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

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

UNMC Nebraska Medicine

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

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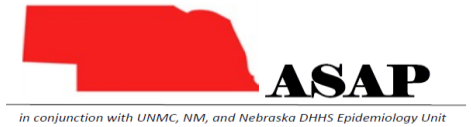
Why is ASP needed?



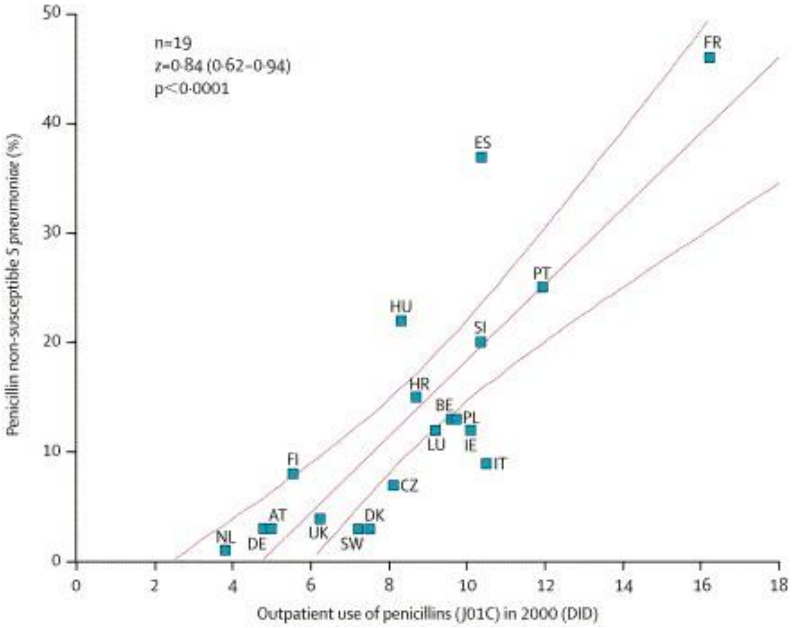
Development of Antibiotic Resistance

- 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*



Goossens H, et al. *Lancet*. 2005;365:579-87.

Evidence of Antibiotic Overuse in Acute Care Facility

- Inappropriate prescribing ranged from 20-50% in acute care settings[1]
- Prospective, observational review of new antibiotic start over 2 weeks in 650-bed tertiary hospital[2]
- Total of 1941 days of therapy (DOT) for 129 patients captured
- 30% (>500 DOT) considered unnecessary

Reason for Unnecessary DOT	No. Pt (%)
Non-infectious or non-bacterial	187 (32)
Colonization or contamination	94 (16)
Longer duration than needed	192 (33)
Timely adjustment not made	20 (3)
Redundant coverage	60 (10)
Spectrum of activity not indicated	23 (4)

