Practical Strategies for Antibiotic Stewardship in LTCFs

Christine Smyth, RN, BSN, University of San Francisco MPH Candidate

San Francisco Department of Public Health

Communicable Disease Control and Prevention Program

POPULATION HEALTH DIVISION
SAN FRANCISCO DEPARTMENT OF PUBLIC HEALTH
DISEASE PREVENTION & CONTROL

Learning Objectives

- Define antibiotic stewardship and explain its importance in long term care facilities and in the greater whole of public health
- Recognize components of successful antibiotic stewardship programs
- Explain the difference between urinary tract infection and asymptomatic bacteriuria

Note: Each health care facility should review guidance documents and create a facility-specific antibiotic stewardship plan. Evidence-based best practices are presented here for adaptation to individual facilities and patient care situations based on professional judgement.

What is antibiotic stewardship (AS)?

- Coordinated efforts to promote appropriate use of antimicrobials

- Goals:
  - Improve patient outcomes
  - Decrease antimicrobial resistance
  - Decrease the spread of drug-resistant organisms

(Source: Association for Professionals in Infection Control and Epidemiology [APIC], n.d.)

Why is AS so important?

- Multi-drug resistant organisms (MDROs) are a global problem

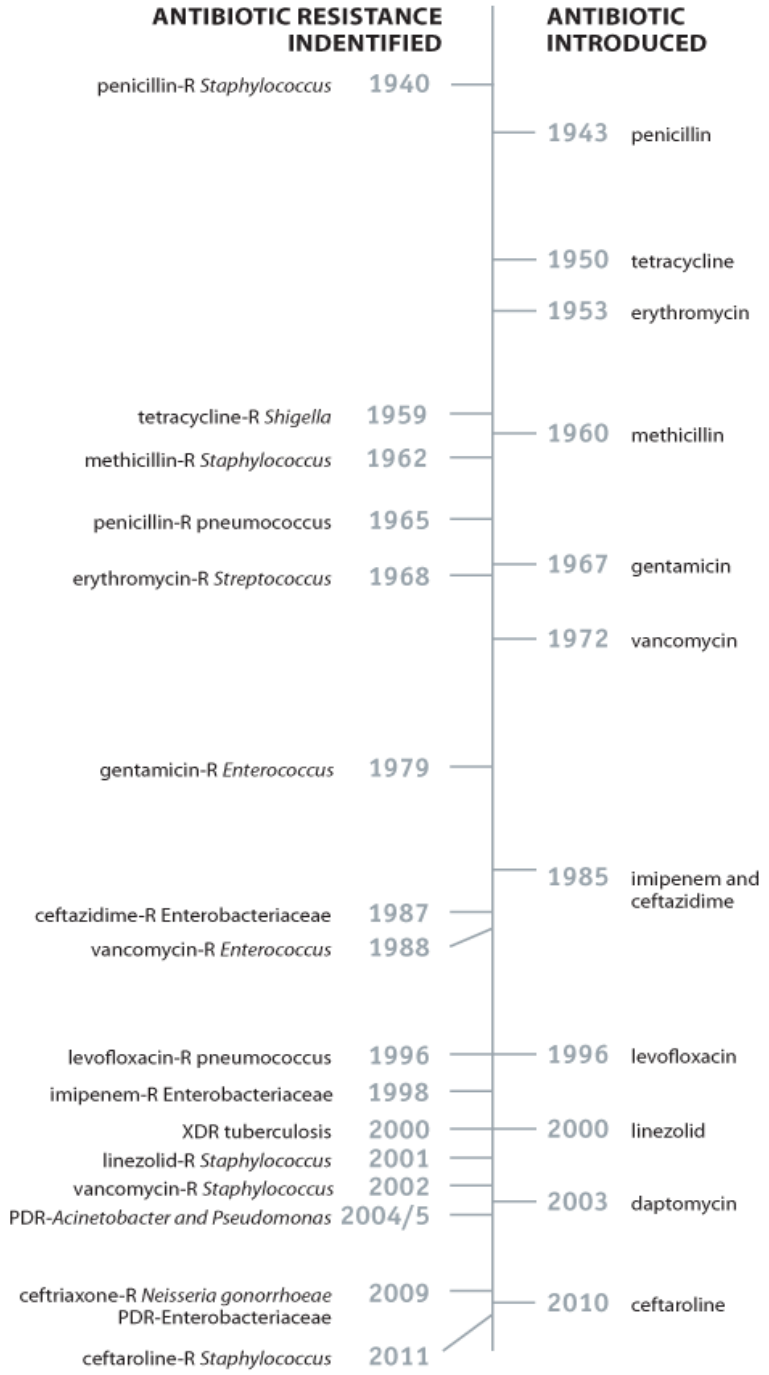
- In the United States, at least two million people are infected each year with an antibiotic-resistant bacteria

