

Antibiotic Stewardship in a Long-term Care Facility - Focus on Multidisciplinary approach

Pharmacy perspective



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Disclosure Statement

☞ The author has no actual or potential conflict(s) of interest/relevant financial relationship(s) with any commercial interests in relation to this CE activity

Objectives

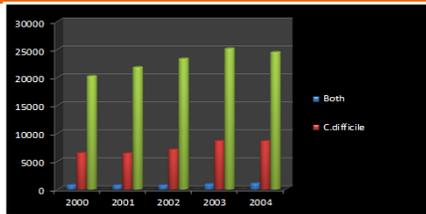
- ☞ Describe the development and implementation of antibiotic stewardship in a Long Term Care facility based on example of a single facility.
- ☞ Understand the importance of interdisciplinary approach to antibiotic stewardship
- ☞ Understand the process of selecting appropriate antibiotic therapy:
 - **Determine the need for antibiotic therapy** (Ex: urinary tract infection vs asymptomatic bacteriuria, wound infection vs chronic wound management)
 - **Evaluate patient specific factors:** age/ gender, past infections/ cultures, comorbidities, degree of immunosuppression, risk for resistant pathogens, prior failed therapies.
 - **Use local antibiogram** to select empiric therapy.
 - **Utilize treatment algorithms**
 - **Evaluate other aspects** affecting therapy such as allergies, drug interactions, disease interactions, renal function, route of administration, cost of medication etc.
- ☞ Key resources for development of antibiotic stewardship in your facility.

Antibiotics: Scope of the Problem

- ↻ 1.6-3.8 million nursing home patients are treated for infections in the US each year.
- ↻ 400,000 – number of deaths from infections in US nursing homes each year.
- ↻ According to the Society of Healthcare Epidemiology of America, antibiotics comprise up to 40 % of all prescribed medications in Long Term Care Facilities.
- ↻ 25% to 75% of the antibiotic use in nursing homes is inappropriate.

Source:
 1. Crutch J., Salfon N, Robinson J., Zimmerman D. Longitudinal Trends in Antibiotic Resistance in US Nursing Homes 2000-2004 *Infect Control Hosp Epidemiol* 2007;28:1006-1008
 2. Nobile-LI, Bering D, Garibaldi R, Neuhaus EG, Smith PW. Antimicrobial use in long-term-care facilities. *SHEA Long-Term-Care Committee. Infect Control Hosp Epidemiol.* 2005;30:1673-1678
 3. Gupta A, Hoeman TM, Haber AG, et al. Infectious Diseases Society of America, European Society for Microbiology and Infectious Diseases. International clinical practice guidelines for treatment of acute uncomplicated cystitis and pyelonephritis in women: a 2002 update by the Infectious Diseases Society of America and European Society of Microbiology and Infectious Diseases. *Clin Infect Dis.* 2011;52(5):e113-e120.

Antibiotics: Scope of the Problem



- ↻ Annual incidence of antibiotic-resistant infections in US nursing homes
- ↻ MRSA, vancomycin-resistant enterococci, beta-lactam-resistant
 - Gram negative bacteria – green
 - C.difficile – red
 - Both – blue

Source:
 Crutch J., Salfon N, Robinson J., Zimmerman D. Longitudinal Trends in Antibiotic Resistance in US Nursing Homes 2000-2004 *Infect Control Hosp Epidemiol* 2007;28:1006-1008

Antibiotics: Scope of the Problem

- ↻ Inappropriate use of antibiotics:
 - Increase bacterial resistance
 - Increased risk of drug – related complications
 - Drug- drug interactions

Antibiotic Stewardship

☞ “Antimicrobial stewardship refers to coordinated interventions designed to improve and measure the appropriate use of antimicrobials by promoting the selection of the optimal antimicrobial drug regimen, dose, duration of therapy, and route of administration. ” – Infectious Disease Society of America.