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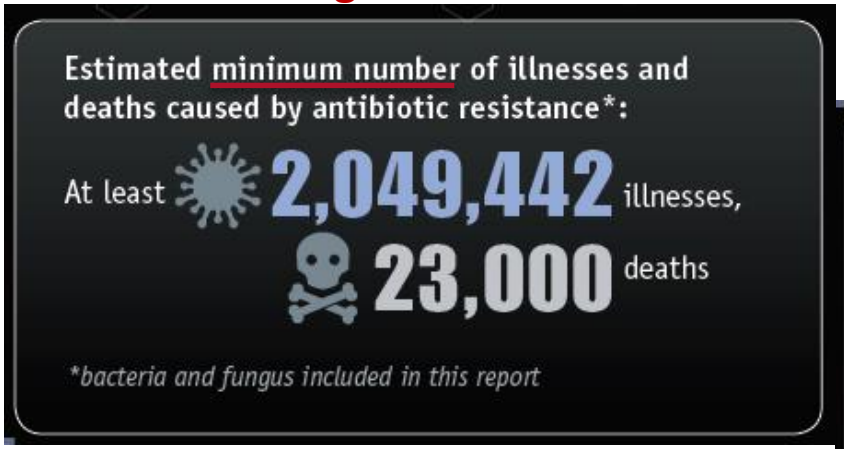
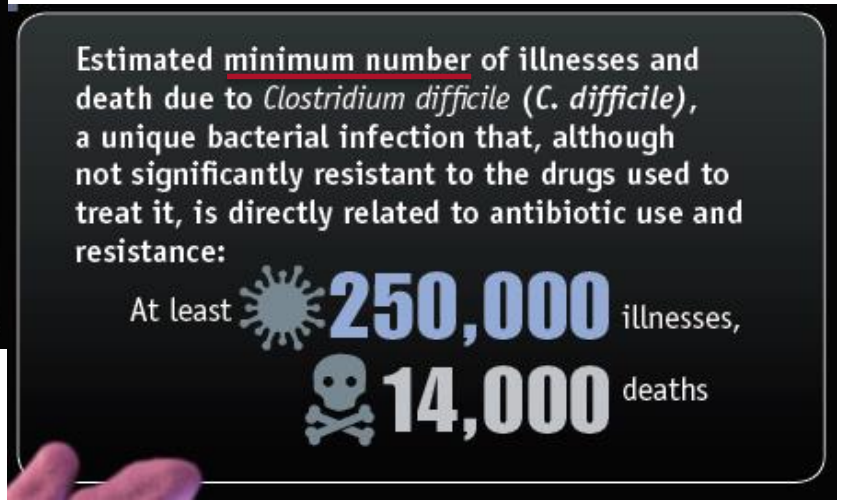
1. CDC. Core Elements of Hospital Antibiotic Stewardship Programs. Atlanta, GA: US DHHS, CDC; 2014.
2. Hecker MT, *et al*. Arch Intern Med 2003:163:972-8.

Consequences of Antibiotic Overuse

Resistant Pathogens



Clostridium difficile Infections



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

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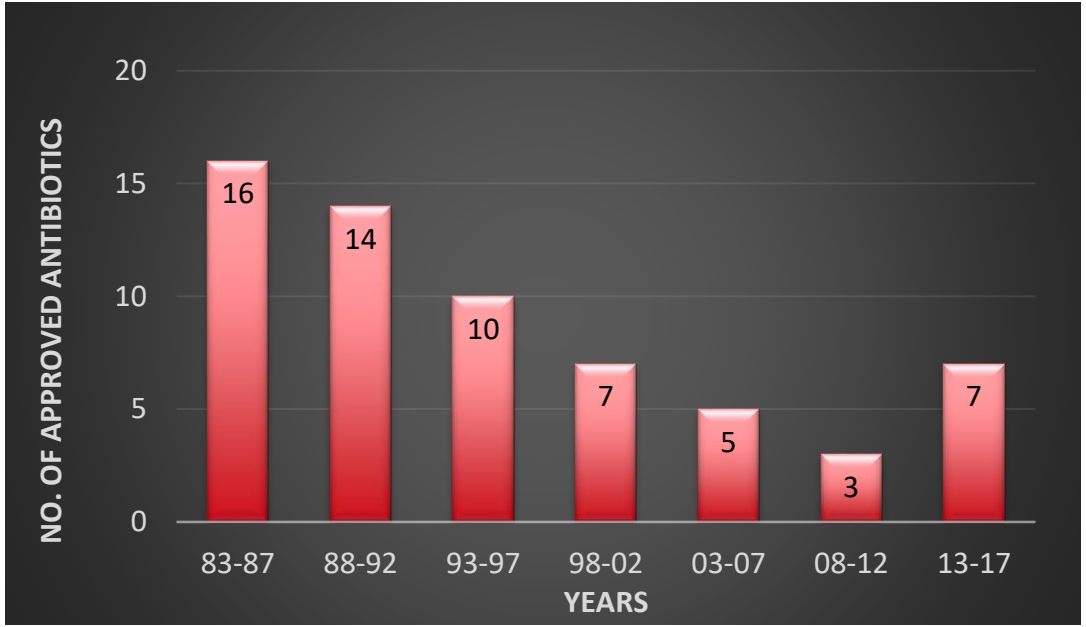
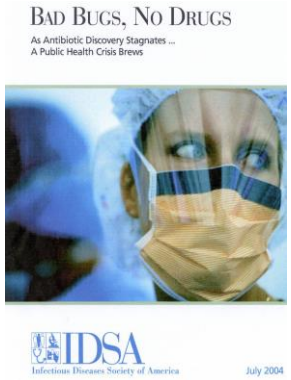
http://www.cdc.gov/drugresistance/threat-report-2013/pdf/ar-threats-2013-508.pdf.

