Strategies Toward Antibiotic Stewardship in Long-Term Care"

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Conflicts of Interest

- Grant, speaker and consultant support: Pfizer, Sanofi, Seqirus,
- Grant support: CDC,* NIAID
- Consultant: American Healthcare Association, Catapult Consultants, Gerontologic Society of America, Healthcentric Advisors QIN, Janssen, Longevoron, Merck, Novavax, Novartis
- DSMB: Longevoron, NIA
- SRC: Merck

*** Specific to antibiotic stewardship; remaining relate to QI and vaccines**

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Core Elements for Stewardship

- Leadership- culture and commitment to stewardship, written transparency to residents, families and staff
- Accountability- empower leadership, engage consultant pharmacist through QU for medication review and reporting antibiotic usage data
- Partner with experts in ID, consultant pharmacy, ID pharmacist stewardship certificate training
- Standardize tracking & practices for reporting/intervening with acute change in condition that might not need ATB
- Education, Goal Setting, …

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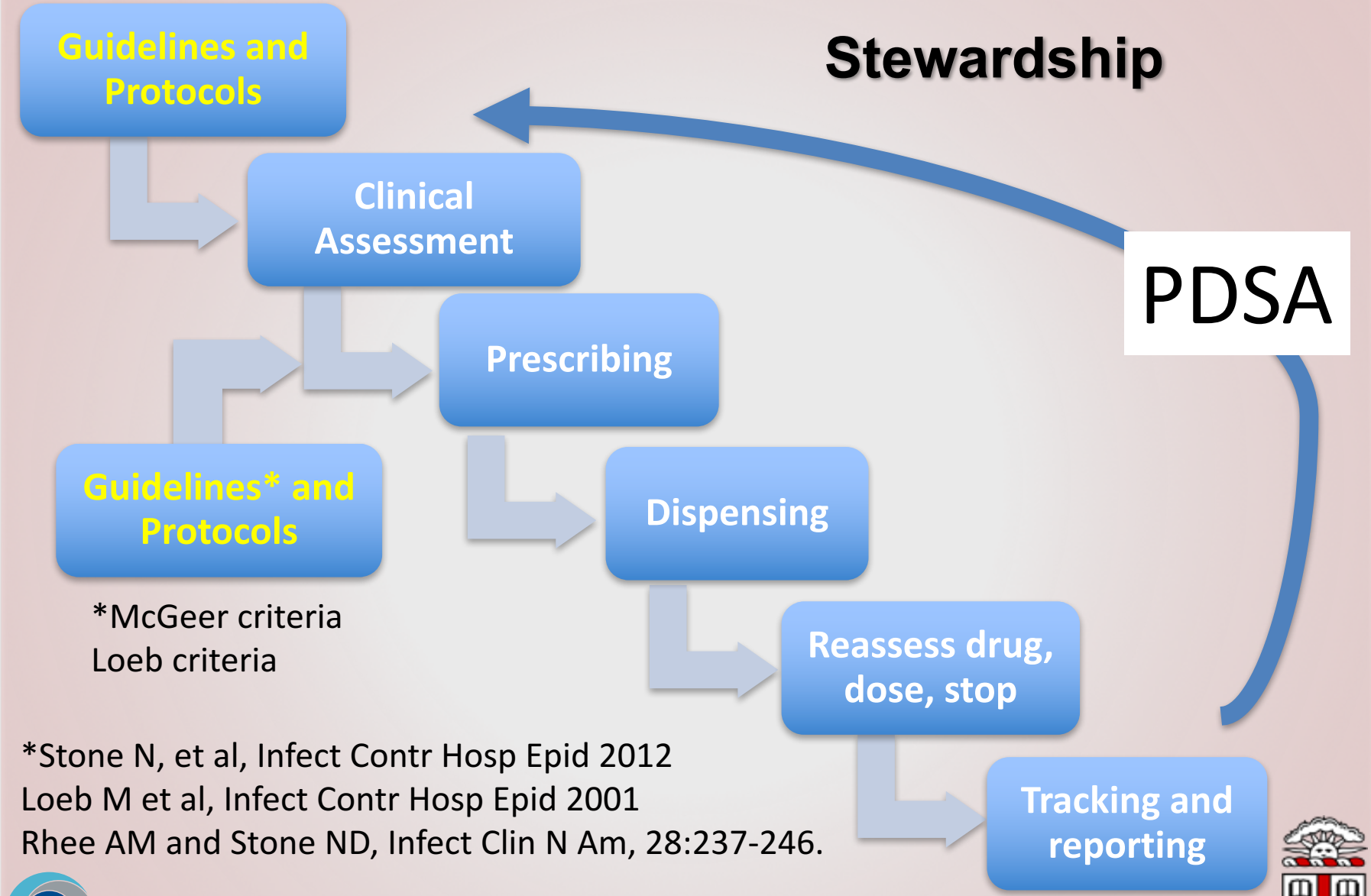
Stewardship



*McGeer criteria
Loeb criteria

*Stone N, et al, Infect Contr Hosp Epid 2012
Loeb M et al, Infect Contr Hosp Epid 2001
Rhee AM and Stone ND, Infect Clin N Am, 28:237-246.

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True or False?

- Antibiotic stewardship should be driven top-down by leadership
- Stewardship means we shouldn't prescribe antibiotics for UTI's
- Stewardship can begin with tracking information to assess performance and behaviors of prescribers

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Objectives in 40 Min!

- URIs in the LTC population:
- Stewardship considerations for diagnosis, prevention…
  - Vaccination, environment, measuring, reporting
- What's your strategy?

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Case 1

- The RN awakens you at 3 AM and reports that your 86 year old NH resident has **temp 38.2°C, RR 18, HR 72 and BP 110/64**. She says **no cough, congestion, wheezing, chills, sweats, SOB, diarrhea or dysuria**. H/O several UTIs treated with antibiotics x two years. **She asks for a UA and to pre-emptively start antibiotics**—cipro the last time—with the idea of stopping if its negative
- **What is it and what do you do?**

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Are there guidelines as to what to do?

