition**
- Assist with education to facility staff on understanding lab tests and results as well as which lab tests are available
- Provide facility-specific antibiogram to track resistance of organisms isolated and assist physicians with antibiotic selection for empiric therapy

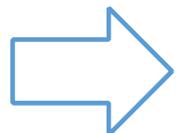
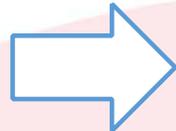




Sample of a Diagnostic Laboratories urine culture & sensitivity (C&S) report

Message Alert For MDRO

Message alert to consider UTI vs ASB



www

Diagnostic Laboratories & Radiology
2820 N. Ontario Street
Burbank, CA 91504

Patient:	DOB:	Client:
Specimen:	Age:	Phone:
Account:	Sex:	Fax:
Room#:		Provider:

Collection Date/Time: 12/02/2015 04:30 Current Printed Date/Time: 06/01/16 15:40
Report Status: COMPLETED
Report Requested By: DOLLY JUN 1, 2016 15:40

Specimen Comment: CS IF INDICATED

URINE CULTURE

MICROBIOLOGY REPORT COMPLETED: DEC 4, 2015

ORG#1 ESBL POS. (RESISTANT TO ALL CEPHALOSPORINS AND PENICILLINS)

ORG#2 NO SUSCEPTIBILITY TESTING REQUIRED

Organism #1: Escherichia coli (esccol)	
Antibiotics	esccol
Amikacin	<=2 S
Ampicillin	>=32 R
Ampicillin/Sulbactam	>=32 R
Ciprofloxacin	>=4 R
ESBL	Pos +
Ertapenem	<=0.5 S
Gentamicin	<=1 S
Imipenem	<=0.2 S
Levofloxacin	>=8 R
Nitrofurantoin	<=16 S
Piperacillin/Tazobac	<=4 S
Tobramycin	<=1 S
Trimethoprim/Sulfame	<=20 S

BLANK= DATA NOT AVAILABLE, OR DRUG NOT ADVISABLE OR TESTED
S = SUSCEPTIBLE I = INTERMEDIATE R = RESISTANT (L) = MedCal Drug

The majority of positive urine cultures (non-catheter) from residents in long term care facilities represent asymptomatic bacteriuria with no clinical signs of infection. Studies have shown that 30-50% of elderly long term care residents can have a positive urine culture - and pyuria - without any clinical evidence of infection. According to recent guidelines by multiple clinical societies, antibiotic therapy is not recommended without clinical signs localizing to the urinary tract.

Parts of an Antibiogram

Number of Isolates

Antibiotic	<i>Aeromonas hydrophila</i> carvata	<i>Citrobacter freundii</i>	<i>Citrobacter koseri</i>	Coagulase negative Staphylococci	<i>Enterobacter cloacae</i>	<i>Enterococcus</i>	<i>Escherichia coli</i>	<i>Escherichia coli</i> ESBL POSITIVE	<i>Klebsiella oxytoca</i>	<i>Klebsiella pneumoniae</i>	<i>Klebsiella pneumoniae</i> ESBL POSITIVE	<i>Morganella morganii</i>	<i>Proteus mirabilis</i>	<i>Providencia stuartii</i>	<i>Pseudomonas aeruginosa</i>	<i>Staphylococcus aureus</i>	<i>Staphylococcus aureus</i> MRSA	<i>Stenotrophomonas maltophilia</i>
	1	1	1	4	1	12	49	20	1	16	1	10	25	7	14	10	6	1
AMIKACIN	100	100	100		100		100	100	100	100	100	100	100	100	100			
AMPICILLIN	0					92	47	0	0	0	0	0	69	0				
AMPICILLIN/SULBACTAM	0						63	25	100	88	0	0	74	0				
BENZYLPENICILLIN			0		92											0	0	
CEFAZOLIN	0	0	100		0		98		100	100		0	97	0				
CEFEPIME	100	100	100		100		100		100	100		100	97	100	86			
CEFTAZIDIME	100	100	100		100		100		100	100		60	97	100	93			
CEFTRIAXONE	100	100	100		100		100		100	100		70	97	100				
CIPROFLOXACIN	100	100	100	25	100	33	57	0	100	100	100	50	51	43	43	10	0	
CLINDAMYCIN				25												50	33	
ERTAPENEM		100	100				100	100	100	100	100	100	92	100				
ERYTHROMYCIN			0		0											20	17	
GENTAMICIN	100	100	100		100		96	60	100	94	100	40	74	0	100			
GENTAMICIN HIGH LEVEL					100													
IMPENEM	100	100	100				100	100	100	100	100	20	29	43	79			
LEVOFLOXACIN	100	100	100	25	100	42	55	0	100	100	100	60	51	43	43	10	0	100
LINEZOLID				100		100										100	100	
NITROFURANTOIN		100	100	75	0	92	96	95	100	42	100	0	0	0		100	100	
OXACILLIN MIC				25												100	0	
PIPERACILLIN/TAZOBAC		100	100		100		96	95	100	88		90	100	100	100			
QUINUPRISTIN/DALFOPR					0													
RIFAMPICIN			100													100	100	
STREPTOMYCIN HIGH LEVEL					100													
TETRACYCLINE				100		8										100	100	
TIGECYCLINE					100													
TOBRAMYCIN	100	100	100		100		96	60	100	94	100	80	74	0	100			
TRIMETHOPRIMS/SULFAME	100	100	100	75	100		52	60	100	81	0	20	69	57		100	100	100
VANCOMYCIN				100		83										100	100	