Antibiotic Stewardship

- ☞ Elements of antibiotic stewardship:
- Practitioners with infectious disease training
 - Institutional policy
 - Antibiotic formulary
 - Antibigram
 - Education

Antibiotic Stewardship: Pharmacist Role

- ☞ Role of pharmacists is well established and supported by Infectious Disease Society of America (IDSA)
- ☞ Research data: Morgan et al. Impact of hospital-based antimicrobial management program on clinical and economic outcomes
- ID pharmacists vs ID fellows.
 - Comparative study focused on appropriateness of antimicrobial therapy, patient outcomes and cost of hospitalization.
 - Recommendations retrospectively evaluated by a blinded ID physician

Gross R, Morgan AS, Kinkly DE, Weiner M, Gibson GA, Fishman NO. Impact of hospital-based antimicrobial management program on clinical and economic outcomes. Clin Infect Dis. 2001;33(3):289-295.

Antibiotic Stewardship: Pharmacist Role

Study Results	ID Pharmacists	ID Fellows
Antibiotic choice was deemed appropriate	87%	47%
Cure Rate	64%	42%
Median Cost of Hospitalization	\$6468	\$7864
Median Cost of Antibiotics	\$79	\$122

Gross R, Morgan AS, Kinky DE, Weiner M, Gibson GA, Fishman NO. Impact of hospital-based antimicrobial management program on clinical and economic outcomes. Clin Infect Dis. 2001;33(3):289-295.

Antibiotic Stewardship: Pharmacist Role

- ⇒ Antibiotic stewardship efforts so far have been focused on inpatient/hospital setting
- ⇒ Little experience with antibiotic stewardship in long-term care facilities

Antibiotic Stewardship in Long-term Care Facilities

- ⇒ Support from major health care societies
 - Centers for Disease Control and Prevention (CDC)
 - Infectious Disease Society of America
 - Society for Healthcare Epidemiology of America (SHEA)
 - Association for Professionals in Infection Control and Epidemiology (APIC)
 - American Society of Health-System Pharmacists

Smith P, Watkins K, Miller H, Van Schooneveld T. Antibiotic stewardship programs in long-term care facilities. Annals of Long Term Care: Clinical Care and Aging. 2011;19(4):20-25.

Antibiotic Stewardship in Long-term Care Facilities

Barriers:

- Lack of appropriately trained MDs and PharmDs
- Insufficient knowledge of current guidelines
- Lack of antibiogram
- Lack of electronic medical records

Smith P, Watkins K, Miller H, Van Schooneveld T. Antibiotic stewardship programs in long-term care facilities. *Annals of Long Term Care: Clinical Care and Aging*. 2011;19(4):20-25.

Memorial Health Center, Medford WI

- ↳ Critical access hospital
- ↳ Memorial Nursing and Rehab Center
- ↳ Pharmacy
- ↳ Dialysis center
- ↳ Primary care clinics
- ↳ Fitness center
- ↳ Satellite campus for Aspirus Heart and Vascular Institute



Antibiotic Stewardship at the Memorial Health Center

- ↳ Led by Pharmacists
- ↳ Includes
 - PharmD with infectious diseases training
 - Internal medicine physician on as needed basis
 - Staff pharmacists
 - Infection control coordinator
- ↳ Practice setting:
 - Memorial Health Center hospital and Nursing and Rehab center.
 - Access to full medical record
 - Staff dedicated to providing the best patient care

Antibiotic Stewardship

- Antibiotic stewardship was implemented at the MHC Hospital in the spring - summer 2011
- The process of expansion of the program to Memorial Health Nursing and Rehab Center.
 - Evaluate the need
 - Challenges
 - Develop a model of antibiotic stewardship program for LTCF
 - Evaluate outcomes

Antibiotic Stewardship: Evaluating the Need

- A study was conducted at the Memorial Health Center Nursing and Rehab Center
 - Evaluate the use of antibiotics
 - Determine the need for the Antibiotic Stewardship
 - Evaluate the effectiveness of the Antibiotic Stewardship
 - Determine the areas for improvement