- Loeb criteria for assessing fever
  - Minimum criteria for initiating antibiotics
    - GU with and without indwelling catheter
    - Skin and soft tissue
    - LRTI
    - Fever of unknown focus
- McGeer criteria (revised) for LTC
  - All symptoms must be new / acutely worse
  - Alternative causes excluded (hydration, meds, pain, etc.)
  - Need > than any one of labs or symptoms or exam

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RTIs in LTC
Symptoms and etiology

- This is really straightforward
- Can anyone tell me symptoms of upper respiratory tract infections?

URI: Coryza, sore throat, head ache, nasal congestion, tearing, sneezing

LRTI: cough, hacking cough, wheezing, rhonchi, pleuritic chest pain, dyspnea

- Can anyone tell me what are signs of systemic infection?

Fevers, chills, sweats, hyper and hypothermia, productive cough

Malaise, fatigue, myalgia, encephalopathy

Tachypnea, hypoxemia, hypotension, reduced breath sounds

- What causes these symptoms?
- How would infection from a virus differ from bacterial presentation?

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Case 2

- The CNA reports that the resident **isn't behaving normally.** She's 94, and has an oral temperature of **99°F (37.2°C), HR 84, RR 18, O2 sat 96%.** She's able to make needs known, and respiratory virus season is afoot. She denies cough, sore throat, sneezing, fever, chills, sweats, dysuria and flank and suprapubic pain. There are no skin lesions. **The CNA notices the garbage is full of tissues. Someone else in the facility was diagnosed with strep throat.**
- What does she have?

Challenges in Dx: AGE

- Declining immunity (more later) with age
  - Altered presentation of disease (later diagnosis)
  - Reduced immune response to vaccines
- Difficulty in clearing pathogens with advanced age
  - Mucociliary escalator less efficient
  - Cough less forceful
  - Less fever, less impairment of viral replication
- Increase in underlying inflammatory markers
  - Increasingly in a “pro-thrombotic state”
- Change in the way we complain, accept illness
- Physiologic reserve

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AGE + Disease

- Lung disease
  - Affects viral clearance, pulmonary reserve, inflammatory state
- Endocrine disease
  - Affects immune defense mechanisms, physiologic reserve, inflammatory state
- Obesity
  - Affects pulmonary function, underlying inflammation

Biologic Changes with Age

Biologic Change With Age	Clinical Consequence
Reduced IL-2	Reduced T-cell help and symptoms
Reduced T-cell help	Reduced vaccine response (both antibody avidity and quantity)
Reduced IL-6, IFN-α response	Reduced fever
Reduced TNF-α	Reduced malaise and anorexia
Delayed increase and decline in inflammatory cytokines	Delayed symptom onset and resolution; prolonged prothrombotic state
Prothrombotic state	Increased risk from thrombotic outcomes (MI, CVA, etc.)
Increased IL-6 and 8 baseline	Increased delirium from cytokines

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Risk Factors for Pneumonia

- Age
- Immune deficiency
  - E.g., HIV, diabetes, age, hyposplenism, cancer, cancer therapy
- Pulmonary disease (reduced pathogen clearance)
  - Asthma, chronic bronchitis, COPD, age

Case 3

- Ms. M is a 98 year old woman who has said in 2007 and 2010, she wants to be “DNR”, and no aggressive measures should be taken to keep her alive; she’s had “a good and full life.” She now has advanced dementia.
- On March 14, a big **blizzard** came, and the power went out in her facility for several hours. She developed a **cough** and vital signs now report **BP 98/60, 96°F oral, 102 irreg-irreg, 22.**
- What happened?

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Important Causes of Pneumonia

- Aspiration
- Healthcare Acquired Pneumonia*
- Pneumococcal pneumonia*
- TB*
- Legionella
- Influenza*
- RSV* (and other respiratory viruses)

What is the significance of the **?

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Aspiration Pneumonia

- 5-15% of 4.5 million of community acquired, higher % in NH
- 21% 30-day mortality (higher than HAI)
  - Most common cause of death in dementia in LTC (>50%)
  - The majority of residents in continuing care facilities with aspiration pneumonia have neurologic disease with dysphagia
- Clinical: Symptoms plus VS plus O2sat, lung exam, and what position was patient in when aspirating
- Lab: CBC with diff, metabolic panel, ABG?, Lactate vs procalcitonin, CXR, CT if ddx if PE or pleural effusion

Aspiration

- Airway, circulation, suctioning, O2, cardiac monitoring, IV, pulse ox
- Antibiotic
  - **Early, presumptive antibiotics (prophylactic) not recommended**
  - **With recent aspiration, don't treat fever or leukocytosis, even with pulmonary infiltrate**
  - Use antibiotics if
    - Pneumonitis doesn't resolve in <48h
    - SBO (bacteria colonize gastric contents)
    - If on antacids (greater likelihood of gastric bacterial colonization)
    - Piperacillin/tazobactam or imipenem/cilastatin plus vanco
- Steroids--if septic or on long-term steroid treatment

What are the stewardship opportunities here?