Limited New Antibiotic Options





Bad Bugs Need Drugs

10x'20

Ten new ANTIBIOTICS by 2020

Target = ESKAPE

***E**nterococcus faecium*
***S**taphylococcus aureus*
***K**lebsiella pneumoniae*
***A**cinetobacter baumannii*
***P**seudomonas aeruginosa*
***E**nterobacter* 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.

Antibiotic-Associated Adverse Drug Events (ADE)

- Review of national databases for ED visits due to ADE over 2 years
- >140,000 ED visit annually due to ADE from antibiotics
  - Translate to 1 out of 5 ED visits
- Allergic reactions most common reason for seeking care (>100,000 annual visits)
- Penicillins (37%) and fluoroquinolones (14%) were most commonly implicated
- Conclusion: small reduction in unnecessary use can significantly decrease ADE risks

- 10-month review of patients who received ≥24 hrs of antibiotics at Johns Hopkins
- ~1500 patients (27%) included
  - 20% developed ADE
- 287 regimens without clear indications
  - 56 (20%) were associated with ADE
  - Including 7 cases of *Clostridium difficile* infection
- ADE risks increase by 3% for every 10 DOT

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Shehab N, *et al*. Clin Infect Dis 2008;47:735-43.
Tamma PD, *et al*. JAMA Intern Med 2017;177:1308-15.

Antibiotics Are Unique

Lose efficacy over time and must be continually replaced

Need to be used sparingly to prolong efficacy

Use of new drugs are actively discouraged for non-financial reasons

How I use them affects others

Antimicrobials are a shared natural resource which must be preserved for future generations

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What Do We Do?

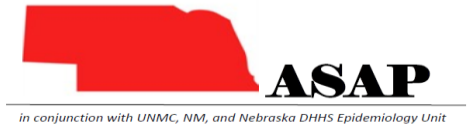
Options

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?



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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 antibiotic(s) should be used
  - Optimal dose, route, and duration of therapy

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Goals of Stewardship

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

- Financial goals are always secondary

Correct drug	→	**Cure/prevent infection**
Right dose		**Minimize toxicity**
Appropriate duration		**Prevent emergence of resistance**

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

Joint Commission Requirement

New standards for hospitals, critical access hospitals, and nursing facilities (MM.09.01.01), effective 1/1/2017

1. Establish ASP as an organizational priority
2. Educate practitioners on resistance and ASP practices
3. Educate patients/families on appropriate antibiotic use
4. Create ASP that is multidisciplinary
5. Include 7 CDC core elements (LeAD A TREn: Leadership, Accountability, Drug expertise, Action, Tracking, Reporting, Education) in ASP
6. Use approved multidisciplinary management protocols
7. Collect, analyze, report data on ASP
8. Act on improvement opportunities identified by ASP

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https://www.jointcommission.org/assets/1/6/New_Antimicrobial_Stewardship_Standard.pdf

