

Antibiotic Resistance in Bacteriuria of Multiple Sclerosis Patients with Neurogenic Bladder

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DISCLOSURES

- Carol Gibson-Gill, MD
 - No financial interest or relationships to disclose
- Jackie Tran, MD
 - No financial interest or relationships to disclose

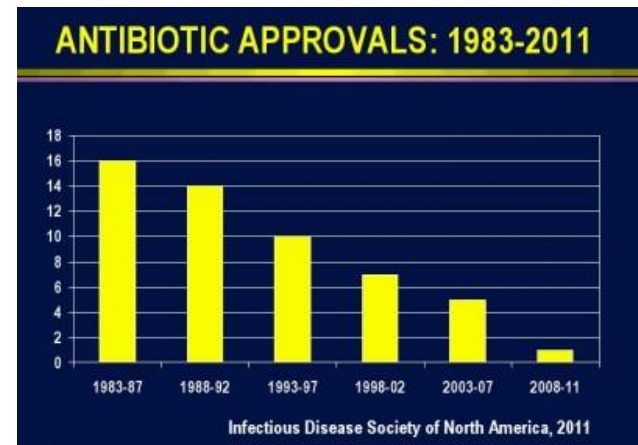
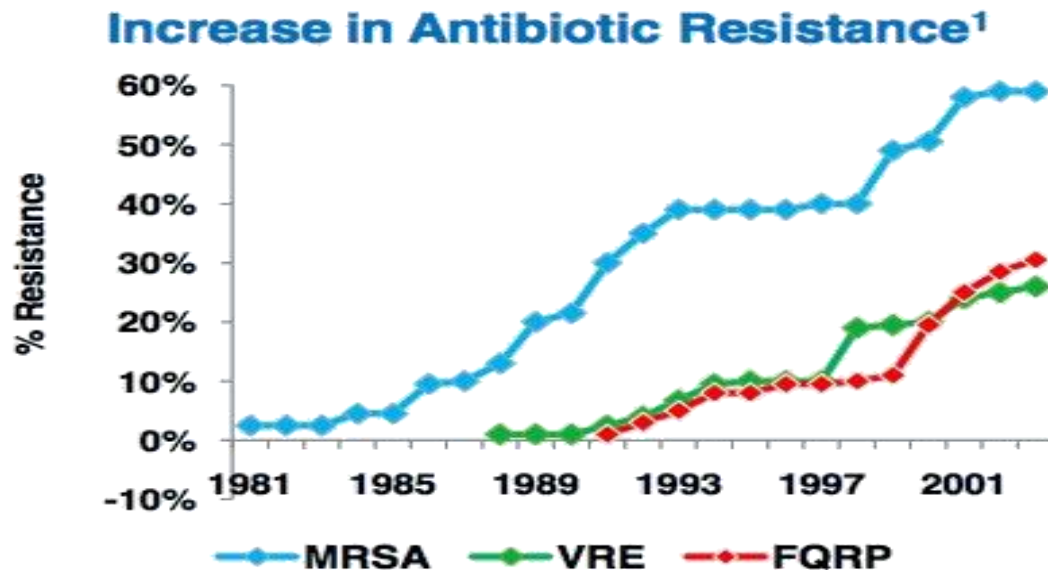
LEARNING OBJECTIVES

At the conclusion of this activity, the participant will be able to:

- Discuss the implications of antibiotic resistance in MS patients with neurogenic bladder from multiple sclerosis and when eradication may be appropriate.
- Describe the role of surveillance for multidrug-resistant bacteria in this patient population.
- Appreciate the need for strategies to decrease the rate of antibiotic-resistant bacteria development in patients with neurogenic bladder from multiple sclerosis

ANTIBIOTIC RESISTANCE

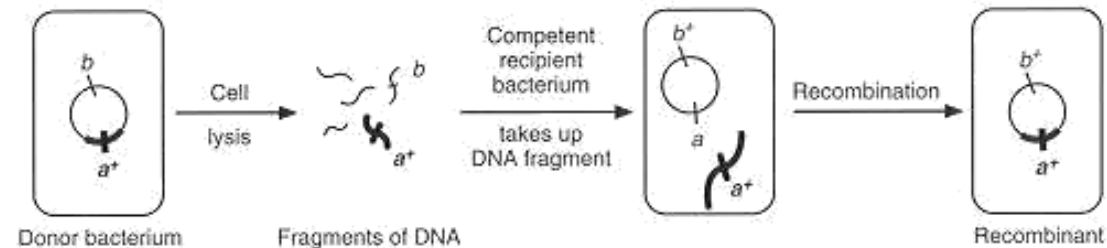
- “One of the greatest threats to human health in 21st century” -World Health Organization



