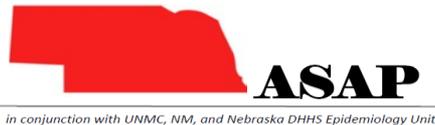


Antimicrobial Stewardship Basics – Why, What, Who, and How

Philip Chung, PharmD, MS, BCPS
ASAP Community Network Pharmacy Coordinator
October 12, 2017



Objectives

- List reasons for developing antimicrobial stewardship programs (ASP): the whys
- Outline the goals of ASP: the whats
- Describe the role of various personnel in ASP: the whos
- Introduce common ASP strategies: the hows

Why is ASP needed?

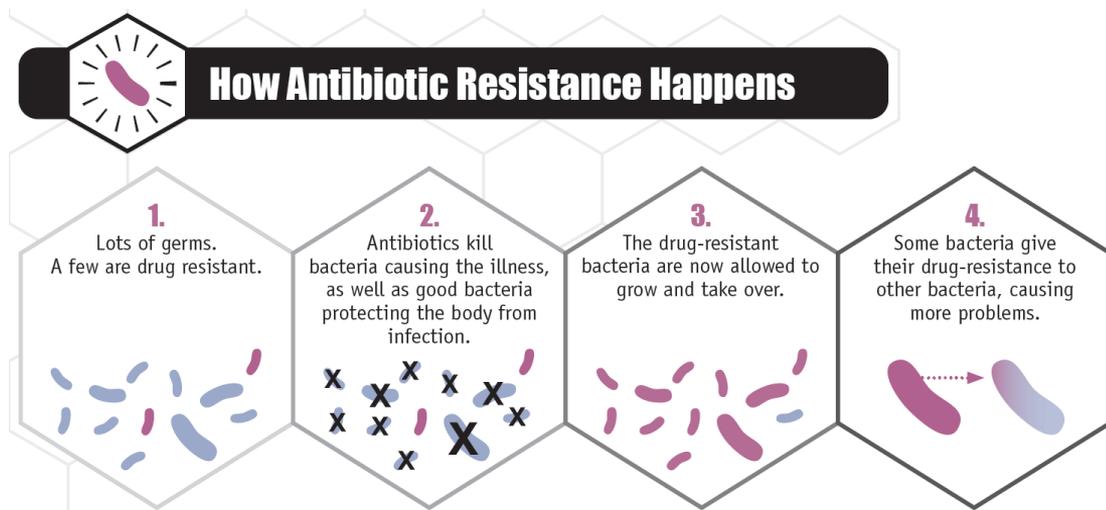


in conjunction with UNMC, NM, and Nebraska DHHS Epidemiology Unit



Development of Antibiotic Resistance

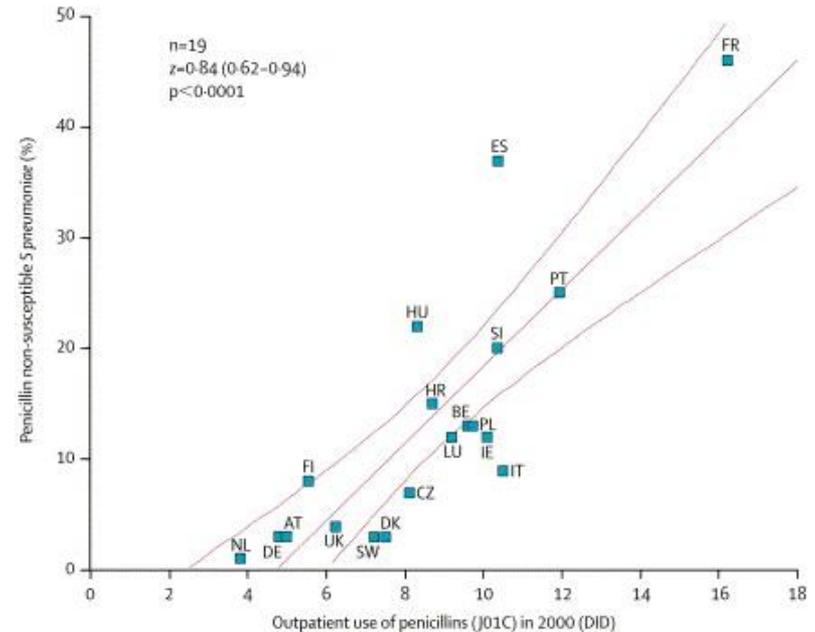
- Resistant bacteria are selected when colonizing or infecting bacteria are exposed to antibiotics
- Longer exposure to antibiotics → more likely to become colonized with resistant organisms
- Highest risk patients:
 - Immunocompromised
 - Hospitalized
 - Invasive devices



Where Does All This Resistance Come From?