CMS Requirement for Conditions of Participation

- Rules proposed on 6/16/2016; yet to be finalized
- 42 CFR 482.42

  …require a hospital to develop and maintain an antibiotic stewardship program
  … to improve hospital antibiotic prescribing practices
  … curb patient risk for possibly deadly CDIs
- Goals and responsibilities
  - Document evidence-based antibiotic use
  - Demonstrate sustained improvements in proper antibiotic use
  - Use nationally recognized guidelines to monitor and improve antibiotic use
  - Competency-based training on ASP guidelines, policy, and procedure

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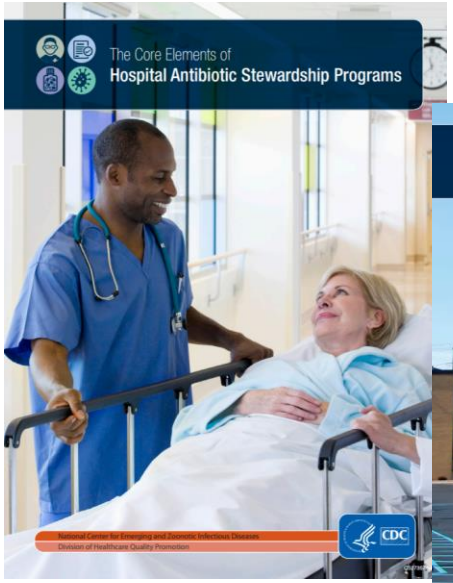
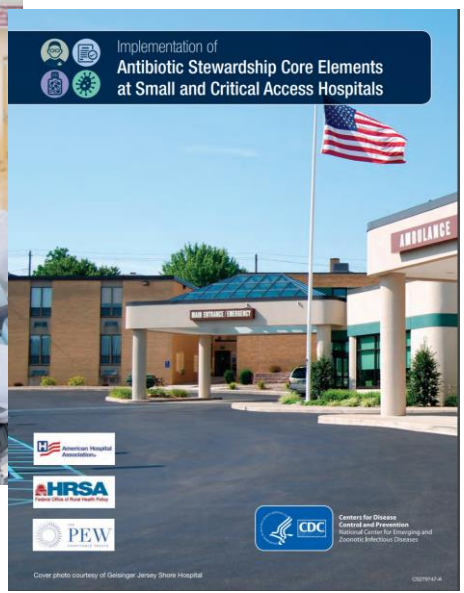
https://www.gpo.gov/fdsys/pkg/FR-2016-06-16/pdf/2016-13925.pdf

ASP Core Elements for Hospital, Small and Critical Access Hospitals





Leadership Commitment
Accountability
- Single MD Expert

Drug Expertise
- Pharmacist

Action
Tracking
Reporting
Education

https://www.cdc.gov/getsmart/healthcare/implementation/core-elements.html
https://www.cdc.gov/getsmart/healthcare/implementation/core-elements-small-critical.html

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Comparison of ASP Core Element Documents

Core Element	Hospital ASP	Small & Critical Access Hospital ASP
Leadership Commitment	Formal statement, job descriptions, training support	Formal statement, approve ASP policy, integrate with QI, training support
Accountability	Single physician leader	C-suite physician accountable for outcomes
Drug Expertise	Pharmacist leader + other key support (e.g., micro, IP, IT, QI, RN)	Pharmacist leader, offer access to training, remote consultation
Action	Broad: time-out, audit-feedback Pharmacy: IV→PO, dose adjustment Infection: treatment guidelines (e.g., UTI)	Infection: UTI, CAP, SSTIs Drug: carbapenems, pip/tazo, IV vanco Pharmacist: IV→PO, dose adjustment RN: culture technique, monitor response
Tracking	Process: compliance to guidelines, policies Use: DOT, DDD per 1000 patient-days Outcome: antibiotic resistance, CDI rates	Submit AU/AR data to NHSN Monitor UTI, CAP, SSTI guideline compliance Medication use evaluations for selected drugs
Reporting	Process, use, outcome measures to frontline staff +/- NHSN	Regular report, provider-specific report, newsletters/emails
Education	Regularly to prescribers and staff	Incorporate in orientation and re-credentialing process; focus on UTI, CAP, SSTI interventions

https://www.cdc.gov/getsmart/healthcare/implementation/core-elements.html
https://www.cdc.gov/getsmart/healthcare/implementation/core-elements-small-critical.html