Study Design

Part I	Part II
Prior to implementation of the antibiotic stewardship program	After the implementation of the antibiotic stewardship program
3 month	3 months

- The data was collected using retrospective chart review

Antibiotic stewardship: Evaluating the Need

Criteria for inappropriate antibiotic use:

- Antibiotic did not provide adequate coverage empirically, current guidelines recommend against using this antibiotic empirically.
- Antibiotic resistance was not addressed after Culture and Sensitivity Report became available.
- Dose of antibiotic was not adjusted to patient's renal function
- Treatment of asymptomatic bacteriuria
- Duration of therapy too long or too short according to current guideline recommendations.

Antibiotic stewardship: Evaluating the need

Prior to implementation of Antibiotic Stewardship (Data from October – December 2010)

Number of residents evaluated for possible infections	29
Number of residents treated with antibiotics	20
Number of cases where antibiotics were prescribed inappropriately	8 (40%)

Antibiotic stewardship: Evaluating the Need

Prior to implementation of Antibiotic Stewardship (Data from October-December 2010)

Antibiotic did not cover expected pathogens; current guidelines recommend against using that antibiotic empirically	
Antibiotics were not changed to address resistance after Culture and Sensitivity report became available	
Dose of antibiotic was not adjusted to patient's renal function	
Attempt to treat asymptomatic bacteriuria, no evidence of infection	

Antibiotic Stewardship: Outcomes		
	Prior to implementation of Antibiotic Stewardship Data from October-December 2010	After implementation of Antibiotic Stewardship Data from January-March 2011
Number of residents evaluated for possible infections	29	24
Number of residents treated with antibiotics	20	19
Number of cases where antibiotics were prescribed inappropriately	8 (40%)	4 (21%)

Antibiotic Stewardship: Outcomes		
	Prior to Implementation of Antibiotic Stewardship. Data from October-December 2010	After Implementation of Antibiotic Stewardship .Data from January-March 2011
Antibiotic did not cover expected pathogens; current guidelines recommend against using that antibiotic empirically	11	1
Antibiotics were not changed to address resistance after Culture and Sensitivity report became available	11	11
Dose of antibiotic was not adjusted to patient's renal function	1	0
Attempt to treat asymptomatic bacteriuria, no evidence of infection	11111	1
Inappropriate duration of therapy	0	1

Antibiotic Stewardship: Outcomes		
<ul style="list-style-type: none"> ☞ Pharmacists recommendations in antibiotic therapy were well received by primary care providers at Memorial Health Center Nursing Home. ☞ In the first three months of implementation of Antibiotic Stewardship, the number of inappropriately prescribed antibiotics was reduced by 50% ☞ Areas for improvement: patient follow up and tools for timely and efficient patient evaluation 		

Antibiotic stewardship: Steps for Improvement

- ☞ Improved tracking of finalized cultures to ensure follow up
- ☞ Developed treatment algorithms to assists prescribers and pharmacists in choosing appropriate antibiotic therapies