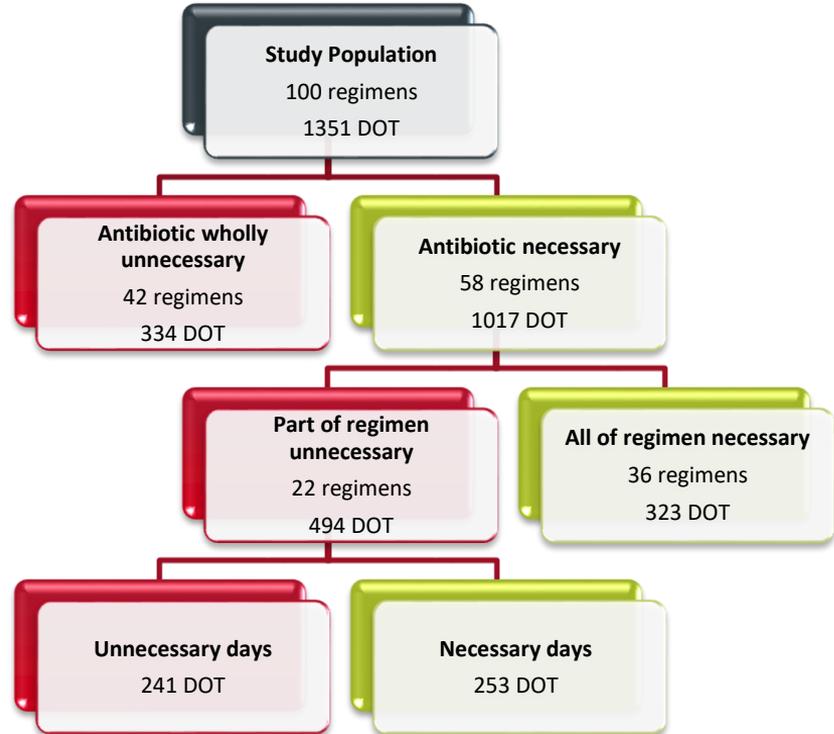
- Changes in antibiotic use parallel changes in prevalence of resistant pathogens
- Resistance is more prevalent in healthcare- vs. community-acquired infections
- Most resistant pathogens arise in acute or long-term care facilities
- Hospitals/areas with highest rates of antibiotic use have the highest rates of resistance

Correlation between Penicillin Use and Prevalence of Penicillin Non-Susceptible *S. pneumoniae*



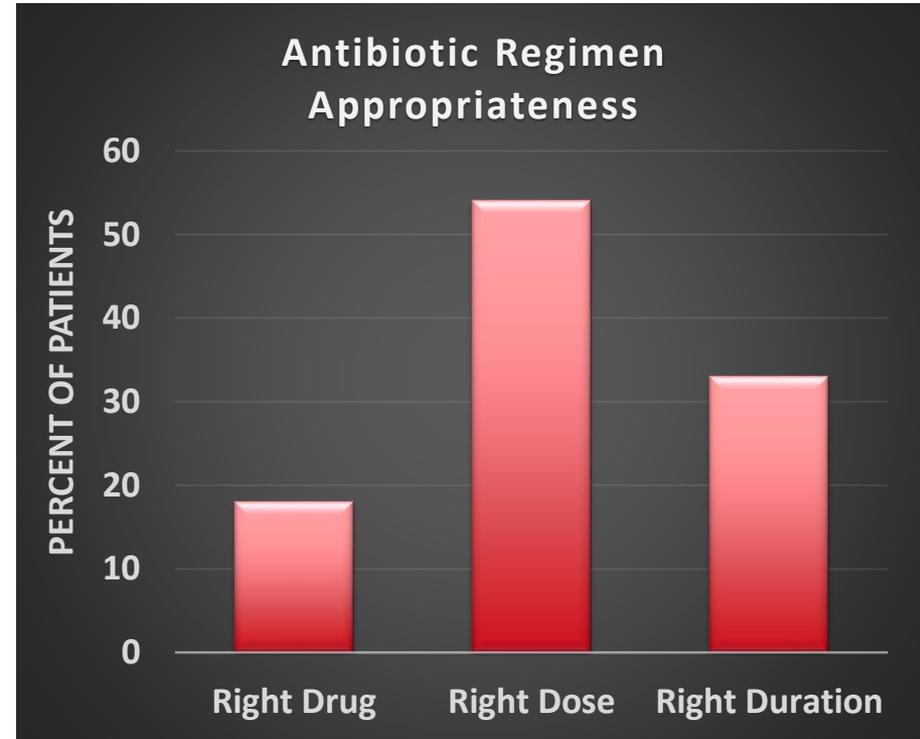
Evidence of Antibiotic Overuse in Long-Term Care Facility

- Review of 100 random course of antibiotics over 6 months
- Performed by 2 ID physicians in a 160-bed skilled nursing facility
- 1351 total days of therapy (DOTs); 43% of DOTs were unnecessary
- >60% of antibiotic courses were at least partly unnecessary



Reasons for Inappropriate Antimicrobial Prescribing in Urinary Tract Infections

- Evaluated antibiotic appropriateness for treatment of urinary tract infections
 - Does patient meet criteria to start antibiotic?
 - Is antibiotic regimen (agent, dose, frequency, duration) consistent with national guidelines?
 - Did patient develop *C difficile* infection (CDI)?
- Urinalysis sent for 172 patients
 - 146 (85%) did not meet treatment criteria; 70 started on antibiotics
 - Two out of five patients received antibiotic inappropriately
- 8x more likely to develop CDI with inappropriate antibiotic



Consequences of Antibiotic Overuse

Resistant Pathogens

Estimated minimum number of illnesses and deaths caused by antibiotic resistance*:

At least  **2,049,442** illnesses,
 **23,000** deaths

**bacteria and fungus included in this report*

- Estimated annual costs (in 2008 dollars)
 - \$20 billion in excess direct healthcare costs
 - \$35 billion in lost productivity