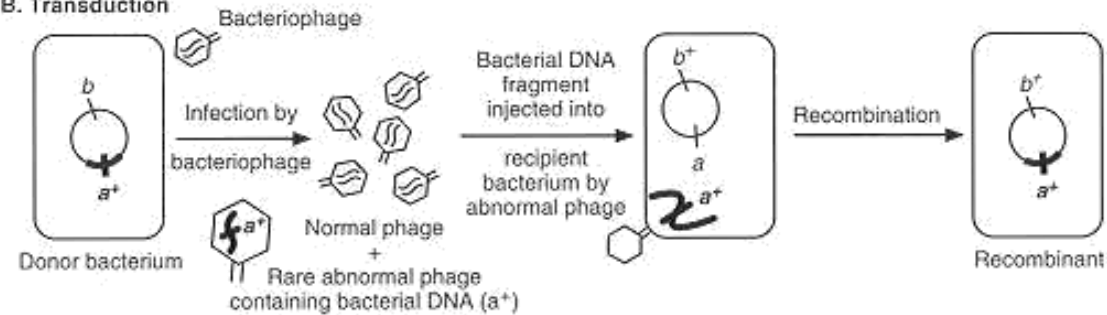
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Gupta K. Addressing antibiotic resistance. *Dis Mon*. 2003 Feb;49(2):99-110.
MRSA Surveillance Summary 2003. Centers for Disease Control and Prevention.

HORIZONTAL TRANSFER OF RESISTANCE

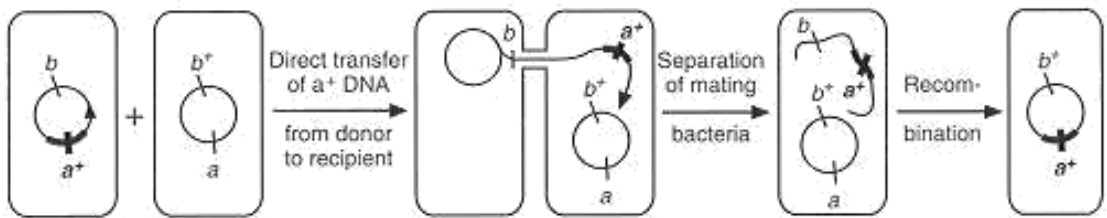
A. Transformation



B. Transduction



C. Conjugation

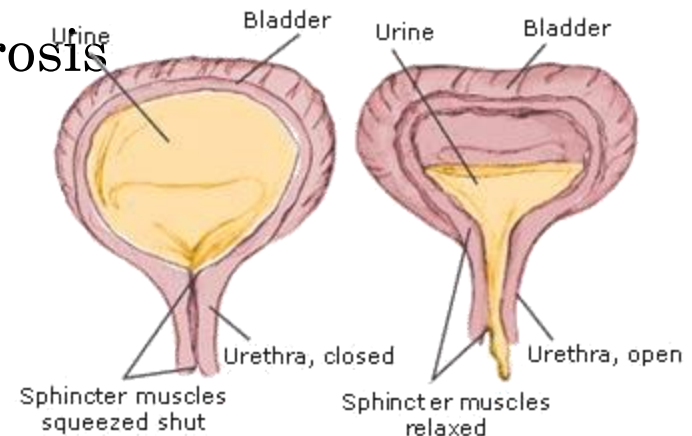


Multi-drug resistance (MDR) = resistant to more than 1 antibiotic

MULTIPLE SCLEROSIS PATIENTS AT RISK

- Bladder dysfunction increases exposure & susceptibility
 - GU symptoms present in 52% to 97% of patients
 - Colonization rate up to 90% of patients
- Systemic infection increases morbidity & mortality
 - risk of relapses in multiple sclerosis
 - prolonged neurological deficits

Further characterization of the threat is necessary



STUDY GOALS

- Demonstrate the significance of MDR bacteria in our patients with multiple sclerosis and neurogenic bladder
- Identify common MDR bacteria strains and antibiotic resistance patterns in our population
- Study the association of bladder management methods with presence of MDR bacteria in our patients
- Compare the above data with the rest of our SCI/D population