Aspiration

- Semi-recumbent: HOB 30-45°
- If dysphagia: speech/swallow eval for diet modification
  - consider: soft diet, smaller bite size, chin tuck and head turned, repeated swallow
- ?Mosapride citrate is gastroprokinetic agent 5 mg 1h ac
- ?Gastric acidity reduction
- G-tubes:
  - Confirm tip of enteral tube before starting feeding by XRay
  - Monitor gastric residuals regularly
  - Limit residuals for bolus feeds to <150 cc before next bolus
- Avoid over-sedation

True/False

1. When someone has aspirated and they develop a fever to 37.6 and leukocytosis of 13.5, initiate empiric antibiotic therapy
2. The best position for eating in someone at high risk for aspiration is with the head of bed elevated to about 60°
3. New rales in a resident who has a new cough should generate a suspicion for aspiration

HAI

- Infection acquired in a healthcare setting, usually preventable; a patient safety threat
- 4% of inpatients had a HAI in 2014, ~10% die
- Within hours of admission, resident's flora changes
  - Infections evident after 48 hours are HAI
  - Infections after discharge are HAI if acquired during stay
- Main issue: CLABSI, CAUTI, SSI, C diff, MRSA bacteremia
- Pneumonia was number one HAI in 2011 (20% of HAI)
- 70% HAI reduction possible with infection surveillance and control

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HAI in US Hospitals 2011

Major Site of Infection	Estimated No.
Pneumonia	157,500
Gastrointestinal illness	123,100
Urinary tract infections	93,300
Primary bloodstream infections	71,900
Surgical site infections (any surgery)	157,500
Other types of infections	118,500
Estimated total number of infections in hospitals	721,800

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Prevention of HAI

- For Pneumonia:
  - What do we do to prevent aspiration?

Semi-recumbent: HOB 30-45°

If dysphagia: speech/swallow eval for diet modification

consider: soft diet, smaller bite size, chin tuck and head turned, repeated swallow

?Mosapride citrate is gastroprokinetic agent 5 mg 1h ac

?Gastric acidity reduction

G-tubes:

Confirm tip of enteral tube before starting feeding by XRay

Monitor gastric residuals regularly

Limit residuals for bolus feeds to <150 cc before next bolus

Avoid over-sedation

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True/False

1. HAI stands for health by aspiration and inspiration
2. Influenza in a long-term care setting is typically an HAI
3. C diff in the long-term care setting is an HAI
4. The two most common situations where antibiotics are inappropriately prescribed for respiratory symptoms are influenza infection and aspiration among long-stay residents

Case 4

- It is March 14, and a **late influenza season**, now peaking here in Massachussets. The facility calls you for the antibiotic you would recommend, now that **five residents in the last week have a new onset cough**, sneezing or runny nose on the second floor. **Two have a low grade fever (37.2° C), and 80% were vaccinated** with influenza early last September, and it's a **"good match."** 70% are up-to-date on pneumococcal vaccine.
- What do you recommend?

Influenza and Pneumococcal Pneumonia

- Adults ≥65 years of age represent:
  - 14% of the US population
  - 63% of influenza-related hospitalizations
  - 90% of influenza-related deaths
  - 64% of the total economic burden of influenza
- The bulk of vaccine preventable burden of pneumonia is caused by influenza and pneumococcal disease
- 8th leading cause of death
- Unbeknownst to most nursing homes leadership, influenza season outbreaks are not uncommon

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P&I Dx

- **Clinically, influenza-like illness (ILI) is a respiratory illness with rapid onset of any respiratory symptom** (sore throat or cough, runny nose)
  - cough can begin dry but become productive, wheezing
  - often malaise, myalgia, headache, and sometimes even diarrhea or anorexia
  - Older adults often fail to mount a fever.
- **Clinically, you can't tell P&I apart**
- Influenza is unlikely when influenza is not circulating in your state.
- **Influenza often precedes pneumococcal and staph pneumonia**
- **Influenza is spread via air and fomite, person to person*****
- Rapid antigen test (nasal or nasopharyngeal swab) is less sensitive and specific in older adults. PCR is highly sensitive and specific...
- If influenza is suspected and treatment clinically indicated, antiviral treatment should begin ASAP and should not wait for the results of testing

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Complications of P&I

- Pneumococcal disease
  - Conjunctivitis, otitis media, sinusitis, exacerbation of bronchitis
  - Pneumonia, purulent pericarditis
  - Vascular invasion leading to
    - Bacteremia
    - Meningitis
    - Osteomyelitis, septic arthritis, myositis, cellulitis, abscess, peritonitis, endocarditis (cardiac infections)
- Influenza
  - Conjunctivitis, otitis, sinusitis, exacerbation of lung disease, pneumonia
  - Heart attack, stroke, atrial fibrillation

P&I

- CBC & diff, ESR, CRP, CXR
- IF considering pneumococcal pneumonia,
  - Consider culture of blood, CSF, pleural fluid or lung aspirate, etc
- IF considering influenza:
  - Consider formal culture
  - Reportability to state
  - Lymphocytosis vs segs on CBC differential early in course

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Influenza

Method	Types Detected	Acceptable Specimens	Test Time	CLIA Waived
Viral tissue cell culture or rapid cell culture	A and B	NP or throat swab, NP or bronchial wash, nasal or endotracheal aspirate, sputum	3-10 days viral culture; 1-3 days rapid cell culture	No
Immunofluorescence, Direct (DFA) or Indirect (IFA) Florescent Antibody Staining	A and B	NP swab or wash, bronchial wash, nasal or endotracheal aspirate	1-4 hours	No
RT-PCR5 and other molecular assays [influenza viral RNA or nucleic acid detection]	A and B	NP swab, throat swab, NP or bronchial wash, nasal or endotracheal aspirate, sputum	Varies (Generally 60 minutes-8 hours)	No
Rapid Molecular Assay [influenza viral RNA or nucleic acid detection]	A and B	NP swab, nasal aspirate, wash, swab	<30 minutes	Yes/No
Rapid Influenza Diagnostic Tests (antigen detection)	A and B	NP swab, (throat swab), nasal wash, nasal aspirate	<30 minutes	Yes/No

Treatment

- Pneumococcal pneumonia
  - PCN G or if resistant, based on susceptibility testing
  - If complicated, additional interventions
- Influenza