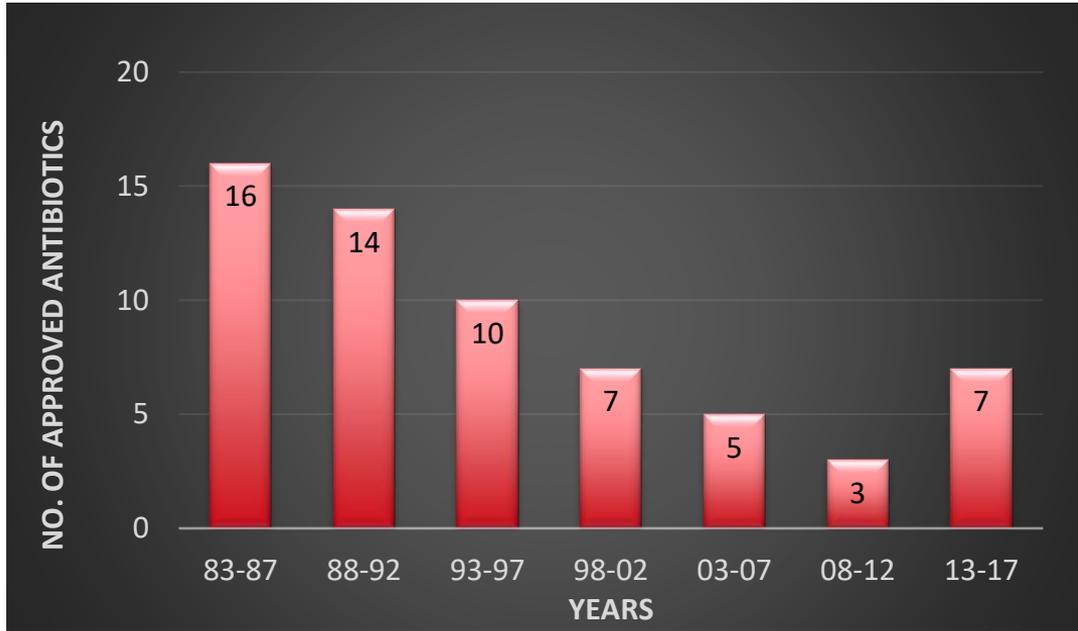
Clostridium difficile Infections

Estimated minimum number of illnesses and death due to *Clostridium difficile* (*C. difficile*), a unique bacterial infection that, although not significantly resistant to the drugs used to treat it, is directly related to antibiotic use and resistance:

At least  **250,000** illnesses,
 **14,000** deaths



Limited New Antibiotic Options



BAD BUGS, NO DRUGS

As Antibiotic Discovery Stagnates ...
A Public Health Crisis Brews



IDSA
Infectious Diseases Society of America

July 2004

Bad Bugs Need Drugs



Ten new **ANTIBIOTICS** by 2020

Target = ESKAPE

Enterococcus faecium

Staphylococcus aureus

Klebsiella pneumoniae

Acinetobacter baumannii

Pseudomonas aeruginosa

Enterobacter species

Infectious Diseases Society of America. Clin Infect Dis 2011;52(suppl 5):S397-S428.

Theuretzbacher U. Recent FDA Antibiotic Approvals: Good news and Bad News.

Available at: http://cddep.org/blog/posts/recent_fda_antibiotic_approvals_good_news_and_bad_news#sthash.adeCdYpE.dpbs.

Drug@FDA: FDA Approved Drug Products. Available at: <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm>.

Incidence of Adverse Drug Events in LTCF

- Evaluated adverse drug events (ADE) in two LTCF totaling 1229 beds
- 815 ADE identified among >1200 residents (9.8 events per 100 resident-months)
 - >25% of events were serious
 - 42% deemed preventable
 - Mostly from monitoring (80%) and ordering (59%) errors
- 105 (13%) from antimicrobial use
 - Quinolones, clindamycin, and TMP-SMX most commonly implicated

Risk Factors Associated with ADE

Parameter	Odd Ratio	95% CI
On 6-8 medications*	1.4	0.9 – 2.0
On 9-11 medications*	1.7	1.1 – 2.6
On ≥12 medications*	2.1	1.3 – 3.5
Anticoagulants	3.1	1.7 – 5.6
Antipsychotics	2.4	1.7 – 3.5
Antimicrobials	1.9	1.3 – 2.8

* Compared to residents on 1-5 medications.

What Do We Do?

Options

- ~~1. Create new drugs~~
2. Learn to use what we have more wisely

Antimicrobial Stewardship

3. Infection prevention will also help

What is an ASP?



in conjunction with UNMC, NM, and Nebraska DHHS Epidemiology Unit



What is Antimicrobial Stewardship?

- Rational, systematic approach to antibiotic use
- Using or implementing processes that are designed to optimize antibiotic use
- Includes interventions to guide clinicians:
 - When are antibiotics needed
 - Which antibiotics should be used
 - Optimal dose, route, and duration of therapy

Goals of Stewardship

- Primary goals:
 - Improve quality of patient care
 - Improve public health
 - Stabilize or reduce rates of resistance
- Financial goals are always secondary