- Antimicrobial resistance accelerated by:
  - Overuse and inappropriate use

- Antibiotics are one of the most commonly prescribed medications, but up to 50% of antibiotics are inappropriately prescribed

(Sources: APIC, n.d.; Centers for Disease Control and Prevention [CDC], 2017a; (McKissick,2009; World Health Organization [WHO], 2015)

History of Antibiotics



POPULATION HEALTH DIVISION
SAN FRANCISCO DEPARTMENT OF PUBLIC HEALTH
DISEASE PREVENTION & CONTROL

(Source: CDC, 2013)

AS in Long Term Care Facilities (LTCFs)

- Large portion of the U.S. population is aging
- 380,000 people in LTCFs die of infections in the U.S. each year
- Chronic diseases and functional impairments predispose residents of LTCFs to infection
- Congregate settings contribute to high risk for transmission

(Sources: CDC, 2017b; Federal Interagency Forum on Aging-Related Statistics [FIFARS], 2016; Strausbaugh, Sukumar, Joseph, and High, 2003)

Antibiotic Use in LTCFs

- An estimated 75% of antibiotic prescriptions in LTCF population are inappropriate
- Unnecessary prescriptions for antibiotics predispose residents to the adverse effects associated with antibiotics- including, but not limited to, drug-resistant organisms.
- Increase in adverse conditions related to antibiotics in facilities with high prescription rates

(Source: CDC, 2017c; Daneman et al., 2015; Loeb et al., 2001)

AS Activities are required in LTCFs

- **Centers for Medicare and Medicaid**
  - LTCFs must have an infection prevention and control program that includes an Antibiotic Stewardship Program (ASP) and at least one designated Infection Preventionist (IP)
  - The ASP must include:
    - Antibiotic use protocols
    - Systems to monitor antibiotic use
    - Record of incidents identified under the infection prevention and control program (IPCP) with documentation of corrective action taken
  - Facilities must provide mandatory training on IPCP, including:
    - Written standards
    - Policies and procedures
  - Deadline: November 28, 2017

(Source: U.S. Department of Health and Human Services [HHS], 2016)

AS Activities are required in LTCFs

- **California SB 361**
  - Skilled nursing facilities required to adopt and implement an antimicrobial stewardship policy on or before January 1, 2017
  - Must be in line with antimicrobial stewardship guidelines from the CDC, CMS, the Society for Healthcare Epidemiology of America, or a similar professional organization.

- Regulations specify certain components which must exist as part of an IPCP and ASP, but how the ASP is implemented in LTCF largely left to discretion of LTCF considering:
  - Structure of LTCF
  - Available resources

(Source: S. 361: Antimicrobial stewardship: Education and policies, 2015-2016)

Developing an ASP

- Research regarding successful implementation of antibiotic stewardship in LTCFs is limited, but best practices are emerging.
- Use CDC Core Elements
- Utilize quality improvement approaches
- Consider trend toward value based purchasing
- Intervention approaches include:
  - Educational interventions
  - Pharmacist led interventions
  - Consultation services
  - Intervention and Feedback
  - Multifaceted Interventions
  - **Infection Specific Interventions**

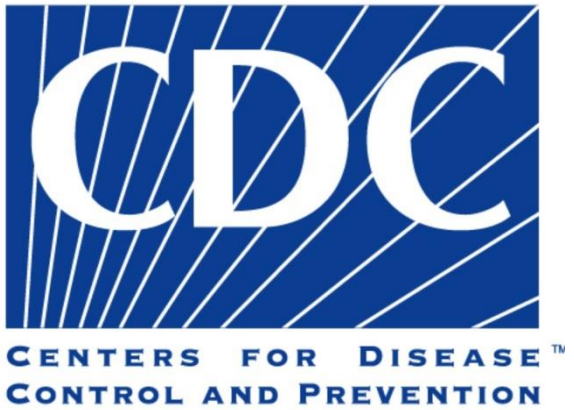
(Sources: Crecelius, 2014; HHS, 2002 Nace et al., 2014; Patel, 2017; Pharmacy OneSource, 2016

)

POPULATION HEALTH DIVISION
SAN FRANCISCO DEPARTMENT OF PUBLIC HEALTH
DISEASE PREVENTION & CONTROL

Core Elements of Antibiotic Stewardship in LTCFs

- CDC Recommendations
  - Leadership Commitment
  - Accountability
  - Drug expertise
  - Action
  - Tracking
  - Reporting
  - Education



(Source: CDC, 2015b)

Colonization vs. Infection

- Colonization is asymptomatic presence of bacteria; infection is symptomatic.
- If an infection develops, it is usually from colonizing bacteria
- Colonizing bacteria can be spread patient-to-patient, even though they are not causing symptoms
- Colonization is often NOT treated with antibiotics
- It can be hard to tell the difference between colonization and infection; colonized sites often mistaken as infected:
  - Urine, Respiratory samples, Wound, and GI (C.diff).