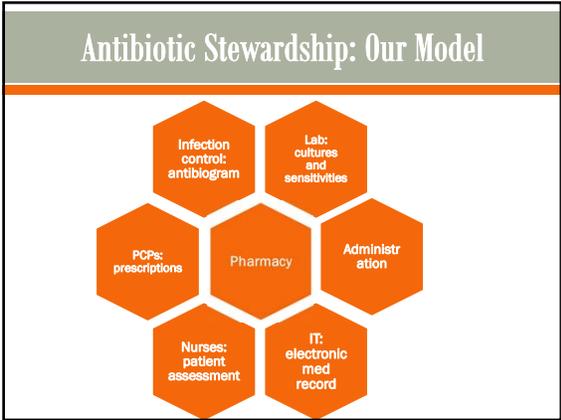
Treatment algorithm

Urinary Tract Infection Treatment algorithm

Acute Uncomplicated UTI	Acute Complicated UTI	Pyelonephritis
non-pregnant females living in the community	Complicated= elderly, diabetes, structural abnormality, male, nosocomial pathogen IDd, catheter	Infection ascended to kidneys
Treatment arranged according to IDSA rec:	Treatment arranged according to evidence	Treatment arranged according to evidence:
Nitrofurantoin 100mg BID x 5days (DOC pregnant) Bactrim DS BID x 3 d Fosfomycin 3g PO one dose Levaquin 250mg Q24 x3d Cipro 250 mg q 12h x 3d <u>Alternatives:</u> Cefpodoxime 100 mg Q12 h x 7 days Augmentin 875 mg q 12 H x 7 day	Mild Infection: Levaquin 500mg x 5-7 days Cipro 500mg Q12 h x 7 days Bactrim DS Q12 h 7-10 days <u>Alternatives:</u> Cefpodoxime 100 mg Q12 h x 7 days Augmentin 875 mg q 12 H x 7 day More Severe Cases: Cefepime 1 g IV q 24h Cipro 500 mg BID x7d Levaquin 750 mg QD x 7d Zosyn 3,375 mg IV q 6h Meropenem 500 mg IV q 6 h	Mild Pyelo: Levaquin 750mg x 5 days Levaquin 500QD x 7 days Cipro 500 mg Q 12 h x 7 d Bactrim DS Q12 H x 14 days Augmentin 875mg Q12 H 10-14 days Cefpodoxime 100-200mg Q12 H x 10-14 days More severe cases: Ceftriaxone 1g IV Q24Hx 14 days Ciprofloxacin 400mg IV Q12 h x 14 days Levaquin 750 mg IV/PO QD x 5-7, up to 14days. Aminoglycoside x 5 days Aztreonam 1g IVn Q8 H x14 days

Antibiotic stewardship: Challenges in Nursing Home

- ☞ Differences between inpatient setting and skilled nursing facility
 - Provider access - establishing communication
 - Effective provision of service - make it fit into nursing, pharmacist, physician workflow
- ☞ Seeking support
 - Prescribers
 - Pharmacists
 - Nurses
 - Administration
 - Infection control
 - Wound care
 - Other providers



Antibiotic Stewardship

⇒ Final product –the model that assures timely, convenient communication between nurses, physicians and pharmacists and any other providers involved in patient care.

Antibiotic Stewardship

⇒ The program is constantly evolving:

- Continue improving antibiotic use practices
- Educate providers on appropriate use of antimicrobials

The process of selecting appropriate antibiotic therapy: pharmacist approach

- Determine the need for antibiotic therapy
- Evaluate patient specific factors
- Utilize treatment algorithms
- Use local antibiogram to select empiric therapy.
- Other aspects affecting therapy

Patient Case

- ↻ JJ 60 yo female
- ↻ PMH: MS, paraplegia, MDII, obesity, depression, GERD.
- ↻ Allergies: penicillin (rash)
- ↻ Current diagnosis: urinary tract infection
- ↻ Order: SMX/TMP (Bactrim) DS BID x 7 days.

Determine the Need for Antibiotic Therapy

- ↻ Asymptomatic bacteriuria - WHOM **NOT** TO TREAT:
 - Diabetic patients
 - Elderly in the community and NH residents
 - Spinal cord injury
 - Indwelling urethral catheters
- ↻ Avoiding treatment of asymptomatic bacteriuria is important for reducing development of antibiotic resistance

1. Nicolle L, Bradley S, Colgan R, Rice JC, Shaeffer A et al. IDSA Guidelines for the Diagnosis and Treatment of Asymptomatic Bacteriuria in Adults. Clinical Infectious Diseases. 2005;40(6):832-41.
2. Fekete T, Hooton T. Approach to the adult with asymptomatic bacteriuria. Up To Date. Accessed 8/6/13