Antibiotic "Stewardess"
Not that Far off

Airline Stewardess

- Security and boarding to start your course
- Passport
- Sees the world at 35,000 ft
- Your safety is their priority
- Recent airplane crash in NY – "miracle" vs. flight crew attributed to careful systems in place and exercise by a skilled team

Antimicrobial Stewardship

- Approval for restricted antibiotics to start antibiotic course
- Antibiograms is a passport to our local micro
- See hospital's use and resistance in aggregate ("35,000 ft" vs. just 1 patient at a time)
- Patient's safety and outcome are our priority
- Developing systems using a specialized team to promote antibiotic use

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Courtesy of Belinda Ostrowsky, MD, MPH, FSHEA, FIDSA. Circa 2010.

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
  - Infectious diseases physician / physician with ASP training
  - Pharmacist with ID / ASP certificate training
- Additional members
  - Infection preventionists
  - Clinical microbiologists
  - Information system specialists
  - Members of Quality Improvement
  - Nurses
  - Hospital epidemiologists

Dellit TH, *et al*. Clin Infect Dis 2007;44:159-77.
Fishman N. Infect Control Hosp Epidemiol 2012;33:322-7.
CDC. Core Elements of Hospital Antibiotic Stewardship Programs. Atlanta, GA: US Department of Health and Human Services, CDC; 2014. Available at http://www.cdc.gov/getsmart/healthcare/implementation/core-elements.html.

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Who is Available in the Real-World?

- Nationwide survey of ASP practices in hospitals between 2009 – 2010
- About 206 of 406 (51%) hospitals with some form of ASP

ASP Composition	Rate
ID physicians	71%
ID pharmacists	59%
Infection control professionals	51%
Clinical microbiologists	39%

Barriers to ASP	Rate
Staffing constraints	69%
Funding	50%
Insufficient buy-in	33%
Not a priority	22%

- ~65% of respondents with <300 beds

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Doron S, *et al*. Clin Ther 2013;35:758-65.

Who is Available in Community Hospitals?

- Survey of >1400 community hospitals
  - 568 hospitals responded
  - >80% with 25-300 beds
- ~16% with antimicrobial committee

Point Person	Frequency
Pharmacist	64.0%
Physician	5.2%
Nurse	1.7%
Other	0.4%
None identified	28.3%

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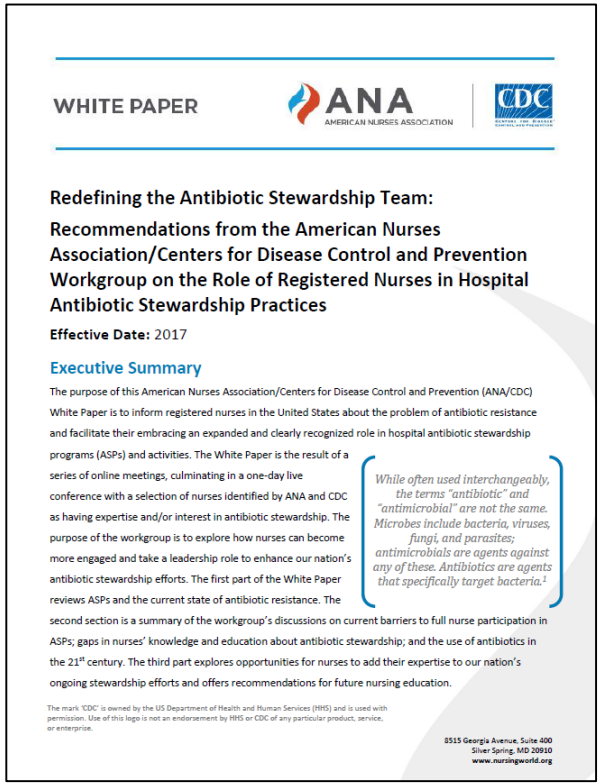
Septimus EJ, Owens RC. *Clin Infect Dis*. 2011;53:S8-14