(Source: Doron & Beaulac, 2017)

Practical Strategies for Antibiotic Stewardship in LTCFs

- Establish facility policies for surveillance, diagnosis, and treatment of common infections
- Should be a team-based effort with emphasis on comprehensive patient assessment and interdisciplinary communication
- Education to providers, patients, and their families can support the optimal use of antibiotics and prevent infections or adverse outcomes.
- Coordinate efforts to promote and adopt principles of responsible prescribing and use globally

(Source: CDC, 2017c, Roos, 2017)

Criteria for Surveillance, Diagnosis, and Treatment of Infections

- McGeer Criteria (revised)
  - Surveillance definitions are highly specific for benchmarking across facilities
  - Revised McGeer criteria often applied retrospectively to review and count cases
  - Not very useful for diagnosis or necessity of treatment.

- Loeb Criteria
  - Establish minimum criteria that should be present before initiating antibiotics
  - Useful for guiding patient care and clinical practice

(Sources: Loeb et al., 2001; Nace, Drinka, & Crnich, 2014)

Applying the Loeb Criteria

- Loeb Criteria is applied prospectively, in “real time” to identify cases in which antibiotic initiation is appropriate in LTCF

- Loeb Criteria developed for:
  - **Urinary Tract Infections (UTIs)**
  - Skin and Soft-Tissue Infections
  - Respiratory Infections
  - Fever of Unknown Origin

(Sources: Loeb et al., 2001; Nace et al., 2014)

Apply clinical criteria in these situations

- Symptoms are acutely worse (e.g. not chronic cough or urinary urgency)
  - Changes in baseline are key
- Alternative causes of symptoms have been ruled out (e.g. dehydration or medication)
- Always consider complete clinical presentation and microbiologic or radiologic information available
  - Do not identify infection based on one piece of evidence
    - Microbiologic and radiologic findings should NOT be sole criteria to define an infection (a positive culture could be colonization!)
    - Compatible signs and symptoms should also be present

(Source: Stone et al., 2012)

When to properly use antibiotics for UTI

- UTIs are the most common infection found in residents of LTCFs and the most common reason for antibiotic prescriptions in LTCFs
- Asymptomatic bacteriuria is common in elderly LTCF residents
- Asymptomatic bacteriuria in elderly does NOT need to be treated with antibiotics
- Treatment of uncomplicated UTI ranges from $112- $172; $676 for nosocomial catheter-related UTI

(Sources: Loeb et al., 2001; Nace et al., 2014; Rosenberg, 1999; Rummukainen et al., 2012; Saint, 2000)

Prevalence of Asymptomatic Bacteriuria

Population	Prevalence, %	Reference
Healthy, premenopausal women	1.0–5.0	[31]
Pregnant women	1.9–9.5	[31]
Postmenopausal women aged 50–70 years	2.8–8.6	[31]
Diabetic patients		
Women	9.0–27	[32]
Men	0.7–11	[32]
Elderly persons in the community[a]		
Women	10.8–16	[31]
Men	3.6–19	[31]
Elderly persons in a long-term care facility		
Women	25–50	[27]
Men	15–40	[27]
Patients with spinal cord injuries		
Intermittent catheter use	23–89	[33]
Sphincterotomy and condom catheter in place	57	[34]
Patients undergoing hemodialysis	28	[28]
Patients with indwelling catheter use		
Short-term	9–23	[35]
Long-term	100	[22]

[a] Age, ≥70 years.

(Souce: Nicolle et al., 2005)

Choosing Wisely®

An initiative of the ABIM Foundation

AMDA – The Society for Post-Acute and Long-Term Care Medicine™

THE SOCIETY FOR POST-ACUTE AND LONG-TERM CARE MEDICINE™

Ten Things Physicians and Patients Should Question

Don't obtain a urine culture unless there are clear signs and symptoms that localize to the urinary tract.

American Geriatrics Society

AGS Geriatrics Healthcare Professionals

Leading Change. Improving Care for Older Adults.

Five Things Physicians and Patients Should Question

Don't use antimicrobials to treat bacteriuria in older adults unless specific urinary tract symptoms are present.