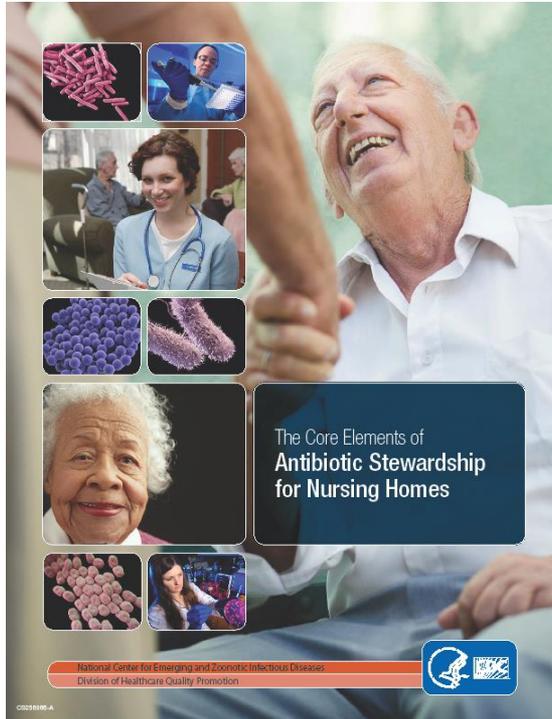


CMS Requirement for Conditions of Participation

For long-term care facilities

- Rules finalized on 10/4/2016 as an overall effort to improve care in LTCF
- 42 CFR 483.80(a)(3)
 - “...Infection Prevention and Control Program (IPCP) that must include an antibiotic stewardship program that includes antibiotic use protocols and system to monitor antibiotic use.”
- 42 CFR 480.80(a)(4)
 - “...a system for recording incidents identified under the facility’s IPCP and the corrective actions taken by the facility.”
- Must be implemented in Phase 2 by **11/28/2017**

ASP Core Elements - LTCF



Leadership Commitment
Accountability

- MD, pharmacist, and nursing

Drug Expertise

- MD with ID/ASP knowledge
- Consultant pharmacist

Action

Tracking

Reporting

Education



Antibiotic “Stewardess”

Not that Far Off



Airline Stewardess	Antimicrobial Stewardship
Check security, start boarding process to begin journey	Assess residents before starting antibiotic course
Passport	Antibiogram is passport to facility microbiology
See the word at 35,000 ft	See use & resistance in aggregate (35,000 ft vs. 1 resident at a time)
Your safety is their priority	Residents safety and outcomes are our priority
Hudson River plane landing – “miracle” vs. carefully planned system in place exercised by skilled team	Develop systems using a specialized team to promote antibiotic use

Who should be part of ASP?



in conjunction with UNMC, NM, and Nebraska DHHS Epidemiology Unit



The Stewardship Team

- Ideally anyone who prescribe, dispense, administer, or receive antibiotics
- Should be multidisciplinary
- Core members
 - Medical director
 - Director of Nursing
 - Infection preventionist
 - Consultant/dispensing pharmacist
- Additional members
 - Members of Quality Improvement
 - Nurses
 - Providers



Who is Available in the Real-World?

- Statewide surveys of ASP practices in LTCFs (NE, MI)

Parameters (Data Expressed as %)	NE (N = 37)	MI (N = 86)	Hospitals (N = 406)
Established ASP / ASP activities	60	17	51
ASP Compositions			
Infection control professionals	68	85	51
Director of nursing or nurses	32	48	Not Reported
Medical director or ID physicians	27	48	71
Pharmacist or ID pharmacists	23	43	59

- Composition in LTCF typically different from hospitals

Van Schooneveld T, et al. Infect Control Hosp Epidemiol 2011;32:732-4.
Malani AN, et al. Infect Control Hosp Epidemiol 2016;37:236-7.
Doron S, et al. Clin Ther 2013;35:758-65.



Responsibilities of Stewardship Team Members

Member	Primary Responsibilities
Medical Director	Set standard for antibiotic prescribing Liaise with other medical staff
Director of Nursing	Set practice standard for nursing staff Ensure adequate staffing / resources for IP and ASP activities
Infection Preventionist	Responsible for IPCP, which include ASP Track infection trends (e.g., MDRO, CDI) Provide ASP-related data to quality committee
Consultant Pharmacist	Perform medication regimen review Report antibiotic use data Assist with development of treatment guidelines
Nursing Staff	Employ standard clinical assessment and communication tools Monitor patient response to therapy and availability of culture results Perform antibiotic time-out
Other Providers	Support antibiotic prescribing practices set by facility ASP Attend / participate in required ASP education and other activities

Nurses in Antimicrobial Stewardship Activities

WHITE PAPER



ANA
AMERICAN NURSES ASSOCIATION



CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

**Redefining the Antibiotic Stewardship Team:
Recommendations from the American Nurses Association/Centers for Disease Control and Prevention Workgroup on the Role of Registered Nurses in Hospital Antibiotic Stewardship Practices**

Effective Date: 2017

Executive Summary

The purpose of this American Nurses Association/Centers for Disease Control and Prevention (ANA/CDC) White Paper is to inform registered nurses in the United States about the problem of antibiotic resistance and facilitate their embracing an expanded and clearly recognized role in hospital antibiotic stewardship programs (ASPs) and activities. The White Paper is the result of a series of online meetings, culminating in a one-day live conference with a selection of nurses identified by ANA and CDC as having expertise and/or interest in antibiotic stewardship. The purpose of the workgroup is to explore how nurses can become more engaged and take a leadership role to enhance our nation's antibiotic stewardship efforts. The first part of the White Paper reviews ASPs and the current state of antibiotic resistance. The second section is a summary of the workgroup's discussions on current barriers to full nurse participation in ASPs; gaps in nurses' knowledge and education about antibiotic stewardship; and the use of antibiotics in the 21st century. The third part explores opportunities for nurses to add their expertise to our nation's ongoing stewardship efforts and offers recommendations for future nursing education.

While often used interchangeably, the terms "antibiotic" and "antimicrobial" are not the same. Microbes include bacteria, viruses, fungi, and parasites; antimicrobials are agents against any of these. Antibiotics are agents that specifically target bacteria.¹

The mark "CDC" is owned by the US Department of Health and Human Services (HHS) and is used with permission. Use of this logo is not an endorsement by HHS or CDC of any particular product, service, or enterprise.