STUDY SETTING

- East Orange Campus of the Veteran Affairs New Jersey Health Care System



- Spinal Cord Injury/Disorders (SCI/D) Service

URINE SCREENING

- Existing protocol
 - Admission urinalysis & urine culture from all inpatients
 - Controlled collection techniques
 - clean catch
 - straight catheterization
 - indwelling exchange
 - Analysis by in-house microbiology laboratory
- Protocol devised to serve as reference
 - Presence of antibiotic-resistant bacteria
 - Nosocomial versus community infection

DATA COLLECTION

- Electronic chart review

- Data extraction
 - Demographics
 - Unique admission urinalysis (UA) & culture/sensitivity
 - Bladder management technique(s)

- Selection Criteria
 - Patients admitted to our SCI/D service between January 2008 and December 2009

STUDY POPULATION

- Total **160** unique patients admitted between January 2008 and December 2009
- Diagnoses
 - **37** have the diagnosis of multiple sclerosis (MS)
 - **123** remaining SCI/D diagnoses
- Age: 34 to 90 year-old
- Gender: 152 males and 8 females
- All multiple sclerosis patients have Kurtzke Expanded Disability Status Scale steps ≥ 6

BLADDER MANAGEMENT METHODS

	Multiple sclerosis		Other SCI/D diagnoses	
	count	percent	count	percent
Continent	10	27.0%	19	15.0%
Indwelling catheter	10	27.0%	32	25.2%
Strict intermittent catheterization (IC)	4	10.8%	20	15.7%
External catheter	4	10.8%	16	12.6%
Suprapubic catheter	3	8.1%	17	13.4%
Variable IC	2	5.4%	3	2.4%
External catheter & IC	2	5.4%	8	6.3%
Diaper	1	2.7%	2	1.6%
Ileal conduit	1	2.7%	4	3.1%
Suprapubic & External catheter	0		1	0.8%
Suprapubic & Indwelling catheter	0		1	0.8%
Total	37		123	

RESULT OVERVIEW

- 282 unique admission UA/UC+S
- 69 samples belonged to 37 patients with multiple sclerosis
 - >1 admission in instances of annual evaluation, scheduled test, etc

	Multiple sclerosis		Other SCI/D diagnoses	
# patients	37		123	
# males : females	33 : 4		119 : 4	
# samples	69	% of samples	213	% of samples
# samples w/ bacteria	36	52.2%	143	67.5%
# samples w/ MDR bacteria	30	43.5%	74	34.7%
# bacteria, total	55		196	
# bacteria, unique	16		22	

ANTIBIOTIC RESISTANCE IS SIGNIFICANT

- Especially multi-drug resistance (MDR)

Multiple sclerosis		# antibiotic(s) bacterium is resistant to	Other SCI/D diagnoses	
% all bacteria	# bacteria		# bacteria	% all bacteria
	30	no bacteria	90	
14.5%	8	R = 0	35	17.9%
30.9%	17	R = 1	51	26.0%
1.8%	1	R = 2	31	15.8%
10.9%	6	R = 3	19	9.7%
10.9%	6	R = 4	18	9.2%
30.9%	17	R > 4	42	21.4%
	55		196	

54.5% bacteria are MDR

56.1% bacteria are MDR

MOST COMMON BACTERIA

all

Multiple sclerosis		Other SCI/D diagnoses	
Enterococcus	38.2%	Enterococcus	40.8%
Kleb pneumoniae	18.2%	Kleb pneumoniae	15.3%
Pseud aeruginosa	9.1%	Pseud aeruginosa	10.7%
	65.5%		66.8%

MDR

Multiple sclerosis		Other SCI/D diagnoses	
Enterococcus	40.0%	Enterococcus	31.8%
Kleb pneumoniae	13.3%	Kleb pneumoniae	15.5%
Providencia stuartii	10%	Pseud aeruginosa	13.6%
	63.3%		60.9%



MOST COMMON FAILING ANTIBIOTICS

Multiple sclerosis		Other SCI/D diagnoses	
	% all counts of antibiotic resistance		% all counts of antibiotic resistance
ampicillin	19.9%	ampicillin	19.3%
levofloxacin	15.8%	tetracycline	16.9%
ciprofloxacin	15.2%	ciprofloxacin	16.7%
tetracycline	12.3%	levafloxacin	16.5%
	63.2%		69.3%