Antiviral Agent	Use	Adults
Oseltamivir (Tamiflu®)	**Treatment (5 days)**	75 mg twice daily
	Chemoprophylaxis (7 days)	75 mg once daily
Zanamivir (Relenza®)	**Treatment (5 days)**	10 mg (two 5-mg inhalations) twice daily
	Chemoprophylaxis (7 days)	10 mg (two 5-mg inhalations) once daily
Peramivir (Rapivab®)	**Treatment (1 dose)**	One 600 mg dose, via intravenous infusion for 15-30 minutes
	Chemoprophylaxis	N/A

TB

- 9421 cases, and 2.96 cases per 100k in the US in 2014
- **Airborne and person to person transmission*****
- **Incubates over 2-12 weeks**
- Risk for developing active TB disease is highest in first 2 years after infection and development of positive PPD
- Caused by Mycobacterium tuberculosis
- **Usually in the lungs**, can be anywhere
- **Susceptibility**: Immunocompromised (ex. HIV infection, substance abuse, DM, severe kidney disease, head and neck cancer, medical treatment with corticosteroid, underweight, elderly)

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CDC

TB: Dx

- **Clinical Presentation & Symptoms**: Latent Infection or Disease

Latent TB infection	TB disease
Does not feel sick, no symptoms	Feels sick, bad cough that lasts 3 weeks or longer, pain in the chest, coughing up blood or sputum, weakness or fatigue, weight loss, no appetite, chills, fever, night sweats

- Note: A person with latent TB cannot spread TB bacteria to others whereas a person with TB disease can spread TB bacteria to others

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TB: Dx

- **Diagnostic tests, turnaround time & interpreting results**:

Test	Turnaround time	Results
Mantoux TB skin test (TST)	48-72 hours	**Positive skin test:** Infected. Additional tests needed to determine if latent TB infection or TB disease. **Negative skin test:** Latent TB infection or disease is unlikely.
TB blood test or IGRAs:* 1) QFT-GIT 2) T-Spot		**Positive TB blood test:** Infected. Additional tests are needed to determine if latent TB infection or disease. **Negative TB blood test:** Latent TB infection or TB disease is not likely.
Chest X-ray Sputum smear Sputum culture or PCR	24 h 24-72 h 72 h to months	**Normal CXR and negative sputum:** with negative sputum test had latent TB **Abnormal suspicious for TB or positive sputum smear or culture:** has TB disease

https://www.cdc.gov/tb/topic/testing/tbtesttypes.htm accessed 4Sep2016

Diagnostic Criteria for PPD

Reaction ≥ 5 mm induration	Reaction ≥ 10 mm induration	Reaction ≥ 15 mm of induration
Persons with HIV	Individuals who immigrated in the last 5 years from a high prevalence country	Persons with no risk factors for TB
Recent contacts of patients with known TB	Injection drug users	
Fibrotic changes on CXR consistent with prior TB	Residents and employees of high risk congregate settings, such as nursing homes and other long-term care facilities, homeless shelters, hospitals, etc.	Persons at low risk at start of employment in high-risk setting
Patients with organ transplants and other immunosuppressed patients receiving the equivalent of ≥15 mg/d of prednisone for 1 month or more (risk increases more with higher dose and duration)	Persons with conditions increasing TB risk: silicosis, diabetes mellitus, chronic renal disease, certain hematologic and other malignancies, weight loss of ≥ 10% of ideal body weight, gastrectomy, and jejunoileal bypass	
	Mycobacterial laboratory personnel	

https://www.cdc.gov/mmwr/PDF/rr/rr4906.pdf accessed 4Sep2016

TB Rx

- **Relevant treatment guidelines**:
  - http://www.cdc.gov/tb/topic/treatment/ accessed 4 Sep 2016
- **Stages of disease:**
  - Latent TB: Consider treatment to prevent TB disease
    - High priority for latent TB infection Rx: Residents and employees of high-risk congregate settings (e.g., correctional facilities, NHs, homeless shelters, hospitals, and other health care facilities) with a positive IGRA result or a TST reaction of ≥10 mm
  - TB disease: Needs treatment
    - First line of anti-TB agents
    - Several medications typically for 6-9 months
    - Must take as prescribed

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TB: Prevention

- **Acquiring**: Screen with TB skin tests on admission and hire.
- **Spread**: Treat latent infection before it becomes active disease. Plan* for how to handle active disease, i.e. transfer, environmental controls, respiratory protection program.
- **Surveillance:** Track test results and conduct risk based monitoring for TST conversions.
- **Care transition implications**: Monitor community activity.
- **Collaboration opportunities**:
- Complete a TB Risk Assessment with your team.
- Work with local state health department to review your center's program and determine any opportunities for improvement.

https://www.cdc.gov/tb/topic/infectioncontrol/default.htm accessed 4Sep2016

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TB Resources

- **If someone you test in your facility tests positive, call your local or state TB control program for assistance.**
- **Resources:**
  - CDC TB website
  - State TB Control websites
  - CDC publications & products – including patient materials and health care provider tools
- **Additional Reading**:
  - CDC TB Fact Sheets

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T/F

1. TB is spread through the water.
2. Healthcare workers in high-risk settings, such as nursing homes, should be tested for TB at least annually.
3. If an employee or healthcare center resident has TB disease, a contact investigation for contacts should be initiated
4. If a TST tests positive in a newly admitted resident, you should wait at least two weeks before getting a confirmatory test.
5. If a resident has a new diagnosis of tuberculosis and is coughing, he should be placed in a positive pressure room.
6. All staff should have a TST each year.

Influenza Outbreak Control

- **Have a policy for case detection and outbreak control**
- **When a new case of respiratory illness presents:**
  - Consider:
    - Isolated? Do others (residents or staff) have new respiratory sx (cough, sneeze, coryza, sore throat, running eyes, using facial tissues, etc), or are on sick leave?
    - Are there other respiratory viruses circulating in the community?
  - If there is influenza circulating in the state, consider testing for influenza; if any other residents or staff are known to have influenza, consider this to be influenza until proven otherwise
  - Take outbreak control measures with the detection of two new respiratory illnesses with onset only days apart, consider:
    - Isolation of ill residents, cohorting activities at unit/ward level
    - Posting signs to limit visits, screen for illness
    - Systematic chemoprophylaxis and treatment as indicated according to policy and/or guidelines of residents and staff

Case 5

- It's been a hot month of May, and a resident develops a new cough. Flu season is long over. Anything special to consider in the ddx?