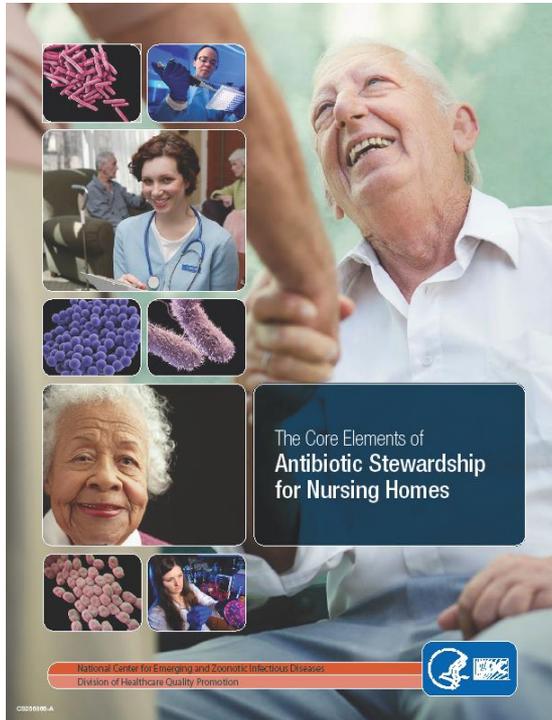
5515 Georgia Avenue, Suite 600
Silver Spring, MD 20910
www.nursingworld.org

ASP Task	Core Elements	Example of Nurse's Role
Triage/Isolation	Accountability Drug Expertise Education	Initially assess source of infection Identifies appropriate precaution
Early / appropriate culture	Accountability Drug Expertise Tracking	Obtain cultures before antibiotics Monitor/report culture results
Adverse events monitoring	Action Tracking Education	Monitor/report adverse events
Antibiotic dosing	Drug expertise Action Tracking Education	Obtain appropriate drug levels
Transition of care to different acuity level	Action Tracking Education	Communicate clinical information (diagnosis, management) to hospital/VNA

How to antibiotic stewardship?



ASP Core Elements - LTCF



Leadership Commitment Accountability

- MD, pharmacist, and nursing

Drug Expertise

- Consultant pharmacist
- Hospital partner with ASP
- Regional ASP network

*Assumed
already
established*

Action Tracking

Reporting Education

*Things to
discuss in
the future*



IDSA/SHEA Stewardship Strategies

General Interventions

- Prospective audit feedback
- Restriction/Pre-authorization
- Practice guidelines
- Antibiotic use based on syndrome
- Reduce use of CDI-associated antibiotics
- Clinical decision support system
- Educate prescribers to review antibiotic regimens

Pharmacy-Based Interventions

- Pharmacokinetic monitoring service
 - IV to PO conversion
- Use of PK/PD-optimized dosing regimens
 - Allergy assessment
- Shortest effective duration of therapy

Not all are
applicable to LTCF

Laboratory-Based Interventions

- Antibiograms based on sample source, location, age
- Selective susceptibility reporting
- Rapid testing for viral respiratory pathogens
- Rapid diagnostic for blood cultures
- Procalcitonin to reduce antibiotic use
- Fungal biomarkers to reduce antifungal use

Population-Based Interventions

- Guideline for febrile neutropenia
- Antifungals in immunocompromised
- Long-term care facility interventions
 - Neonatal ICU
 - Terminally ill patients

Dellit TH, *et al.* Clin Infect Dis 2007;44:159-77.

Barlam TF, *et al.* Clin Infect Dis 2016;62:e51-77.

Strategies for LTCF ASP

- Develop policies to support optimal antibiotic prescribing
 - Ensure medication safety policy applied to antibiotic use
 - Perform medication regimen review to check for
 - ✓ Unnecessary medications (excess dose/duration; inadequate monitoring/indication)
 - ✓ Medication-related problems, medication errors, other irregularities
- Board interventions to improve antibiotic use
 - Standardize practices for residents suspected of having infections
 - ✓ Use standardized methods to evaluate residents
 - ✓ Communicate evaluation findings to providers
 - ✓ Only request tests and/or antibiotic if appropriate
 - Perform antibiotic review 72 hours after starting
 - ✓ Reassess patient's condition
 - ✓ Check availability of culture results

<http://www.cdc.gov/longtermcare/prevention/antibiotic-stewardship.html>

https://www.cms.gov/Regulations-and-Guidance/Guidance/Manuals/downloads/som107ap_pp_guidelines_ltc.pdf



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https://www.cms.gov/Regulations-and-Guidance/Guidance/Manuals/downloads/som107ap_pp_guidelines_ltc.pdf



Example of Antibiotic Time-Out

SBAR Communication Tool Template for Antibiotic Time-Out

	[Facility Logo]	Resident Label
S	Situation: I am calling to follow-up on [resident's name: _____] who was started on antibiotic(s) recently.	
B	Background: This patient was started on: Antibiotic #1: _____ Start date: _____ Antibiotic #2: _____ Start date: _____ For: <input type="checkbox"/> UTI <input type="checkbox"/> Pneumonia <input type="checkbox"/> Bronchitis <input type="checkbox"/> Skin infection <input type="checkbox"/> GI infection <input type="checkbox"/> Fever of unknown source <input type="checkbox"/> Other, specify: _____ Vitals at initial presentation were as follows: BP ____/____ HR ____ Resp. rate ____ Temp. ____ O ₂ Sats ____ Symptoms and positive exam findings at that time were: _____ The diagnosis fits: <input type="checkbox"/> McGeer criteria <input type="checkbox"/> Loeb criteria <input type="checkbox"/> Neither <input type="checkbox"/> Assessment tool not used	
A	Assessment: Current vital signs: BP ____/____ HR ____ Resp. rate ____ Temp. ____ O ₂ Sats ____ Since starting antibiotic(s), the resident: <input type="checkbox"/> now has <u>no</u> signs or symptoms of infection <input type="checkbox"/> has remained the same <input type="checkbox"/> has improved but continues to have signs and symptoms of: _____ <input type="checkbox"/> has <u>new or worsening</u> signs/symptoms of: _____ Microbiology culture result (fax microbiology report if available): <input type="checkbox"/> has not returned yet <input type="checkbox"/> has <u>no</u> growth <input type="checkbox"/> was not obtained <input type="checkbox"/> has positive Gram stain/growth of [specify Gram stain/microorganism: _____] Is susceptible to the antibiotic(s) prescribed: <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know <input type="checkbox"/> Not tested by lab <input type="checkbox"/> Not yet performed by lab Other antibiotics the organism is sensitive to: _____	
R	Recommendation: <input type="checkbox"/> Patient is not improving and needs further evaluation. <input type="checkbox"/> Patient has improved and needs final antibiotic therapy plan.	
	Nurse's Signature: _____ Date/Time: _____ <input type="checkbox"/> Faxed or <input type="checkbox"/> Called to: _____ By: _____ Date/Time: _____	