The greater the number of isolates, the more accurate the sensitivity results for the given organism⁴

Minimum isolates should be 10-30^{4,5,6,7}

4. Moehring RW, Hazen KC, Hawkins MR, et al. Challenges in preparation of cumulative antibiogram reports for community hospitals. Journal of Clinical Microbiology. September 2015;Volume53:9:2977-2982

5. Leuthner KD, Doern GV. Antimicrobial stewardship programs. Journal of Clinical Microbiology. December 2013. Volume51(12):3916-3920

6. Joshi S. Hospital antibiogram: A necessity. Indian Journal of Medical Microbiology 2010;28:277-80

Sample Empiric Therapy Developed from Facility Antibiogram for UTI*

Infection/ Diagnosis	Likely Pathogen	JHA Initial Treatment	IDSA Empiric Treatment	Alternative Treatment/ Comments
Cystitis (UTI) uncomplicated	E. coli, Klebsiella, Staph aureus, coagulase negative staph	Cephalexin 250- 500mg PO q6h x 3-7 days	Bactrim DS 1 tablet BID x 3days	Penicillin allergy: Bactrim DS 1 tab BID x3days
Cystitis (UTI) complicated	E. coli, Klebsiella, Staph aureus, coagulase negative staph	Cephalexin 250- 500mg PO q6h x 7-14 days	Ciprofloxacin or Levofloxacin x 5-10 days	Penicillin allergy: Bactrim DS 1 tablet x 7days
Pyelonephritis Uncomplicated	MRSA, Enterobacteriaceae (E. coli, Klebsiella, Proteus, Enterococcus	Piperacillin/ Tazobactam 2.25mg IV q6h	Ciprofloxacin or Levofloxacin (use only if E. coli sensitivity is >80% OR ↓	Penicillin allergy: Aztreonam 500mg-1g IV q8-12h and Vancomycin IV (per pharmacy protocol)
Pyelonephritis Complicated (Foley, instrumentation, Underlying disease)	Enterobacteriaceae (E. coli, Klebsiella, Proteus, Pseudomonas, Enterococci), Staph spp.	Piperacillin/ Tazobactam 2.25mg IV q6h	Bactrim DS 1 Tablet PO BID (use only if E. coli sensitivity >80%)	Remove change Foley/nephrostomy tube

*This table was developed by the pharmacy department at Los Angeles Jewish Home for the Aging – Joyce Eisenberg Keefer facility. Permission to use this table granted by Jewish Home Organization July 29, 2016, Administrator Ilana Grossman. Acknowledgment given to Janice Hoffman PharmD, Florenda Shakir RN, Fatemeh Pournahavandi PharmD Candidate 2017 and Shokoofeh (Nasha) Namiranian PharmD Candidate 2017.