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Legionella

- 8000-18000 reported in US annually, 80% through year
  - Outbreaks usually summer or early fall
  - 2nd most common PNA requiring ICU stay
- Transmitted via aerosolized water containing bacteria
  - Incubates 2-10 days
  - No person-to-person spread
- Caused by Legionella (esp. pneumophilia serogroup 1)
  - Most source of over 70 pathogenic serotypes, causes legionnelosis
  - Affects respiratory tract most commony (though can go to liver, spleen, nodes, brain, lymph node
- **Susceptibility**: Age, especially older; immunocompromised (eg. HIV infection, DM, severe kidney disease, cancer, diabetes mellitus, medical treatment with corticosteroid, chronic lung disease

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http://emedicine.medscape.com/article/965492-clinical accessed 4 Sep 2016

Legionellosis Presentation

- Two clinical forms, Pontiac fever and Legionnaires disease.
  - **Pontiac fever**: influenza-like illness with a 1-2 day incubation period, and prominent symptoms of fever, malaise, myalgia, cough, headache.
    - Tends to occur in outbreaks
    - Infection rate >90%
    - Self-limited disease, persisting about 1 week
  - **Legionaires disease**: presents with developing pneumonia after 2-10 incubation accompanied by any of fever, weakness, fatigue, malaise, myalgia and chills
- Respiratory symptoms may lag by a few days, followed by dry cough that can become productive and purulent
  - May have chest pain
  - Neurologic (any of headache, lethargy, confusion, cerebellar ataxia, agitation, stupor) and GI (non-bloody watery diarrhea, nausea, vomiting and abdominal pain) symptoms are prominent

Legionnaires Dx

- Non-specific tests
  - Pneumonia on CXR, unilateral, lower lobes, patchy/alveolar, variable
  - Hyponatremia (SIADH) more common in Legionnaires than other PNAs
  - Transaminitis, mild
  - Highly elevated ESR (>90), ferritin levels (2x normal)
  - Hypophosphatemia (only respiratory infection associated with this)
- Specific tests:
  - Culture from **sputum** (80-100% sensitive and specific), pleural fluid, bronchoalveolar lavage (BAL; best source); takes 3-5 days to grow
  - **Blood** culture
  - **Urine** antigen only detects L pneumophilia serogroup 1; detectable by day 1-3 in 80%; can remain positive for months after resolution from Rx
  - PCR urine and BAL sensitivity ~ culture; but diagnoses other serotypes

Legionella: Prevention

- If 1 definite or 2 possible cases of nosocomial Legionella occurs among residents, need to investigate for a source
- Do routine maintenance of cooling towers and plumbing systems; use sterile water to fill and rinse nebulizers
- Disinfection
  - Superheating water to 70-80° C with flushing of distal sites may help prevent water contamination
  - Copper-silver ionization units kill bacteria; UV does too, but doesn't provide sustained protection
  - Hypercholrination no longer recommended

Risk factors for resistance

- Unnecessary exposure to antibiotics or antivirals
  - When not indicated
  - At sub-therapeutic doses
    - Due to issues of clearance, metabolism, dosing
    - When used for prophylaxis but inoculum too large for prophylaxis to be effective or prophylaxis initiated when infection subclinical
  - For prolonged duration
- Unnecessary exposure to others who carry resistant infection
  - Transmissibility (e.g., influenza, TB, streptococcal pneumoniae
- Immunocompromise
  - Immune assist for pathogen clearance inadequate

Empiric & targeted ATB options

- Discussed above
- Pearls:
  - For aspiration pneumonia or in flu season, don't start too early
  - For medication selection, if it is a new admission from home, expect CAP or aspiration if presenting in the first 48 hours of admission
    - In the LTC setting, CAP will be the exception for most facilities
  - Test to assure optimal medication choice
  - For change in condition, use INTERACT or similar algorithms for a guided path to assessment, and collaborative intervention (SBAR)

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CAP

- Half the cases are “typical” community acquired PNA
  - **typical**= *S pneumoniae, H influenza,* and *M catarrhalis.* Historically, *S pneumonia* considered most common, but with better testing other pathogens increasing: *S aureus* (especial after influenza), MRSA;
  - **atypical**= zoonotic (*Chlamydia psittaci*--psittacosis, *F tularensis, C burnetii*); non-zoonotic (*Legionella, M pneumoniae and C pneumoniae*) (less easily identified by gram stain or standard culture media)
- **Prevalence**: 2.48 cases per 100,000 adults in U.S. in 2014 with a median age of 57 (46-71), and risk of CAP increases with age.
- **Transmission:** airborne, fomite, depending on pathogen; usually by inhalation of pathogenic organism
- **Susceptibility and worse prognosis**: increases with age and underlying disease, especially of the heart, lung, poor splenic function and delayed antimicrobial therapy.

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Jain S, Self WH, Wunderink RG, Fakhran S, Balk R, Bramley AM, et al. Community-Acquired Pneumonia Requiring Hospitalization among U.S. Adults. *N Engl J Med*. 2015 Jul 30. 373 (5):415-27.