Determine the Need for Antibiotic Therapy

➤ UTI vs asymptomatic bacteriuria

Patient Findings	UTI	Asymptomatic Bacteriuria
Culture grows bacteria	+	+
Urinalysis: non-contaminated, clean catch urine sample collected and shows presence of bacteria >100,000 CFU/ml, >10 UWBC/HPF, positive leukocyte esterase, +/- nitrites and other indicators of urinary tract infection.	+	+
Presence of symptoms of urinary tract infection. The symptoms of UTI may include: dysuria, hematuria, altered mental status, urinary frequency and urgency, fever, loss of appetite, abdominal pain.	+	-

1. Treatment of Asymptomatic Bacteriuria in Adults. Clinical Infectious Diseases 2005; 40:643-54
2. Meyers R, Callender SB, Bonn B. Urine sampling and culture in the diagnosis of urinary tract infection in adult. Up To Date. Accessed 6/8/13

Patient Case: Determine the Need for Antibiotic Therapy

➤ Nursing assessment – patient complains Sx of burning upon urination and hematuria.

➤ Lab -

Urinalysis	
Bacteria	>100,000 cfu
Urine color	Straw
Clarity	Cloudy
Leuk esterase	3+
Nitrite	-
WBC urine	20 WBC/HPF
RBC urine	0
Culture	pending

Choosing the Best Therapy

Determine the need for antibiotic therapy	✓ needed
Evaluate patient specific factors	
Utilize treatment algorithms	
Use local antibiogram to select empiric therapy.	
Other aspects affecting therapy	

Patient Case: Evaluate Patient-Specific Factors

Age/ gender	60 yo F
Comorbidities	MS, DMII, paraplegia, obesity, depression, GERD
Degree of immunosuppression	Moderate
Past infections/ cultures	Past UTI significant for <i>Pseudomonas aeruginosa</i> pan-sensitive
Risk factors for resistant pathogens	Residence in NH, immunosuppression, Hx of nosocomial pathogen
Prior failed therapies	None
Allergies	PNC - rash
Renal function	24 ml/min

Choosing the Best Therapy

Determine the need for antibiotic therapy	✓ needed
Evaluate patient specific factors	<ul style="list-style-type: none"> ✓ Past UTI <i>Pseudomonas aeruginosa</i> pan-sensitive ✓ Residence in nursing home ✓ Impaired ability to fight infection ✓ PNC allergy ✓ CrCl 24ml/min
Utilize treatment algorithms	
Use local antibiogram to select empiric therapy.	
Other aspects affecting therapy	

Patient Case: Utilize Treatment Algorithms

Urinary Tract Infection Treatment algorithm

Acute Uncomplicated UTI	Acute Complicated UTI	Pyelonephritis
non-pregnant females living in the community	Complicated= elderly, diabetes, structural abnormality, male, nosocomial pathogen IDd, catheter	Infection ascended to kidneys
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Patient Case: Utilize Treatment Algorithms

According to the algorithm appropriate choices would be:

- Levofloxacin 500mg x 5-7 days
- Ciprofloxacin 500mg Q12 h x 7 days
- TMP/SMX DS Q12 h 7-10 days
- Cefpodoxime 100 mg Q12 h x 7 days
- Amoxi/Clav 875 mg q 12 H x 7 day



Utilize Treatment Algorithms

According to the algorithm appropriate choices would be:

- Levofloxacin 500mg x 5-7 days
- Ciprofloxacin 500mg Q12 h x 7 days
- TMP/SMX DS Q12 h 7-10 days
- Cefpodoxime 100 mg Q12 h x 7 days
- Amoxi/Clav 875 mg q 12 H x 7 day - penicillin allergy