Nurses in Antimicrobial Stewardship Activities



WHITE PAPER

ANA AMERICAN NURSES ASSOCIATION | CDC

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]

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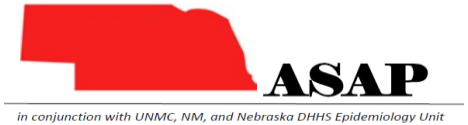
Silver Spring, MD 20910
www.nursingworld.org

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 LTCF/VNA

Available at: http://www.nursingworld.org/ANA-CDC-AntibioticStewardship-WhitePaper. Accessed 9/26/17.

How to antibiotic stewardship?



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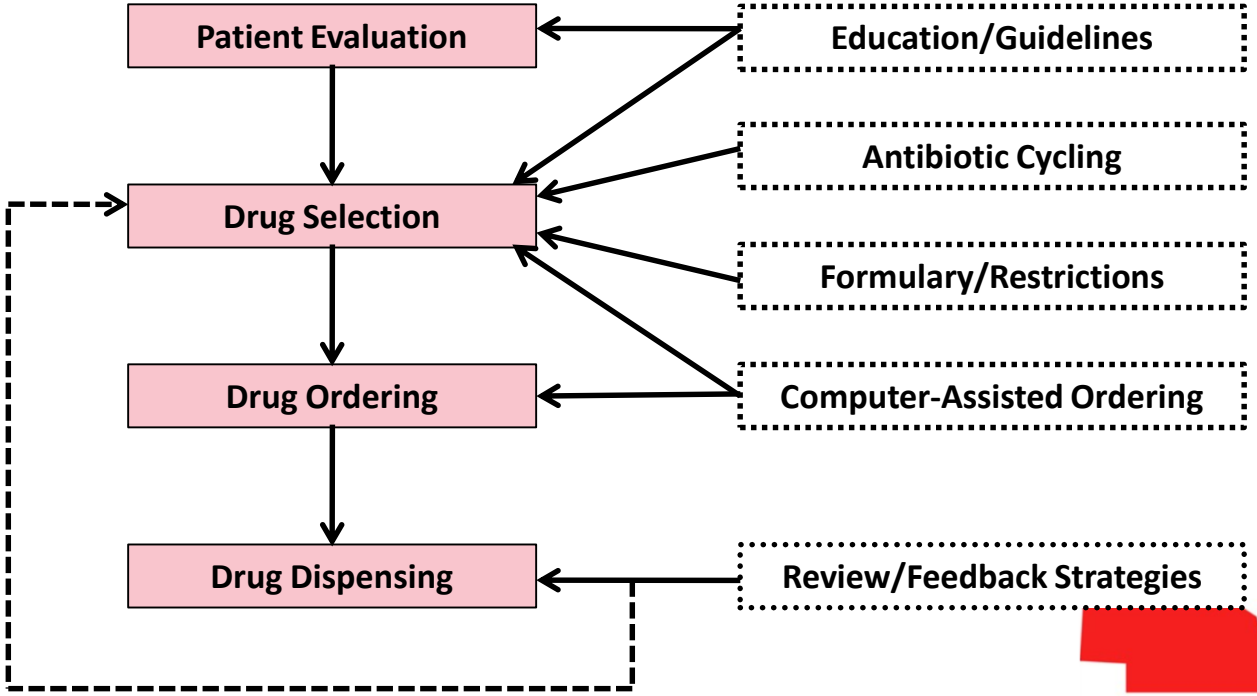
Prescribing Process and Stewardship



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MacDougall C and Polk RE. Clin Microbiol Rev 2005;18:638-56.