CAP Dx

- Clinically:
  - typical CAP-fever, dyspnea, productive cough +/- pleuritic CP
    - purulent sputum
    - blood tinged sputum-pneumococcal, *Klebsiella,* (and *Legionella*) pneumoniae
  - atypical CAP-subacute, or extrapulmonary presentation; not usually producing sputum (except *Legionella*)
    - consolidation more common with *Legionella*, Q fever and psittacosis
- Consider acute cardiac or pulmonary event…
- **Laboratory**: CXR or CT; gram stain/culture; respiratory viral panel; blood culture (esp if worried about *S pneumoniae* and *H influenzae*);
  - **if HIV+** patient, extend w/u for less common pathogens , e.g., histoplasmosis, TB, pneumocystis, etc.
    - Consider: CPK, CRP, procalcitonin, cold agglutinin, DFA, lactic acid, DFA, serology for *B pertussis, M pneumoniae, L pneumophila, C burnetii.* Urinary antigen for pneumococcal or legionella; PCR

CAP Rx

- IDSA practice guidelines and local antibiogram
  - should cover S pneumoniae and atypical bacterial pathogens
  - if no comorbidities--a macrolide plus doxycycline
  - with comorbidities--respiratory fluorquinolone (moxifloxacin or levofloxacin) AND a beta-lactam (high dose amoxicillin, OR amoxicillin/clavulanate, OR ceftriaxone AND macrolide OR doxycycline
- Consider steroids
- Avoid PPI with quinolones for respiratory CAP, increases recurrence
  - PPIs increase risk of C difficile colitis relative to HS blockers
  - Issues with H2 blockers, too, in nursing home populations

CAP Prevention

- Vaccination
  - TdaP
  - Influenza
  - Prevnar and Pneumovax
- Cohort activities for individuals with CAP in case contagious
- Eat in their rooms
- Social distancing
  - 6 ft

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True or False

Lower respiratory tract infections in LTC are

- Usually of bacterial origin
- Usually transmitted by inhalation
- Can be diagnosed by PCR
- Can be prevented

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Role of Stewardship

- Track and monitor infections and antibiotic and antiviral use
  - Compare to state and national standards
    - UTI, pneumonia, respiratory events, skin infections, weight loss and pressure sores
- Develop protocols or adapt existing algorithms (e.g., INTERACT) to your setting to deal with excess events
  - How long to monitor and how to monitor before intervening
  - Respiratory cases
  - Use of urine testing and treatment for, for example, AMS
  - How to partner with prescribers

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Role of Vaccines in LTC

- Pneumococcal
- TdAP
  - Pertussis component
- Influenza
- Hepatitis
- Shingles?