- Information to review include
 - Patient status after starting therapy
 - ✓ Improved
 - ✓ No change
 - ✓ Deteriorated
 - Microbiology data
 - ✓ Available or not
 - ✓ Positive or negative
 - ✓ If positive, is microbe susceptible to antibiotic prescribed
- Also provide visual reminder and script for communication



Strategies for LTCF ASP

- Other board interventions
 - Require specific information on all antibiotic prescription
 - ✓ Dose, frequency, duration
 - ✓ Indication that is syndrome specific (should not just say 'infection')
 - ✓ Indication that makes sense (A fib is not an appropriate indication for ciprofloxacin)
 - Treatment protocols or guidelines
 - ✓ Consider resistance pattern
 - ✓ Consider whether agent is on formulary
 - ✓ Work with prescribers, pharmacists to determine agent, dose, route, duration

Example of Indication and Duration

DAPTOmycin (CUBICIN) 420 mg in sodium chloride 0.9 % 42 mL IV ✓ Accept ✗ Cancel

Order Inst.: [Uses other than for SSTI or Staph aureus bacteremia require ID services approval. See Lexicomp for additional details.](#)
Reference: [1. Link to Lexicomp](#)
Links:
Dose: mg/kg

Weight Type:

Weight: kg

Administer Dose: **420 mg** 6 mg/kg × 70 kg [Order-specific weight as of Wed Aug 19, 2015 1301]
= 420 mg ordered of 10 mg/mL
= 42 mL of 10 mg/mL
= 420 mg

Administer Amount: **42 mL**

Route:

Frequency:

For: Days

Starting: At:

First Dose: **Today 1330** Last Dose: **Tue 9/1 1330** Number of doses: **14** [Show Additional Options](#)

Scheduled Times: [Hide Schedule](#)

8/19/15	1330
8/20/15	1330
8/21/15	1330

Based on system settings, only 3 days of scheduled times are shown.

Duration: Minutes

Indications:

<input checked="" type="checkbox"/> BACTEREMIA/FUNGEMIA	<input type="checkbox"/> GENITAL TRACT INFECTION	<input type="checkbox"/> PNEUMONIA, HCAP/HAP/VAP
<input type="checkbox"/> BONE/JOINT INFECTION	<input type="checkbox"/> IMMUNOCOMPROMISED HO...	<input type="checkbox"/> SKIN SOFT TISSUE INFECT...
<input type="checkbox"/> CLOSTRIDIUM DIFFICILE	<input type="checkbox"/> INTRA-ABDOMINAL INFECTI...	<input type="checkbox"/> SURGICAL PROPHYLAXIS
<input type="checkbox"/> CNS INFECTION	<input type="checkbox"/> LOWER RESPIRATORY TRA...	<input type="checkbox"/> URINARY TRACT INFECTION...
<input type="checkbox"/> CYSTIC FIBROSIS EXACERB...	<input type="checkbox"/> PEDIATRIC FEVER, NO SOU...	
<input type="checkbox"/> FEBRILE NEUTROPENIA	<input type="checkbox"/> PNEUMONIA, COMMUNITY-A...	



Strategies for LTCF ASP

- Other board interventions
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Example of Treatment Recommendation

EDUCATION PROGRAMS

Antimicrobial Stewardship Program

ASP News

ASP App

Antibiograms

Antimicrobial Guidebook

Antimicrobial Restrictions

Clinical Microbiology

Clinical Pathways

Dosing Protocols

Surgical Prophylaxis Protocols

Pharmacokinetics

Procalcitonin Guidance

Other Information

Useful Links

Visiting Scholar Preceptorship

Meet Our Team

Contact Information

COBCH Guidelines

Clinical Pathways

Antimicrobial Catheter Lock Protocols

- Antibiotic and Ethanol Catheter Lock Order Sets
- Institutional Guidelines for Ethanol Lock Technique
 - Refer to Nursing Policies/Procedures VAD-11 (Ethanol Lock Technique for Treatment in Prevention of Infection of Intravascular Devices) for nursing policy and instructions for ethanol administration
- IDSA Guidelines for the Management of Intravascular Catheter-related Infections

Clostridium difficile Infection (CDI)

- **Management Algorithm**
- Environmental Services Cleaning Protocol
- SHEA/IDSA *C. difficile* Infection Guidelines

Invasive Candidiasis

- Institutional Guidelines for the Treatment of Invasive Candidiasis

Perinatal Group B Streptococcal Prevention

- Institutional Guidelines for the Prevention of Perinatal Group B Streptococcal Disease
- CDC Guidelines for the Prevention of Perinatal Group B Streptococcal Disease



Treatment Recommendations for CDI

Treatment for initial episode of CDI and the first recurrence* of CDI should be the same. See below for recommendations for treatment of CDI beyond the first recurrence.