POPULATION HEALTH DIVISION
SAN FRANCISCO DEPARTMENT OF PUBLIC HEALTH
DISEASE PREVENTION & CONTROL

(Sources: American Board of Internal Medicine [ABIM], 2013a; ABIM, 2013b)

Urinary Tract Infections vs. Asymptomatic Bacteriuria

UTI

- Fever
- Dysuria
- New onset frequency, urgency, incontinence
- Suprapubic pain
- Changes in character of urine
- Bacteriuria at least 10^5 colony-forming units/mL of no more than 2 species of microorganisms
- Changes in functional and/or mental status
- Costovertebral angle tenderness
- If catheter present:
  - Recent catheter trauma, obstruction, or purulent drainage around the catheter
  - Rigors
  - New hypotension
  - Bacteriuria at least 10^5 colony-forming units/mL of any organism
  - Focal tenderness or swelling of the epididymis or prostate

ASB

- Can present as odorous and cloudy urine
- NOT accompanied by dysuria, increased urinary frequency or urgency, fever, flank pain, or other symptoms of irritation of urethra, bladder, or kidney

*ASB does not need to be treated with antibiotics in elderly

(Leduc, 2014; Loeb et al., 2001; Stone et al., 2012)

Identifying Infections in the Elderly

- Infection presentation in elderly may be atypical, especially if cognitive impairment exists
- Therefore, many clinicians consider nonspecific symptoms when diagnosing UTIs in this population
  - Fever
  - Functional decline
  - Behavioral changes
  - Mental status changes
- Nonspecific symptoms can be caused by other infectious or noninfectious conditions, therefore, they should NOT generally be used to diagnose a UTI in the absence of other findings

(Source: Nace et al. 2014)

Causes of Mental Status Changes

D: Drugs, Dementia, Discomfort (BEERS Criteria; behavioral problems from dementia; pain, insomnia, depression)

E: Eyes, Ears, Environment (Sensory deprivation- how is noise and lighting level? Do they have their glasses and/or hearing aids?)

L: Low oxygen level

I: Infection

R: Retention (urinary retention, constipation)

I: Ictal States (seizure disorder)

U: Underhydration/Nutrition (consider checking a BMP)

M: Metabolic causes (how is blood sugar? sodium abnormalities?)

(S): Subdural hematoma (head trauma-have they fallen recently?)

Sources: Flahery & Tumosa, n.d.

Challenges for clinical assessment of infection in the elderly

- Lower baseline body temperature and blunted response to infection makes identifying fever more difficult

- Communication difficulties related to cognitive impairment, hearing difficulty, and speech difficulty can hinder ability to share history and symptoms

- Despite these challenges, research shows that using stricter criteria does not jeopardize patient safety.

(Leduc, 2014; Norman, 2000)

UTI-No indwelling catheter
(including intermittent catheterization or condom catheters)

- Minimum criteria to initiate antibiotics:
  - Dysuria alone

    or
  - Fever (>37.9 C or 1.5 C increase above baseline temperature) **and at least one of the following:**
    - New or worsening urgency
    - Frequency
    - Suprapubic pain
    - Gross hematuria
    - Costovertebral angle tenderness
    - Urinary incontinence

*May also use IDSA guideline:
1) Single oral temperature > 37.8°C
or
2) Repeated oral temperatures greater than 37.2°C or rectal temperature than 37.5°C
or
3) A single temperature greater than 1.1°C over baseline from any site

(Loeb et al., 2001)

UTI- Indwelling catheter
(including indwelling Foley catheter or a suprapubic catheter)

- Minimum criteria to initiate antibiotics:
  - Presence of at least one:
    - Fever (>37.9 C or 1.5 C increase above baseline)
    - New costovertebral tenderness
    - Rigors with or without identified cause
    - New onset of delirium

*May also use IDSA guideline:
1) Single oral temperature > 37.8°C
or
2) Repeated oral temperatures greater than 37.2°C or rectal temperature than 37.5°C
or
3) A single temperature greater than 1.1°C over baseline from any site

(Loeb et al., 2001)

Minimum Criteria to Initiate Antibiotics- UTI
(no indwelling catheter, includes intermittent catheterization and condom catheter)

Nonspecific changes noted in patient:
Fever
Functional decline
Behavioral changes
Mental status changes

Does patient have acute dysuria?

YES

-Document assessment and vital signs
-Using SBAR, call and communicate new finding to the MD, PA, or NP to obtain order for urine culture

Antibiotics may be ordered empirically or based on results of culture

Obtain urine culture

Urine culture is POSITIVE:
Voided urine: At least 10^5 cfu/mL of no more than 2 species of microorganisms
In-and-out cath: At least 10^2 cfu/mL of any number of organisms (Stone et al., 2012)

- If empiric therapy started, notify provider of results, ensure antibiotic consistent with sensitivity report
- If antibiotics not yet started, obtain order to start antibiotics

NO

Does patient have a fever or leukocytosis?
(>37.9°C [100°F] **or** 1.5°C [2.4°F] increase above baseline temperature)*

YES

Does patient have one of the following?**
New or worsening:
- Urgency
- Frequency
- Suprapubic pain
- Gross hematuria
- Costovertebral angle tenderness
- Urinary incontinence