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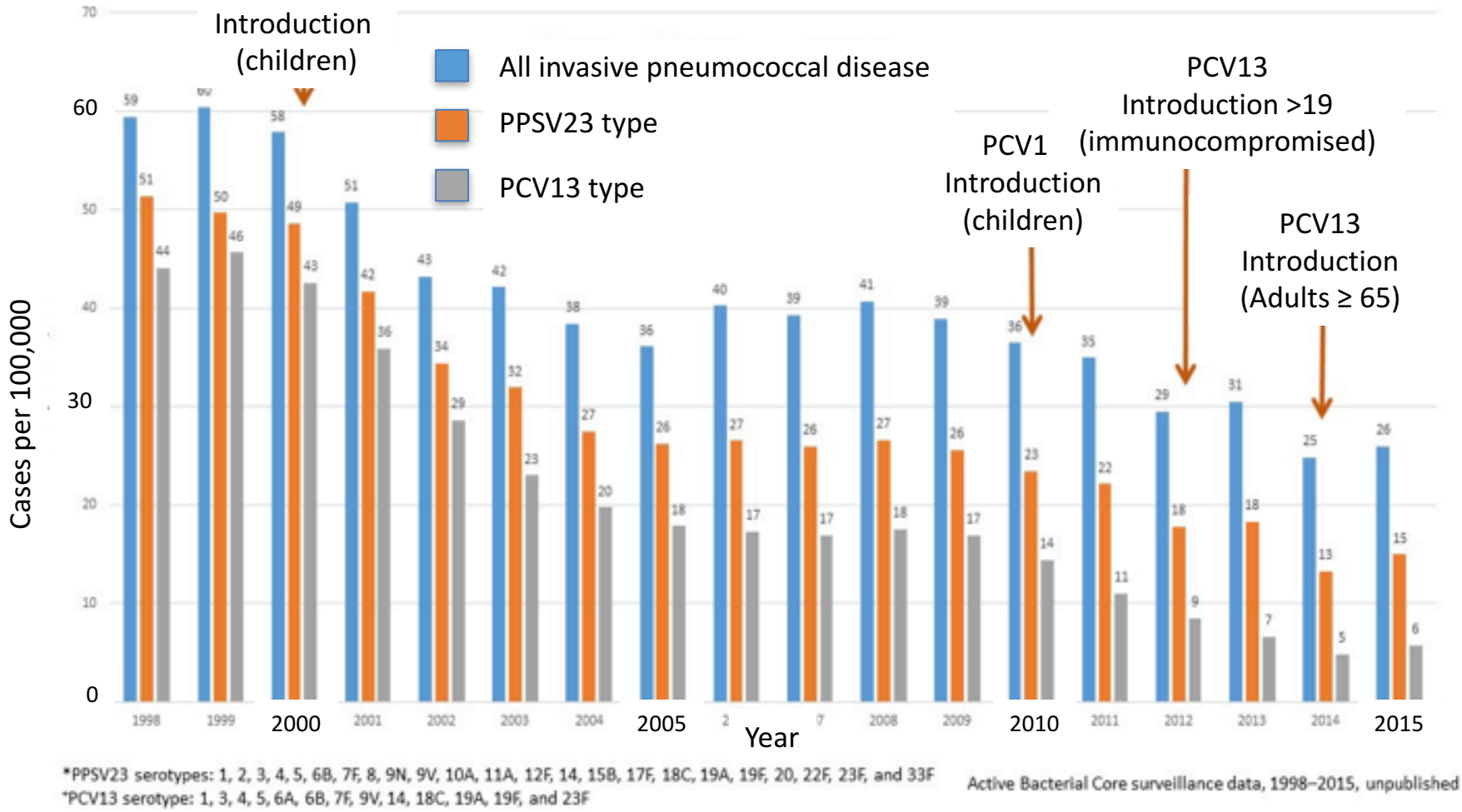
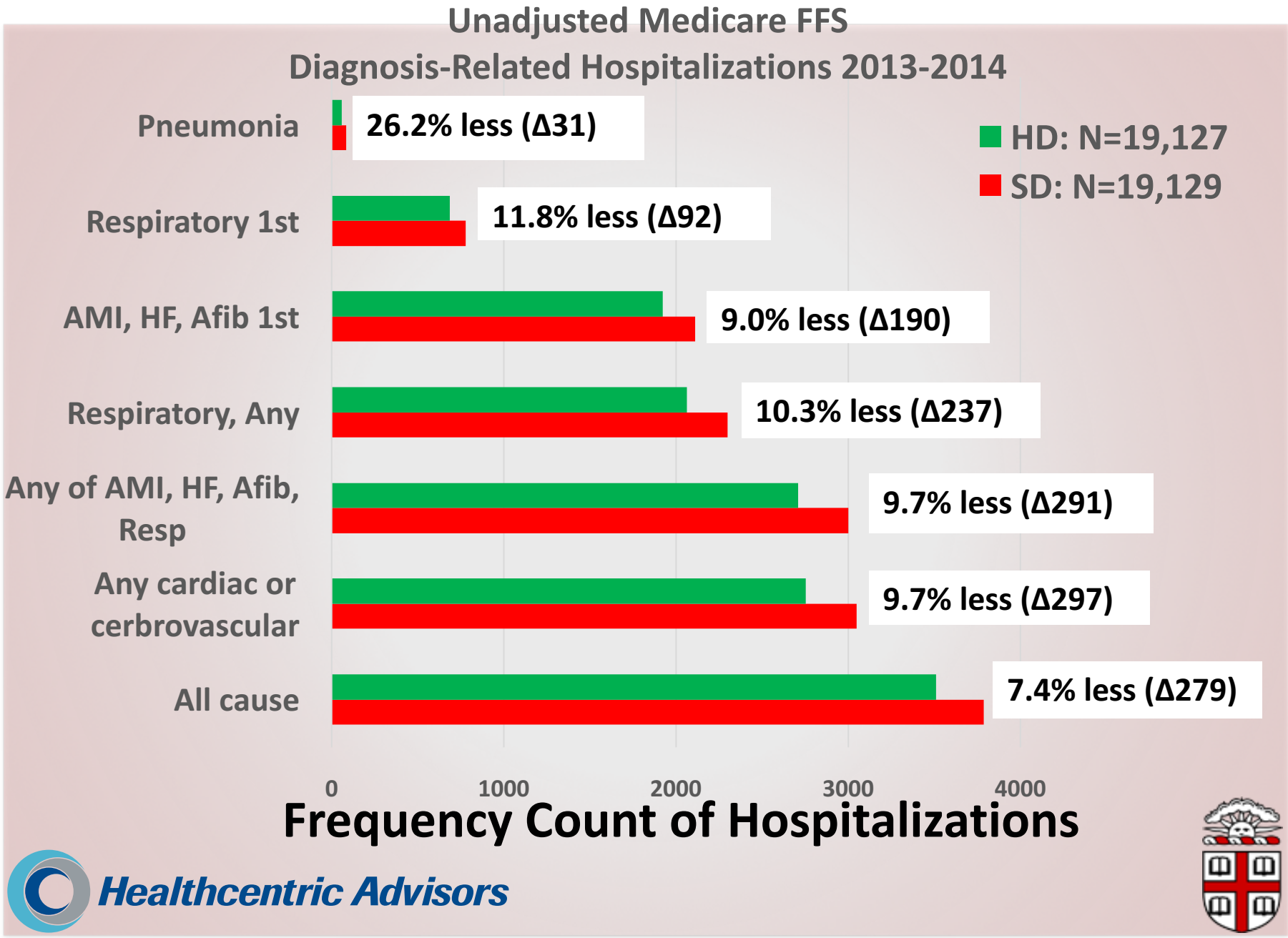
Trends in invasive pneumococcal disease among adults aged >65, 1998-2015



http://www.cdc.gov/pneumococcal/surveillance.html, accessed 10Oct2016



AMI= acute myocardial infarction, HF= heart failure, Afib= atrial fibrillation, Resp= respiratory

Influenza and Pneumonia Vaccination

- Influenza and pneumococcal disease are vaccine preventable and transmissible between employees and residents
- **Annual influenza vaccine** of residents and staff
  - Policies and procedures to ensure it happens
  - Standard orders for annual vaccination of residents initiated at time of admission, and distribution approach for Vaccination Information Statement
  - Knowledge of myths, and approach to residents and staff who resist vaccination (e.g., you can't get influenza from the influenza vaccine)
  - Choosing the right vaccine (trivalent, quadrivalent, high dose and adjuvanted)
- **Up-to-date maintenance of pneumococcal vaccination** for residents and staff 65 years old and older
  - Develop policy for monitoring / tracking vaccine uptake for all residents and staff
  - Goal: have all residents get both the 23-valent (Pneumovax) and conjugate (Prevnar-13) vaccines within a year of admission, if possible

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Role of Influenza Vaccine

- **Primary Prevention: Vaccination for influenza, recommended for all**
  - Any of: TIV, QIV, **Fluad, High Dose** Fluzone of residents annually
  - Any of: TIV, QIV, intradermal vaccine for staff annually
- **Those ill with a new respiratory infection (secondary prevention) regardless of virus type**:
  - Cover coughs and sneezes (handkerchief, cough into elbow
  - Wash hands frequently & correctly (with soap and water for 20 s)
  - Avoid sharing their cups and eating utensils with others
  - Refrain from kissing others

True or False?