Mild-Moderate Infection: Diarrhea that does not meet criteria for severe or complicated

- Metronidazole* 500 mg PO q8h x 10 days
- Avoid IV metronidazole as data suggests inferior to PO.
- Pediatric dosing: 30 mg/kg/day PO divided q6h x 10 days; not to exceed 4 g/day



Examples of Treatment Recommendation

Table 2. Recommended Antibiotics for Treatment of Bacterial Pneumonia among Nursing Home Residents

Mild – Moderate Pneumonia Symptoms				
	Context	Preferred Agent	Dosing	Comments
1 st line	Uncomplicated bacterial PNA	Cefpodoxime	200 mg PO twice a day x 5d (give q24h for CrCl <30; 3x/wk post HD in ESRD)	<ul style="list-style-type: none"> Cefpodoxime may be given safely to patients with mild penicillin allergy (i.e. rash), cross reactivity is low
	Bacterial PNA, aspiration risk	Amoxicillin/Clavulanate	500/125 mg PO 3 times a day x 5d (give q12h for CrCl 10-30; give q24h for CrCl <10; give q24h for ESRD with an extra dose post each HD)	<ul style="list-style-type: none"> Alternative dosing of Amoxicillin/clavulanate 875 mg BID Penicillin resistance of invasive pneumococcus is ~ 10% in Monroe County
	Uncomplicated Bacterial PNA – Alternative Therapy	Doxycycline	100 mg PO twice a day x 5d (no renal adjustment needed)	<ul style="list-style-type: none"> Caution with skin exposure to direct sunlight
2 nd line	Bacterial PNA, severe contraindications to 1 st Line therapy	Levofloxacin	750 mg PO Q24h x 5d (give q48h for CrCl 20-49; 750mg x 1, then 500mg q48h for CrCl <20 and ESRD)	<ul style="list-style-type: none"> Quinolone antibiotics pose a higher risk of <i>C. difficile</i> infection Caution with anti-arrhythmic medications and prolonged QTc
		Moxifloxacin	400 mg PO Q24 x 5d (no renal adjustment needed)	
Severe Pneumonia Symptoms, or Failure to Respond to Initial Therapy				
1 st line	Ceftriaxone IM + Doxycycline	Ceftriaxone 1000 mg IM Q24H (no renal adjustment needed) Doxycycline dosing as above		<ul style="list-style-type: none"> May be given safely to patients with mild penicillin allergy (i.e. rash), cross reactivity is low Assess for de-escalation to oral regimen daily
2 nd Line*	Levofloxacin	Levofloxacin dosing as above		<ul style="list-style-type: none"> *may be used as 1st line agent for any patients with risk factors for Pseudomonas infection such as any of the following: recent (within 90 days) intravenous antibiotic exposure, very severe underlying COPD (FEV1 <35% predicted), known bronchiectasis, previous respiratory infections with Pseudomonas

*Treatment duration is 5 days. Before stopping therapy, the patient should be afebrile for 48 to 72 hours, breathing without supplemental oxygen (unless required for preexisting disease), and have no more than one clinical instability factor (defined as HR >100 beats/min, RR >24 breaths/min, and SBP ≤90 mmHg)



[http://www.rochesterpatientsafety.com/Images_Content/Site1/Files/Pages/Guidelines%20for%20Treatment%20of%20Pneumonia%20\(1\).pdf](http://www.rochesterpatientsafety.com/Images_Content/Site1/Files/Pages/Guidelines%20for%20Treatment%20of%20Pneumonia%20(1).pdf)

Pharmacy-Based Interventions

- Perform medication use review, including antibiotics
 - Review all antibiotic regimens for appropriateness
- Establish clinical/laboratory standard for monitoring adverse reactions from antibiotics
 - Monitor for common adverse reactions (e.g., rash, diarrhea)
- Review microbiology data to guide antibiotic selection
 - Based selection on antibiogram information
 - Prepare treatment guidelines/recommendations

Laboratory-Based Interventions

- Antibigram
 - Important to guide antibiotic selection
- Notify facility of positive culture results timely
 - Phone calls
 - Fax results
- Notify facility of MDRO, *C difficile* test results
 - For prompt isolation
 - For transfer to higher acuity setting
 - For selection of appropriate treatment

<http://www.cdc.gov/longtermcare/prevention/antibiotic-stewardship.html>



Example of Antibiogram

Antibiotic Susceptibility Report for Most Frequently Isolated Gram-Negative Organisms (January 2015 to December 2016)

Pathogen	Isolate Tested	Percent Susceptible																			
		Ampicillin	Ampicillin/Sulbactam	Piperacillin/Tazobactam	Cefazolin	Cefepime	Cefoxitin	Ceftazidime	Ceftriaxone	Cefuroxime	Aztreonam	Ertapenem	Meropenem	Amikacin	Gentamicin	Tobramycin	Ciprofloxacin	Levofloxacin	Trimethoprim/Sulfa	Nitrofurantoin ¹	Tetracycline
<i>Escherichia coli</i>	111	53	59	99	86	98	92	98	97	91	98	100	100	100	91	91	58	59	76	99	77
<i>Klebsiella pneumoniae</i>	41	--	78	98	93	98	95	98	98	93	98	100	100	100	98	98	95	95	93	63	83
<i>Proteus mirabilis</i>	41	98	98	100	100	100	100	100	100	100	100	100	100	100	100	75	75	75	75	50	75
<i>Pseudomonas aeruginosa</i>	31	--	--	97	--	97	--	97	--	--	84	--	90	100	74	77	71	71	--	--	--