YES

Antibiotics may be ordered empirically

-Document assessment and vital signs
-Using SBAR, call and communicate new finding to the MD, PA, or NP to obtain order for urine culture

Urine culture is NEGATIVE:

-Contact provider to STOP antibiotics.
-Continue to monitor the patient (including VS, I&O)
- Communicate findings to provider
- Consider alternative cause for symptoms

NO

-Continue to monitor the patient (including VS, I&O)
-Using SBAR, communicate findings to MD, PA, or NP and consider alternative cause for nonspecific symptoms

NO

-Continue to monitor the patient (including VS, I&O)
-Increase fluid intake if possible
- Using SBAR, communicate findings to provider
- Consider alternative causes for fever and nonspecific symptoms

** In the absence of fever or leukocytosis, a single urinary symptom other than dysuria is a less specific indication of UTI. However, if two or more of these urinary symptoms are present in the absence of fever or leukocytosis, a urine culture may help with diagnosis.

POPULATION HEALTH DIVISION
SAN FRANCISCO DEPARTMENT OF PUBLIC HEALTH
DISEASE PREVENTION & CONTROL

Note: Each health care facility should review guidance documents and create a facility-specific antibiotic stewardship plan. Evidence-based best practices are presented here for adaptation to individual facilities and patient care situations based on professional judgement.

Situation
Background
Assessment
Request

Sources: High et al., 2009; Institute for Healthcare Improvement [IHI], 2017; Leduc, 2014; Loeb, et al., 2001; Stone et al., 2012

Minimum Criteria to Initiate Antibiotics- UTI (with indwelling catheter)

POPULATION HEALTH DIVISION
SAN FRANCISCO DEPARTMENT OF PUBLIC HEALTH
DISEASE PREVENTION & CONTROL

Nonspecific changes noted in patient:
Fever
Functional decline
Behavioral changes
Mental status changes

Does patient have at least one of the following?

- Fever(>37.9°C [100°F] **or** 1.5°C [2.4°F] increase above baseline temperature)*
- ***New*** costovertebral tenderness
- Rigors (shaking chills)
- ***New*** onset delirium or acute functional decline
- ***New*** hypotension
- ***New*** suprapubic pain
- Purulent discharge from around catheter
- Acute pain, swelling, or tenderness at testes, epididymis, or prostate.
- Acute change in mental status or acute functional decline with no alternate diagnosis and leukocytosis.

YES → **Antibiotics may be ordered empirically**
-Document assessment and vital signs
-Using SBAR, call and communicate new finding to the MD to obtain order for urine culture.
-Consider alternative cause for symptoms

→ Change catheter to obtain specimen

→ Urine culture is POSITIVE:
At least 10^5 cfu/mL of any organism
(Stone et al., 2012)

→ Contact provider to communicate results and ensure antibiotic ordered is consistent with sensitivity report

→ Urine culture is NEGATIVE

→ - Continue to monitor the patient (including VS, I&O)
- Communicate findings to provider; discuss stopping antibiotic
-Consider alternative cause for symptoms

NO → - Continue to monitor the patient (including VS, I&O)
- Communicate findings to provider
- Consider alternative cause for symptoms

*May also use IDSA guideline:
1) Single oral temperature > 37.8°C
or
2) Repeated oral temperatures greater than 37.2°C or rectal temperature than 37.5°C
or
3) A single temperature greater than 1.1°C over baseline from any site

Note: Each health care facility should review guidance documents and create a facility-specific antibiotic stewardship plan. Evidence-based best practices are presented here for adaptation to individual facilities and patient care situations based on professional judgement.

Situation
Background
Assessment
Request

Sources: High et al., 2009, IHI, 2017; Loeb, et al., 2001; Stone et

Case Study

- "Mrs. Smith is a 92-year-old female with stage 5 Alzheimer's disease. She resides in a nursing facility because of severe knee arthritis, which has prevented her from walking for the past year. In addition to the arthritis and dementia, she suffers from depression and advanced glaucoma. The nursing home staff contact the on-call physician one weekend after noting the resident's urine is dark and concentrated. The nursing staff also reports the resident is slightly more confused. The resident is afebrile with normal vitals and has no urinary catheter in place. The nursing staff verbalizes a request to "send off a urine." The on-call physician complies by ordering a urine analysis and culture. No antibiotic is started. . ." (Nace, et al., 2014, p. 133)

Case Study

- ". . .Two days later the primary attending is called with the urine results, having little knowledge of the clinical situation surrounding the original test order. The resident has been stable with no fever or urinary symptoms. The urine analysis is remarkable for moderate pyuria and 1+ nitrites. The culture grows greater than 100,000 CFU of a gram negative rod for which an antibiotic is ordered. . . .One week later, the patient continues to have dark urine but remains stable with no fever or urinary symptoms. The resident's family now requests "a repeat urine to make sure the infection has resolved." (Nace, et al., 2014, p. 133)