Patient Case

Determine the need for antibiotic therapy	✓ needed
Evaluate patient specific factors	<ul style="list-style-type: none"> ✓ Past UTI <i>Pseudomonas aeruginosa</i> pan-sensitive ✓ Impaired ability to fight infection ✓ PNC allergy ✓ CrCl 24ml/min ✓ Complicated UTI
Utilize treatment algorithms	<ul style="list-style-type: none"> ✓ SMX/TMP ✓ Ciprofloxacin ✓ Levofloxacin ✓ Cefpodoxime
Use local antibiogram to select empiric therapy.	
Other aspects affecting therapy	

Patient Case: Other Aspects

	Ciprofloxacin	Levofloxacin
E.coli sensitivity	95%	93%
Pseudomonas sensitivity	85%	80%
\$\$	\$64	\$118

Final recommendation:
Ciprofloxacin 250 mg twice daily x 7 days

Source:
 1. Ciprofloxacin monograph, Lexicomp accessed 8/17/13
 2. Levofloxacin monograph, Lexicomp accessed 8/17/13

Summary:

Determine the need for antibiotic therapy	✓ needed
Evaluate patient specific factors	<ul style="list-style-type: none"> ✓ Past UTI <i>Pseudomonas aeruginosa</i> pan-sensitive ✓ Impaired ability to fight infection ✓ PNC allergy ✓ CrCl 24ml/min ✓ Complicated UTI
Utilize treatment algorithms	<ul style="list-style-type: none"> ✓ SMX/TMP ✓ Ciprofloxacin ✓ Levofloxacin ✓ Cefpodoxime
Use local antibiogram to select empiric therapy.	<ul style="list-style-type: none"> ✓ Ciprofloxacin ✓ Levofloxacin
Other aspects affecting therapy	✓ Ciprofloxacin

Patient Case

Follow up

- Monitor Sx improvement
- Culture and Sensitivity report in 24-48 hrs
- Adjust antibiotics if needed



The Process of Selecting an Appropriate Antibiotic Therapy: Pharmacist Approach



Key Resources for Development of Antibiotic Stewardship in Your Facility



- o Center for Disease Control and Prevention (CDC) Get Smart for Healthcare program.
 - o <http://www.cdc.gov/getsmart/healthcare/support-efforts/index.html>
 - o Provides evidence based information supporting antibiotic stewardship



- o Society of Infectious Diseases Pharmacists.
 - o www.sidp.org
 - o Antimicrobial Stewardship Certificate Program

Key Resources for Development of Antibiotic Stewardship in Your Facility



- o Infectious Disease Society of America.
 - o [Guidelines for Developing an Institutional Program to Enhance Antimicrobial Stewardship](#) *Clinical Infectious Diseases* January 2007 vol. 44 no. 2 159-177
 - o http://www.idsociety.org/Stewardship_Policy/



- o Policy Statement on Antimicrobial Stewardship by the Society for Healthcare Epidemiology of America (SHEA), the Infectious Diseases Society of America (IDSA), and the Pediatric Infectious Diseases Society (PIDS)
 - o *Infect Control Hosp Epidemiol* 2012;33(4):322-327 <http://www.jstor.org/stable/10.1086/665010>

Summary

- ↳ Described the development and implementation of antibiotic stewardship in a Long Term Care facility based on example of a single facility.
 - Importance of team work and good communication
 - Roles of different healthcare providers in Antibiotic Stewardship
- ↳ Case study:
 - **Determined the need for antibiotic therapy** (ex.: urinary tract infection vs asymptomatic bacteriuria, wound infection vs chronic wound management)
 - **Evaluated patient specific factors:** age/ gender, past infections/ cultures, comorbidities, degree of immunosuppression, risk for resistant pathogens, prior failed therapies.
 - **Used local antibiogram** to select empiric therapy.
 - **Utilized treatment algorithms**
 - **Evaluated other aspects affecting therapy** (drug interactions, disease interactions, route of administration, cost of medication etc).
- ↳ Key resources for development of antibiotic stewardship in your facility

Questions?