IDSA/SHEA Stewardship Strategies

General interventions

- Prospective audit and feedback
- Restriction / pre-authorization
- Practice guidelines
- Improvement of outcomes and antibiotic use based on syndrome
- Reduce use of *C difficile*-associated antibiotics
- Clinical decision support system
- Education / Encourage prescribers to review antibiotic regimens

Pharmacy-Based Strategies

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

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

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

IDSA/SHEA Stewardship Strategies

Laboratory-Based Strategies

- 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 Strategies

- Guidelines for febrile neutropenia
- Antifungals in immunocompromised
- LTCF interventions
- Neonatal ICU
- Terminally ill patients

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

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

Prospective Audit and Feedback (PAF)

- Daily or scheduled review of target antibiotics
- Educational, evidence-based feedback provided to prescribers
- May establish targets for intervention (i.e., bug-drug mismatch, redundant therapy)
- Requires computer/technical support

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PAF Pros and Cons

Advantages	Disadvantages
Prescriber autonomy maintained	Voluntary compliance
Decision based on more clinical data, enhancing clinician buy-in	Time/labor intensive; may require purchase of surveillance system
Educational opportunities	Requires broad-based knowledge
No delays in therapy	Some inappropriate antibiotic use still permitted
Decreases inappropriate antibiotic use	

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Restriction/Pre-Authorization

- Formulary restriction
  - Limit the number of drugs within a class on formulary
  - Reduce redundancy, confusion with regimen, and resource

- Specific agent restrictions
  - Restrict certain antibiotics based on spectrum of activity, safety, or cost concerns
  - Can obtain with prior approval or authorization
  - Requires providers to justify their rationale, especially outside pre-specified indications
  - Approval may be from ID team via formal consultations or from ASP

Restriction Pros and Cons

Advantages

Direct control over use of antibiotic

Requires less resources

Way to minimize antibiotic use during drug shortages

Decreases inappropriate antibiotic use

Disadvantages

May delay therapy

Antagonistic relationship due to provider's loss of autonomy

Ways to beat the system

ID physicians often exempt

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Clinical Guidelines Example

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
  - SCORCH 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

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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[T] 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

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Other General Strategies

- Antibiotic order requirements
  - Indication
  - Duration of therapy
- Antibiotic time-out
  - Review appropriateness of antibiotic therapy at specific time points
  - Often performed at 48-72 hours when more clinical and culture data are available
- Automatic stop orders
  - Surgical prophylaxis can usually be discontinued after surgery

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Indication and Duration Example

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 Links: 1. Link to Lexicomp

Dose: 6 mg/kg — 4 mg/kg | 6 mg/kg

Weight Type: Actual | Ideal | Adjusted | Dosing | Order-Specific

Weight: 70 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: Intravenous — Intravenous

Frequency: Every 24 hours — Q24H

For: 14 ○ Doses ○ Hours ◉ Days

Starting: 8/19/2015 — Today | Tomorrow — At: 1330

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: 30 Minutes

Indications:

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

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Dose Optimization Example

- Extended infusion of piperacillin/tazobactam
- Alternate dosing protocols for β-lactams (e.g., cefepime, meropenem)
- Aminoglycoside dosing protocol for cystic fibrosis

Medication Ordered	Interchange With
Cefepime 1g q12hr	Cefepime 1g q12hr[a]
Cefepime 2g q12hr	Cefepime 1g q6hr
Cefepime 2g q8hr	Cefepime 1g q6hr
Cefepime 2g q8hr for "Neutropenic Fever"	Cefepime 2g q8hr*

[a]This dose is only appropriate for community acquired pneumonia not due to *Pseudomonas aeruginosa* or for mild to moderate UTI. If 1g q12hr is ordered for any other indication, dose will be interchanged to 1g q6hr.