Remember

- A urine culture should always be obtained to r/o UTI and assist in antimicrobial selection
- Empiric antibiotic therapy may help to relieve acute dysuria, but for other symptoms (e.g. urgency, frequency, or incontinence), consider awaiting culture results before initiating antibiotics.
- Foul smelling, cloudy urine is **not** generally an indication to start antibiotics
- Asymptomatic bacteriuria should **not** be treated with antibiotics in the elderly

(Loeb et al., 2014)

Resources for Creating Your ASP

- CDC's Core Elements of Antibiotic Stewardship for Nursing homes
  - Includes guidance for policy and practice actions, checklist of core elements, ways to measure antibiotic prescribing and use
  - Provides fact sheets that can be presented to residents and families
  - Provides handouts and infographics for medical leaders and administrators

https://www.cdc.gov/longtermcare/prevention/antibiotic-stewardship.html

- Agency for Healthcare Research and Quality
  - Toolkits for implementing and sustaining ASP
    - Including infection specific programs, information on how to work with laboratories and obtain an antibiogram, and information on engaging residents and families

https://www.ahrq.gov/nhguide/index.html

Resources for Creating Your ASP

Citation	Sample/ Setting	Intervention	Findings
Doernberg, S. B., Dudas, V., and Trivedi, K. K. (2015). Implementation of an antimicrobial stewardship program targeting residents with urinary tract infections in three community long-term care facilities: a quasi-experimental study using time-series analysis. Antimicrobial Resistance and Infection Control, 4(54). doi: 10.1186/s13756-015-0095-y	3 Community LTCFs	-ASP team comprised of an ID clinical pharmacist and ID physician -ASP team conducted chart audits and provided feedback to treating physicians -ID pharmacist visited facilities weekly to identify residents receiving abx for UTI -ID pharmacist and ID physician then consulted and made recommendations based on Loeb criteria -ASP team communicated recommendations to Treating physician via phone or fax	-During pre-intervention phase, only 8% of residents started on abx for UTI met the Loeb criteria -Once ASP initiated, an immediate 26% decrease in abx prescriptions for UTIs, 9% change in trend from pre-intervention phase to intervention phase -After initial decrease, rate of abx prescriptions continued to decrease 6% per month throughout intervention period
Leduc, Andrée (2014). Reducing the treatment of asymptomatic bacteriuria in seniors in a long-term care facility. Canadian Nurse, 110(7), 25-30.	182-bed complex care facility	-Self-learning package and education sessions provided to nursing staff with information on risk factors for UTI, typical s/s of UTI, practices to prevent UTI, tips for collecting urine samples. Also included definitions for bacteriuria, pyuria, ASB. -Handout provided to healthcare aides -Clinical pathway introduced after education sessions and staff encouraged to use if they suspected a resident had a UTI -Importance of nursing staff communicating guidelines to physicians, providing full clinical picture of resident also stressed -Clinical pathway introduced to physicians six months after introduction to nursing staff	-Total number of UTIs treated with abx decreased by 36% -Number of UTIs treated only on basis of urine dipstick decreased from 62% to 38% -Communication between nurses and physicians improved -Physicians noted to be regularly asking about residents experiencing typical UTI symptoms, some physicians not treating residents if they were not symptomatic
McMaughan, D. K., Nwaiwu, O., Zhao, H., Frentzel, E., Mehr, D., Imanpour, S., . . . Phillips, C. D. (2016). Impact of a decision-making aid for suspected urinary tract infections on antibiotic overuse in nursing homes. BioMed Central Geriatrics, 16(81). doi: 10.1186/s12877-0160255	12 nursing homes	-Decision making aid for UTI management based on High criteria, Loeb criteria, clinical practice guidelines from IDSA; provided alternatives to antibiotic use when symptoms not present -Nursing homes divided into three groups of four: -decision-making aid with high intensity training -decision making aid with low intensity training -control group	-Decreased abx prescriptions for ASB in low and high intensity training groups compared to control -Higher level of communication ability increased odds of abx prescription being written -Incontinence increased odds of abx prescription being written