- PCV7 and PCV13 given to children has been followed by a reduced rate of similar strain pneumococcal disease in adults over age 65
- High dose influenza vaccine reduces hospitalization in nursing home residents
- Fluad reduces hospitalization
- Tdap reduces hospitalization

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Basic Stewardship Summary

- Vaccinate to reduce antibiotic use
- Assess residents for risk factors that can be addressed with regular care interventions
  - Aspiration, bed position, speech/swallow evaluation
  - Foley catheter care
  - Hand washing
  - PPI use
- Have a surveillance program to detect infectious activity
- Figure out where systematic intervention can occur to reduce inappropriate prescribing

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Antibiotic Stewardship

- CDC initiative to develop formal program for LTC
- We were awarded grant for 2016-2019 to test
  - What's feasible
    - Context of LTC, effort, behavior change
  - What's measurable
    - Context of data sources and burden of data collection
  - What's scalable
    - Context of a national program

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Team

- Stewardship in LTC (Gravenstein, PI) under CDC Master Contract (**Baier**) in Center of LTCQI
- Project Coordinator: David **Manning**, ScM
- Scientific Collaborators:
  - Providence: **McConeghy, Morril, LaPlante, Dosa, Mor, Gozalo**
  - Cleveland: **Jump**
  - Madison: **Crnich, Wellham**
  - Other: **Gifford, Davidson**
- CDC
  - **Nimalie Stone, Liz Wilkins, Sarah Kabbani**

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Appropriateness Matrix

		Skin/Soft Tissue Infection		Urinary Tract Infection		Lower Respiratory Infection		Upper Respiratory Infection	
Lab	WBC	Conditional (N, %)		Required		Required		Required	
	C&S	Possibly		Required		Possibly		Possibly	
	X-Ray	Possibly		Not Required		Conditional (N, %)		Not Required	
	Creatinine	Conditional (N, %)		Conditional (N, %)		Conditional (N, %)		Conditional (N, %)	
Clinical	Medical Record	Calor	□	Temperature	□	Temperature	□	Temperature	□
		Rubor	□	Heart Rate	□	Heart Rate	□	Heart Rate	□
		Dolor	□	Respiratory Rate	□	Respiratory Rate	□	Respiratory Rate	□
		Tumor	□	Localizing signs	□	New Cough	□	New Sinus/Throat/Sniffles	□
		Growing Rubor	□	Localizing symptoms	□	New productive Cough	□	New headache, ear ache	□
				Catheter	□	New Wheezing	□		
		Physician Rx request	□	Physician Rx request	□	Physician Rx request	□	Physician Rx request	□

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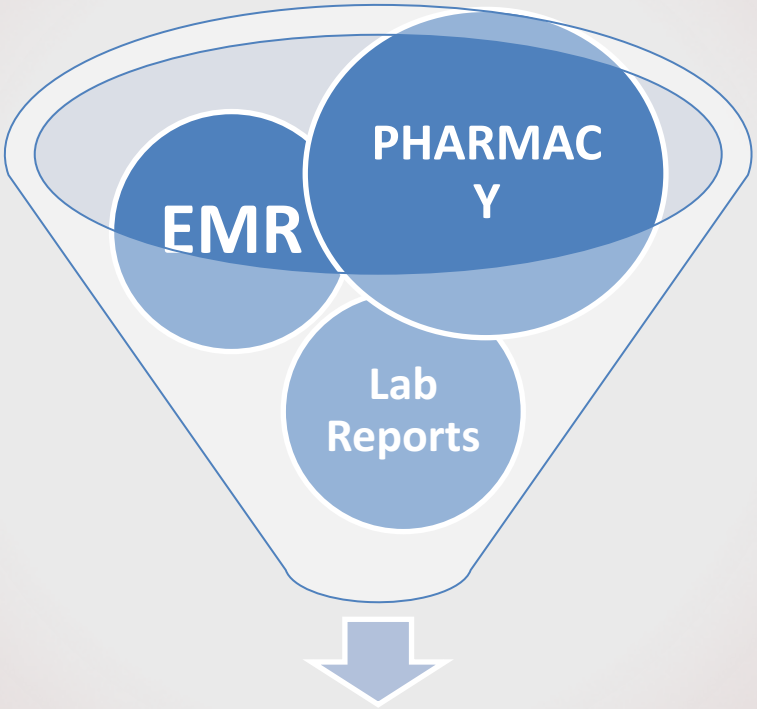
Step 3: Data Acquisition and Merge

- What is **available**?
- Is data **collected**?
- Usable **formats**?



Patient Level "Experience"

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Findings

- No standard way of collecting
  - Laboratory data
  - Clinical data
  - Antibiotic data
- Standardized collection of MDS
- Standardized operating procedures for pharmacy ordering
- Relatively standardized way of determining when a resident goes on report
- SBAR, Interact not standard, or if standard, incompletely implemented

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Realities

- We can't get physicians to change their behavior by "just educating them"
- We can't get nurses to change their behavior by "just educating them"
- We can't expect much in the way of additional data collection
- What to do?

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Approach

- Engage a new conversation between nurse calling change in condition and physician receiving the call
  - Couch request for **"just notifying,"** "will update"; **SBAR**
  - If antibiotic is initiated, **request** also order for **additional information** (so prescription needn't be anchored in a single finding), e.g., testing
  - **Re-engage** provider in 24-72 h as a care standard
    - see if ATB can be D/C'd (time to validate change in condition, lab support, clinical context with staff who know resident best)
  - Engage consultant pharmacist, medical director, QI person, infection preventionist to track antibiotic usage, appropriateness
  - **Aim for culture change with data-driven results**

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Summary

- Stewardship is a team effort
  - Engage leadership, figure out how to track
- Use Interact or similar algorithm to improve stewardship
- Use SBAR
- Collect, track and respond to data
  - Partner with consultant pharmacist and other facility leadership to track, interpret and plan response
  - Partner with prescribers for acceptability of response plan
- Vaccinate

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