BLADDER MANAGEMENT ASSOCIATION

antibiotic(s) a bacterium is resistant to (R)

MS bladder mgmt methods

	no bac	0	1	2	3	4	5	6	7	8	9	10	11	
Continent	12	1												1
Variable IC	2				1	2							1	4
Diaper			2											2
Indwelling	9	5	6	1	4	1	3	1	3	1		1		26
Strict IC	6		2				1							3
Ileal conduit							1							1
Suprapubic			5			1	1	1						8
External cath	2	1	2		1	2								6
Ex cath & IC	2	1								1	2			4
Total	30	8	17	1	6	6	6	2	3	2	2	1	1	55

DISCUSSION: URINE SAMPLING

- Collection
 - Proper techniques
 - Screening vs clinically-indicated
 - asymptomatic vs symptomatic

- Value
 - Epidemiology tool
 - Antibiotic selection
 - empiric in symptomatic
 - peri-genitourinary manipulation
 - Colonization status
 - isolation precautions

Screening for asymptomatic bacteriuria in adults: U.S. Preventive Services Task Force reaffirmation recommendation statement. U.S. Preventive Services Task Force - Ann Intern Med - 1-JUL-2008; 149(1): 43-7

Casey J. Infectious complications in patients with chronic bacteriuria undergoing major urologic surgery. *Urology*. 2010 Jan;75(1):77

DISCUSSION: RESULT INTERPRETATION

○ Non-standardized definitions

● Bacteriuria

“presence of 100,000 microorganisms per milliliter of urine without clinical symptoms”

● Urinary tract infection

“cystitis symptoms who have normal urinary tract anatomy, no fever, no kidney disease, and no contributing medical problems such as diabetes, neurogenic bladder, or renal stones”

“(1) fever (38°C), (2) urgency, (3) frequency, (4) dysuria, (5) suprapubic tenderness... at least two symptoms and dipstick test positive for leukocyte esterase and/or nitrate”

SOME TREATMENT STRATEGIES AGAINST ANTIBIOTIC RESISTANCE

- Judicious antibiotic use
 - Do not “treat” asymptomatic bacteriuria
 - Avoid empiric antibiotics, if possible
 - urine culture and sensitivity guidance
 - Treat if symptomatic or peri-urologic manipulation
 - antibiotic administration time control dilemma
 - Eradication of bacteriuria
 - when is it appropriate?
 - how to do so? (parenteral vs bladder irrigation vs ??)