Resources for Creating Your ASP

Citation	Sample/ Setting	Intervention	Findings
Rummukainen, M.-L., Jakobsson, A., Matsinen, M., Järvenpää, S., Nissinen, A., Karppi, P., & Lyytikäinen, O. (2012). Reduction in inappropriate prevention of urinary tract infections in long-term care facilities. American Journal of Infection Control, 40, 711-714	64 LTCFs	-District level infection control (IC) team comprised of ID consultant, IC nurse, geriatrician -Team visited LTCFs over one year period, conducted structured interviews with head nurses and general practitioners regarding patient population, ongoing systemic antimicrobials, and diagnostic practices for UTI -After visits a regional guideline regarding use of abx in LTCFs was published -Nurse leaders of units sent f/u questionnaire each year for 3 years after last site visit to evaluate pt population and ongoing systemic antimicrobials	-Prior to intervention, authors found UTIs commonly diagnosed based on general and local symptoms - At baseline 14.5% of residents received prophylactic abx for UTI. Decreased to 7.8% after intervention.
Trautner, B. W., Grigoryan, L., Petersen, N. J., Hysong, S., Cadena, J., Patterson, J. E., & Naik, A. D. (2015). Journal of the American Medical Association Internal Medicine, 175(7), 1120-1127. doi: 10.1001/jamainternmed.2015.1878	Inpatients and patients in long-term care wards	-Kicking CAUTI: The No Knee-Jerk Antibiotics Campaign -campaign utilized audit and feedback and a streamlined diagnostic algorithm -Intervention on long-term care wards aimed at nurses, physician assistants, and staff physicians -Case-based audit and feedback provided to clinicians to train them on use of algorithm -Workshops also provided -At control site, healthcare professionals received didactic overview of guidelines using traditional teaching methods	-At intervention sites, overall rate of urine cultures ordered decreased from 41.2 per 1000 bed days at baseline to 23.3 per 1000 bed days during intervention period -rate of ordered urine cultures continued to drop in the maintenance period to 12.0 per 1000 bed days -At intervention site, overall rate of ASB overtreatment decreased from 1.6 per 1000 bed-days to 0.6 per 1000 bed days from intervention period -dropped to 0.4 per 1000 bed-days in maintenance Period -Rates of ASB overtreatment did not decrease at control site -Rates of CAUTI undertreatment did not change at intervention or control sites -Intervention had more significant effect on long-term care unit

Questions?

References

American Board of Internal Medicine (2013). Choosing Wisely: The Society for Post-Acute and Long-Term Care Medicine, Ten Things Physicians and Patients Should Questions. Retrieved from http://www.choosingwisely.org/societies/amda-the-society-for-post-acute-and-long-term-care-medicine/

American Board of Internal Medicine (ABIM). (2013b) Choosing Wisely: American Geriatrics Society, Ten Things Physicians and Patients Should Question. Retrieved from http://www.choosingwisely.org/societies/american-geriatrics-society/

Association for Professionals in Infection Control and Epidemiology (APIC). (n.d.). *Antimicrobial stewardship*. Retrieved from http://www.apic.org/Professional-Practice/Practice-Resources/Antimicrobial-Stewardship

Centers for Disease Control and Prevention (CDC). (2013). Antibiotic resistance threats in the United States, 2013. Retrieved from https://www.cdc.gov/drugresistance/threat-report-2013/index.html

CDC (2015b). The Core Elements of Antibiotic Stewardship for Nursing Homes. Atlanta, GA: US Department of Health and Human Services. Retrieved from https://www.cdc.gov/longtermcare/pdfs/core-elements-antibiotic-stewardship.pdf

CDC. (2017a). Antibiotic/Antimicrobial Resistance. Retrieved from https://www.cdc.gov/drugresistance/index.html

CDC. (2017b). Nursing Homes and Assisted Living (Long-term Care Facilities [LTCFs]). Retrieved from https://www.cdc.gov/longtermcare/index.html

CDC (2017c). Antibiotic Use in the United States, 2017; Progress and opportunities. Atlanta, GA: US Department of Health and Human Services. Retrieved from https://www.cdc.gov/getsmart/pdf/stewardship-report.pdf

Crecelius, C. (2014). Nursing home value-based purchasing: Here to stay. Caring for the Ages, 15(11), 11. doi: http://dx.doi.org/10.1016/j.carage.2014.10.010

References

Doron, S., & Beaulac, K. (New England QIN-WIO). (2017). Caring for the long term care patient with suspected UTI. [Video webinar]. Retrieved from https://www.youtube.com/watch?v=27Rj6s9sncA&feature=youtu.be

Federal Interagency Forum on Aging-Related Statistics. (August 2016). *Older Americans 2016: Key Indicators of Well Being*. Federal Interagency Forum on Aging-Related Statistics. Washington DC: U.S. Government Printing Office. Retrieved from https://agingstats.gov/docs/LatestReport/Older-Americans-2016-Key-Indicators-of-WellBeing.pdf

Flahery, J. H., & Tumosa, N. (n.d.). Saint Louis University Geriatric Evaluation Mnemonics and Screening Tools. St. Louis, Missouri: Sant Louis University School of Medicine Division of Geriatric Medicine and the Geriatric Research, Education, and Clinical Center St. Louis VA Medical Center. Retrieved from http://aging.slu.edu/index.php?page=slu-gems