Infection Prevention & Control^{8,9}

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- Hand hygiene (HH) process
- Surveillance Program
- Standard Precautions
- Transmission-Based Isolation
- Enhanced Standard Precautions
 - Intensified Interventions when needed
- Aerosol Transmissible Disease Program
- Environmental Sanitation
- Antibiotic Stewardship Program
- Education Program



8. Schweon S, Burdsall D, Greene D, et al. APIC Infection Preventionist's Guide to Long-Term Care. 2013 Chapter 5: pg 71-91

9. Cahill C. CDPH Enhanced Standard Precautions. September 2010. <https://www.cdph.ca.gov/programs/hai/Documents/ESPforLTCareFacilities.2010.pdf> Last accessed July 25, 2016

Where Do We Begin^{6,9} (continued)

- Surveillance
 - Set up your tracking system for identifying infections and MDRO occurrences (forms, educate staff)
 - Review data often (use McGeer Criteria)
 - Provide feedback to stakeholders as well as your QA meetings
 - Include all departments and encourage sharing of information
 - Correlate process compliance with infection rates
 - As your HH compliance rates go up your infection rates may go down!



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So Where Do We Begin^{8,9}(continued)

- Isolation
 - Review your policy-Do you know where this policy is located in your manual?
 - Educate your staff on your current policy and practices
- Aerosol Transmissible Disease Program
 - Do you have a policy? Training? Available equipment like N95 respirator? Immunization practices and policy up to date?
- Environmental Sanitation
 - Do you perform competencies on the cleaning practices and knowledge of your housekeepers on a regular basis?

So Where Do We Begin^{8,9}(continued)

- Education
 - Education on your policies extends beyond your employees (include residents, families and ancillary service providers)
 - Ensure that your outside clinicians (podiatrist, dentist, ophthalmologist) are aware of your expectations of infection control practices. Document!



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Antibiotic Stewardship¹⁰

- With the passing and signing of SB 361, all nursing homes in California must have an antibiotic stewardship program (ASP) in place and functioning by January 1, 2017¹⁰
- This mandate means all skilled nursing facilities must have a policy in place, a committee headed by a physician champion selected, and an area to focus on to optimize antibiotic usage in your facility
 - Your committee may consist of your medical director, pharmacy consultant, director of nursing, IP, administrator and laboratory representative¹¹
 - Select an area to focus your stewardship efforts e.g. urinary tract infections is considered a low hanging fruit¹¹

10. Senate Bill No. 361, Chapter 764. <https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml> Last accessed August 5, 2016

11. The Core Elements of Antibiotic Stewardship for Nursing Homes. <https://www.cdc.gov/longtermcare/pdfs/core-elements-antibiotic-stewardship.pdf> Last accessed August 5, 2016

Pearls of an ASP¹²

- Cedars Sinai Medical Center (CSMC) started an ASP with their network of 8 skilled nursing facilities
- CSMC is working with these metrics¹²:
 - As an example: numbers of urine cultures ordered, how many are positive, how many suggest colonization, how many residents are treated with a low colony count (under 100,000 colony forming units), how many residents do not meet the McGeer Criteria, how many residents are tested for Clostridium difficile infection and how many are positive for this infection.
 - **Consider having your committee develop algorithms for treatment protocols**

12. Written permission obtained from Dr. Rekha Murthy from Cedars to use this information, July 9, 2016. Cedars Sinai Medical Center Extended Care Program Collaboration. 2015-16

Pearls of an ASP

- Consider having your ASP committee develop a decision tree for when to order a culture
 - According to experts, mental confusion **alone** does not merit ordering urine cultures¹³
- Consider reaching out to your local acute care hospital to develop working relationship towards these goals

13. Silver SA, Baillie L, Simor AE. Positive urine cultures: A major cause of inappropriate antimicrobial use in hospitals? Canadian Journal of Infectious Diseases & Medical Microbiology. 2009 Winter;20(4):107-111