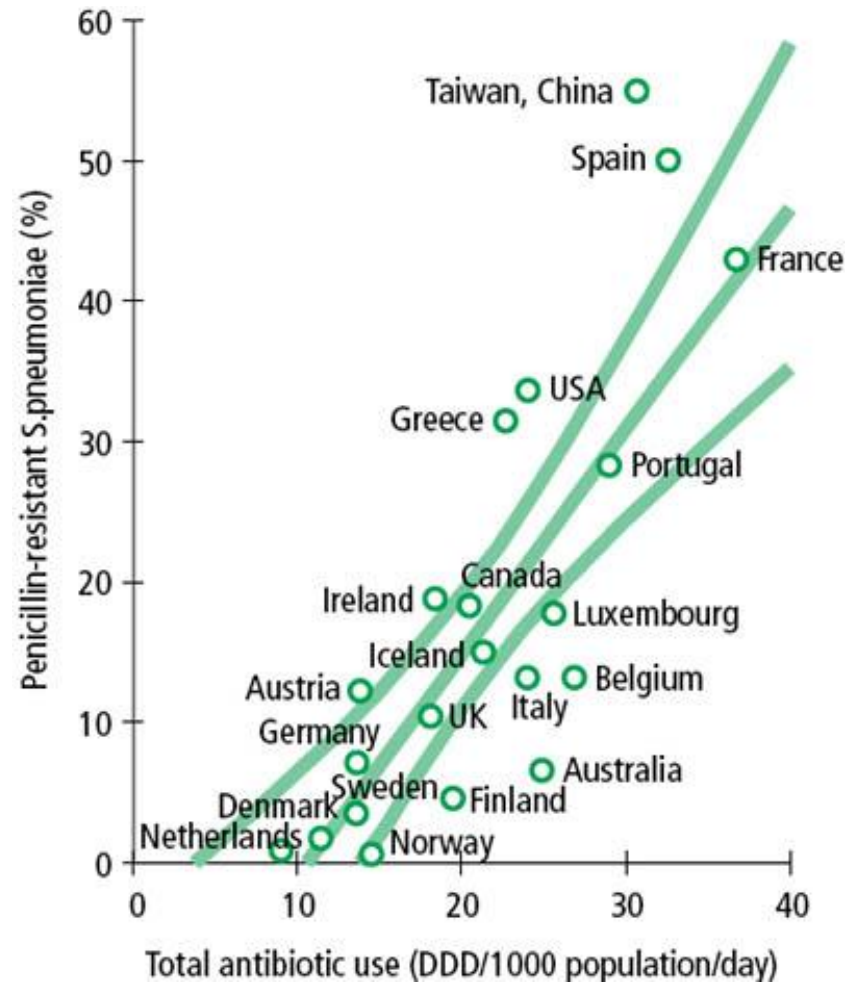
SOME MANAGEMENT STRATEGIES AGAINST ANTIBIOTIC RESISTANCE

- Comprehensive measures
 - Isolation precautions
 - Work-up for stones and other culprits
 - Review patient's history
 - recent hospitalization(s)
 - previous antibiotic use
 - Reinforce patient's education
 - bladder management technique & re-eval method
 - handwashing
 - Infectious Disease consultation, as indicated

AN INTERVENTION STRATEGY AGAINST ANTIBIOTIC RESISTANCE

Center for Disease
Control & Prevention:
**Get Smart for
Healthcare Campaign**
(2010)

- limit unnecessary antibiotic use in inpatient healthcare
- healthcare provider education



Correlation between penicillin-resistant (non-susceptible) pneumococci and out-patient antibiotic use (showing bands with 95% confidence intervals)

OUR PROPOSED ADJUNCT STRATEGY AGAINST ANTIBIOTIC RESISTANCE

- Next step—Patient Education
 - Previous efforts focus on patient behaviors (e.g., wiping techniques, hygiene, postcoital voiding, douching, timing of voiding)
- Prospective study of patient empowerment with
 - knowledge of own medical history (e.g., UTI symptoms, previous urine culture, resistant pattern history, previous antibiotics)
 - proper urine collection techniques
 - medical knowledge (e.g., no antibiotic unless symptomatic)
- Outcome measurement:
 - reduction in number of MDR bacteria

Cardenas D. Impact of a urinary tract infection educational program in persons with spinal cord injury. *J Spinal Cord Med* 27. (1): 47-54.2004

Car J. Urinary tract infections in women: diagnosis and management in primary care. *BMJ* 332. (7533): 94-97.2006

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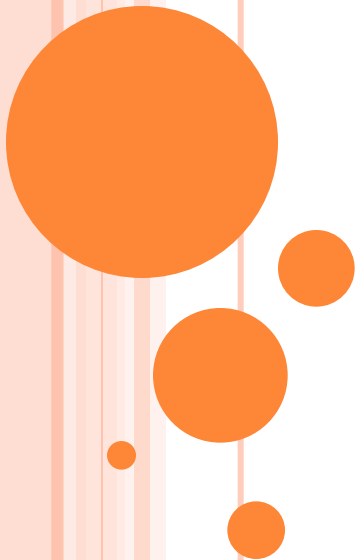
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Also for the support of:

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OBTAINING CME CREDIT

- If you would like to receive CME credit for this activity, please visit:

<http://www.pesgce.com/PVAsummit2011/>

- This information can also be found in the Summit 2011 Program on page 8.

QUESTIONS?

BLADDER MANAGEMENT ASSOCIATION

antibiotic resistance for colonizing bacteria

SCID/D bladder mgmt methods

	nil	0	1	2	3	4	5	6	7	8	9	
Continent	15	5	3	1	2		4	1				16
Variable IC	2		1									1
Diaper	3											0
Indwelling	17	4	19	16	6	6	10	3	2	1		67
Strict IC	15	5	8		4	4			1	1	1	24
Ileal conduit		7	2	5		1	5					20
Suprapubic	4	4	6	6	5	4	3	3	1		1	33
Supra & Foley									1			1
Supra & Ex cath		1										1
External cath	7	5	10	2		2	3		1			23
Ex cath & IC	8	4	2	1	2	1						10
Total	71	35	51	31	19	18	25	7	6	2	2	196