Table 5. Cefepime target attainment versus *Pseudomonas aeruginosa*

Breakpoints	S	I	R					
	≤8	16	≥32					
	MIC (mg/L)							
Regimen/infusion	Target %	0.25	0.5	1	2	4	8	16
2g q12/0.5	67	100	98	97	95	79	45	--
2g q8/0.5	67	100	100	100	100	97	91	--
1g q6/0.5	67	100	100	100	99	97	89	--

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IV to PO Conversion

- Considered the “low hanging fruit” of stewardship
- Target antimicrobials with high bioavailability:

Azithromycin	Fluoroquinolones
Clindamycin	Doxycycline
Fluconazole	Linezolid
Metronidazole	

- Example drug cost savings:
  - Levofloxacin: $1 PO vs. $10 IV / day
  - Linezolid: $270 PO vs. $420 IV / day
- Can potentially save on costs of IV line care and/or IV line-related adverse events

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Antibiogram Example (Urinary)

% Susceptible	*E. coli* (N=2014)	*Klebsiella pneumoniae* (N=405)	*Proteus mirabilis* (N=184)	*Pseudomonas aeruginosa* (N= 134)	Enteric (Lactose-Fermenting) Gram-neg rods	Non-lactose Fermenting Gram-neg rods (oxidase neg)
Amikacin	99.7	100	98.9	95.5	99.8	98.6
Ampicillin	58.5	4.4	84.8	XX	47.5	76.9
Ampicillin/sulbactam	61.5	84.9	92.9	XX	64.4	86.5
Cefepime	97.3	99.3	100	84.7	97.4	100
Cefuroxime (parenteral)	91.7	93.8	100	XX	89.3	91.3
Ceftriaxone	95.9	98.1	100	XX	94.3	98.4
Cephalothin	29.5	87.7	85.6	XX	37.3	71.2
Ciprofloxacin	79.6	97.5	69	68.9	82.6	67.8
Levofloxacin	79.9	98.5	73.9	66.4	83.4	72.6
Ertapenem	100	100	100	XX	99.8	100
Gentamicin	92.9	99	91.3	75.4	94.2	90.4
Imipenem	99.8	99.8	23.4	76.7	99.3	22.6
Meropenem	99.9	100	100	76.1	99.8	99.5
Nitrofurantoin	97.7	43.3	0	XX	86.2	0.5
Piperacillin/tazobactam	97.8	98	99.5	86.8	96.7	99.5
Tobramycin	92.9	99.7	91.3	96	94.3	89.9
TMP/SMX (Bactrim)	77.8	90.4	78.3	XX	80.2	77.4

XX=not generally susceptible

AP

Selecting a Strategy

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

ASAP

How to Select Cases for ASP Review

- High cost / novel agents
- Broad-spectrum agents (e.g., carbapenems)
- High use agents
- High rates of adverse events (e.g., colistin)
- Site / type of infection (e.g., CLABSI, *C difficile*)
- Resistance profile (e.g., MRSA, CRE)
- Syndromic approach (e.g., asymptomatic bacteriuria)
- Unnecessary double coverage (e.g., anaerobes)

ASAP

Metrics to Measure ASP Activities

Measurement for usage

- Days of therapy (DOT)
- Not defined daily dose (DDD)

Measurement for expenditure

- Costs based on administration or prescriptions
- Not based on purchasing data

Measurement for clinical outcomes

- Process measure: compliance to clinical pathways
- Outcome measure: length of stay, number of *C difficile* infections

ASAP

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

Other Metrics to Show ASP Efforts

- Time spent reviewing antibiotics
- Number of people educated about ASP, appropriate antibiotic use
  - Prescribers
  - Nurses
  - Patients
- Number of internal and external outreach activities
- Other outcome measures
  - Number of antibiotic-associated adverse drug events
  - Antibiotic resistance rate over time

ASAP

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-, microbiology-, and population-based strategies

ASAP

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

ASAP

Assessment Question 2

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

A. Limit pharmacy 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 an advantage of prospective audit and feedback as a stewardship strategy?

A. Educational opportunity for prescribers

B. Results in decreased antibiotic use

C. Does not cause delays in starting therapy

D. All of the above

ASAP

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