Pearls of an ASP^{12,14}

- Things to consider when resident is confused^{12,14}:
 - D- Drugs (new medication, changes in dosage) or discomfort
 - E- Ear, Eyes, Environment (check hearing aids, glasses), emotions¹⁴
 - L- Low oxygen (heart attack, or stroke)
 - I-Infection (pneumonia, symptomatic UTI, cellulitis)
 - R- Retention (constipation, urinary retention)
 - I- Ictal state (seizure)
 - U- Under (dehydrated, malnutrition)
 - M-Metabolic (diabetes, check blood sugar)
 - S- Subdural hematoma (head trauma, fall)



Clipart purchased from Adobe Stock June 2016.

14. Delirium, "An Old Word with a New Importance". <http://www.unmc.edu/media/intmed/geriatrics/lectures/delirium.htm> Last accessed July 15 2016

Isolation: When and IF?

- Isolation may be indicated when a resident is suspected of having Clostridium difficile infection diarrhea or suspected of having scabies⁸
- Isolation may be indicated if resident has an infection caused by a significant pathogen (e.g. an MDRO, influenza, scabies)⁸



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What Does Isolation Look Like?⁸

- Proper isolation signs out side of resident's room⁸
- Cart set up outside of the room for close PPE access before entering the room
- Private room, if available, otherwise cohort wisely^{8,9}
- Dedicate non-critical care items to isolated resident (Blood pressure cuff, stethoscope, gait belt etc.)^{8,9}
- Educate all healthcare workers (HCW) entering the isolation room that they must don PPE according to the type of isolation in place (Contact or Droplet)
- Educate visitors and families they must perform HH before and after visiting and don PPE to visit isolation resident
- Review with housekeeping staff the appropriate disinfectants needed and their contact time⁹
- Review with dietary department any special needs in handling trays^{8,9}

When and How to Discontinue Isolation

- Isolation may be discontinued when there is adequate documentation that the symptoms have resolved⁸
 - Be sure your policy correlates with your practices
- Assess the resident to evaluate risks versus benefits of discontinuing isolation precautions, before deciding to discontinue isolation practices
 - Provide the “least restrictive environment” for residents to allow for adequate psycho-social interactions⁹
 - At the same time, assess and ensure the other residents are protected by your isolation practices
 - Whatever you decide, DOCUMENT your rationale!
 - Remember, ONE SIZE DOES NOT FIT ALL!

Education

- Provide in-services for infection control management to all departments and to residents and families.
 - Include contracted services providers e.g., podiatrist, dentist, ophthalmologist
 - Review your infection control policies with these providers
- Perform competencies on practices of staff- don't assume all is well!⁸
 - Collection of urine specimens
 - Foley Catheter care
 - Treatment nurse dressing change



Education (continued)

- Monitor practices by audits⁹
 - Hand Hygiene
 - Isolation practices and proper use of PPE
 - Daily cleaning practices of housekeeping
 - Terminal cleaning of housekeeping



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Aerosol Transmissible Disease (ATD) Program¹⁵

- Respiratory Hygiene /Cough Etiquette
- Tuberculosis screening for HCW and residents
- Respiratory Protection Plan
 - Fit Testing for N95 respirators
- ATD Exposure Control Program Plan
- Vaccination Program



Image purchased from Adobe Stock August 2016



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15. California Code of Regulations, Title 8, Section 5199. Aerosol Transmissible Diseases. www.dir.ca.gov/title8/5199.html Last accessed July 15, 2016

Key Take Away Points

- MDRO infections are considered a global threat- they are bugs without borders!
- Assess your infection prevention and control program and ensure you have included all the necessary components for success
- Understand the tools available to better deal with the infections that enter your facilities (best-practice policies, laboratory tests and reports)
- Educate your staff on your policies for managing MDRO infected residents
 - You may need to inform Physicians/Nurse Practitioners of your policies
- Not only educate on infection control practices, but **monitor** and **document** what you find
- Share your information with your staff and your clinicians

Discussion?



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Thank You!
Dolly Greene RN, CIC
818-535-4485
dolly.greene@diaglabs.com