-- Denotes organism has intrinsic resistance to this antimicrobial

1. Nitrofurantoin is reported for urine sources only

Summary for Gram-Negative Organisms

During the 2-year period between January 2015 and December 2016, a total of 111 *E coli* were identified, making it the most commonly identified Gram-negative pathogen. Antibiotic susceptibility of these *E coli* can be summarized as follow: |

- Oral antibiotics with the **highest** susceptibilities (in descending order) were:
 - Nitrofurantoin (99%)
 - Cefuroxime (91%)
 - Cephalexin (86%, as indicated by cefazolin susceptibility)
 - Trimethoprim/sulfamethoxazole (76%)
- Susceptibilities of antibiotics available only in intravenous formulation (e.g., ceftriaxone) exceed 90%, except:
 - Ampicillin/sulbactam (59%)
 - Cefazolin (86%)

Antibiotic susceptibility data can be useful for guiding selection of empiric antibiotic therapy for residents in whom culture and susceptibility data from the past few months are not available.

Selecting a Strategy

- Should be based on
 - Size of facility
 - Availability of personnel / expertise (IP, pharmacist, micro, ID)
 - Financial resources / manpower
 - Electronic ordering / clinical decision support systems
 - Goals
- Customize
 - One size will not fit all

Tiered Implementation of ASP Activities

Implementation of Antimicrobial Stewardship Components Stratified by Level of Resources

Basic Antimicrobial Stewardship Components

- Obtain leadership commitment via formal written statement
- Appoint physician and consultant pharmacist as program leaders
- Develop policy and implement practices to improve antibiotic use
- Track and report antibiotic prescribing practices and outcome measures
- Educate providers, residents, and/or family on appropriate antibiotic use

Action	Low Level of Resources	Moderate-to-High Level of Resources
Survey	Current antibiotic prescribing practices and issues	
Educate	<ul style="list-style-type: none"> □ Why, what, and how of antibiotic stewardship □ Minimum criteria for testing for UTI □ Minimum criteria for initiating antibiotic for UTI □ Prevention of <i>C difficile</i> infection □ Any other topic identified based on the survey 	<ul style="list-style-type: none"> □ As in low-level of resources, <u>PLUS one or more of the following:</u> □ Criteria for testing and starting antibiotics for skin/soft tissue and respiratory tract infections □ Effective communication strategy to providers (SBAR model) □ Antibiotic time-out □ Bug-drug mismatch
Implement	<ul style="list-style-type: none"> □ Basic stewardship components (see above) <u>PLUS</u> □ Facility antibiogram (if feasible) 	<ul style="list-style-type: none"> □ As in low-level of resources, <u>PLUS at least one additional example interventions listed below (but are not limited to):</u> □ Facility specific prescribing guidelines □ Standard provider communication tool □ Antibiotic time-out and review processes □ Antibiotic prescribing report cards for providers

Things to Remember with Strategy Implementation

- Formulate a plan
 - Enlist others to help
 - DO NOT implement everything all at once (3 at most at one time)
- Made plan known
 - Advertise what will be implemented, when, why, and goal
 - Educate all staff member
 - Don't leave out providers
- Ask and/or negotiate
 - Request monthly antibiotic use report from pharmacy
 - Annual antibiogram from contract lab
 - Put it in writing (i.e., in contract)

Metrics to Measure ASP Activities

Measurement for usage

- Days of therapy (DOT) / 1000 resident-days
- Antibiotic starts / 1000 resident-days
- Can be summarized as overall, by antibiotic class, by individual agents

Measurement for process

- Compliance to assessment, treatment algorithms
- Compliance to antibiotic prescription (dose, frequency, duration, indication)

Measurement for clinical outcomes

- *C difficile* infection rates
- Adverse reaction rates
- Antibiotic resistance rates (e.g., MDRO)

Other Metrics to Show ASP Efforts

- Time spent performing
 - Tracking facility infection
 - Obtaining antibiotic use data
 - Summarizing data for meetings
- Number of people educated on ASP, appropriate use
 - Prescribers
 - Nurses
 - Residents / family members
- Number of internal and external outreach activities
 - Infection control fair
 - Community health fair



Summary

- Antimicrobial resistance is increasing and leads to increased morbidity and mortality for patients and overall healthcare costs
- ASPs are necessary
 - Unnecessary use of antibiotics is common
 - Antibiotic use is the key driver of resistance
 - Regulatory requirements
- Primary goal of ASPs is to improve patient care and public health
- Key recommendations for ASPs include
 - Establishing a multidisciplinary team
 - Implementing general interventions as well as pharmacy-, and laboratory-based strategies



Assessment Question 1

Which of the following is not a consequence of antibiotic misuse?

- A. Development of resistant pathogens
- B. Secondary infections
- C. Decreased length of stay and costs
- D. Adverse drug reactions

Assessment Question 2

Which of the following is not a primary goal of antimicrobial stewardship programs?

A. Limit facility spending on antibiotics

B. Improve public health

C. Prevent development of resistance

D. Improve patient care and outcomes



ASAP



Assessment Question 3

Which of the following is/are antimicrobial stewardship strategies that can be implemented in LTCF?

- A. Prepare antibiogram
- B. Use standard clinical assessment and communication tool
- C. Monitor antibiotic use
- D. All of the above

Need More Nebraska ASAP?

For additional resources, visit

<https://asap.nebraskamed.com>