High, K. P., Bradley, S. F., Gravenstein, S., Mehr, D. R., Quagliarello, V. J., Richards, C., Yoshikawa, T. T. (2009). Clinical practice guideline for the evaluation of fever and infection in older adult residents of long-term care facilities: 2008 update by the infectious diseases society of America. *Clinical Infectious Diseases, 48*, 149-171. doi: 10.1086/595683

Institute for Healthcare Improvement [IHI]. (2017). Tools: SBAR Toolkit. Retrieved from http://www.ihi.org/resources/Pages/Tools/sbartoolkit.aspx

Leduc, Andrée (2014). Reducing the treatment of asymptomatic bacteriuria in seniors in a long-term care facility. *Canadian Nurse, 110*(7), 25-30.

Loeb, M., Bentley, D. W., Bradley, S., Crossley, K., Garibaldi, R., Gantz, N., . . .Strausbaugh, L. (2001). Development of minimum criteria for the initiation of antibiotics in residents of long-term-care facilities: Results of a consensus conference. *Infection Control and Hospital Epidemiology, 22*(2), 120-124.

McKissick, K. (2009, September 10). Antibiotics. Retrieved from http://www.beatricebiologist.com/2009/09/antibiotics/

References

Nace, D. A., Drinka, P. J., & Crnich, C. J. (2014). Clinical uncertainties in the approach to long term care residents with possible urinary tract infection. *Journal of the American Medical Directors Association, 15*, 133-139.

Nicolle, L. E., Bradley, S., Colgan, R., Rice, J. C., Schaeffer, A., & Hooton, T. M. (2005). Infectious diseases society of America guidelines for the diagnosis and treatment of asymptomatic bacteriuria in adults. Clinical Infectious Diseases, 40(5), 643-654. doi: 10.1086/427507

Norman, D. C. (2000). Fever in the elderly. Clinical Infectious Diseases 31(1), 148-151. doi: https://doi.org/10.1086/313896

Pharmacy OneSource Blog (2016, August 24). Antimicrobial stewardship is crucial for value based purchasing programs. Retrieved from http://blog.pharmacyonesource.com/antimicrobial-stewardship-is-crucial-for-value-based-purchasing-programs

Roos, R. (2017, July 28). CDC antibiotics report call for all-out stewardship efforts. Retrieved from http://www.cidrap.umn.edu/news-perspective/2017/07/cdc-antibiotics-report-calls-all-out-stewardship-efforts

Rosenberg, M. (1999) Pharmacoeconomics of treating uncomplicated urinary tract infections. *International Journal of Antimicrobial Agents, 11* (3-4), 247-251. doi: https://doi.org/10.1016/S0924-8579(99)00024-2

Rummukainen, M.-L., Jakobsson, A., Matsinen, M., Järvenpää, S., Nissinen, A., Karppi, P., & Lyytikäinen, O. (2012). Reduction in inappropriate prevention of urinary tract infections in long-term care facilities. *American Journal of Infection Control, 40*, 711-714

References

S. 361: Antimicrobial stewardship: Education and policies. (2015-2016). Retrieved from https://www.cdph.ca.gov/services/boards/Documents/HSC1250_55.pdf

Saint, S. (2000). Clinical and economic consequences of nosocomial catheter-related bacteriuria. *American Journal of Infection Control, 28*(1), 68-75. doi: https://doi.org/10.1016/S0196-6553(00)90015-4

Strausbaugh, L. J., Sukumar, S. R., Joseph, C. L., & High, K. P. (2003). Infectious disease outbreaks in nursing homes: An appreciated hazard for frail elderly persons. Clinical Infectious Disease, 36(7), 870-876. doi: https://doi.org/10.1086/368197

Stone, N., Muhammad, A. S., Calder, J., Crnich, C. J., Crossley, K., Drinka, P. J., . . .Simor, A. (2012). Surveillance definitions of infections in long-term care facilities: Revisiting the McGeer criteria. *Infection Control Hospital Epidemiology, 33*(10), 965-977. doi: 10.1086/667743

U. S. Department of Health and Human Services [HHS] (2016). Medicare and Medicaid programs; Reform of requirements for long-term care facilities. *Federal Register, 81*(192). Retrieved from https://www.federalregister.gov/documents/2016/10/04/2016-23503/medicare-and-medicaid-programs-reform-of-requirements-for-long-term-care-facilities

HHS. (2002). Evaluating the impact of value-based purchasing: A guide for purchasers. Retrieved from http://archive.ahrq.gov/professionals/quality-patient-safety/quality-resources/value/valuebased/evalvbp1.html

World Health Organization (WHO). (2015). *Antimicrobial resistance* [Fact sheet N 194]. Retrieved from http://www.who.int/mediacentre/factsheets/fs194/en/