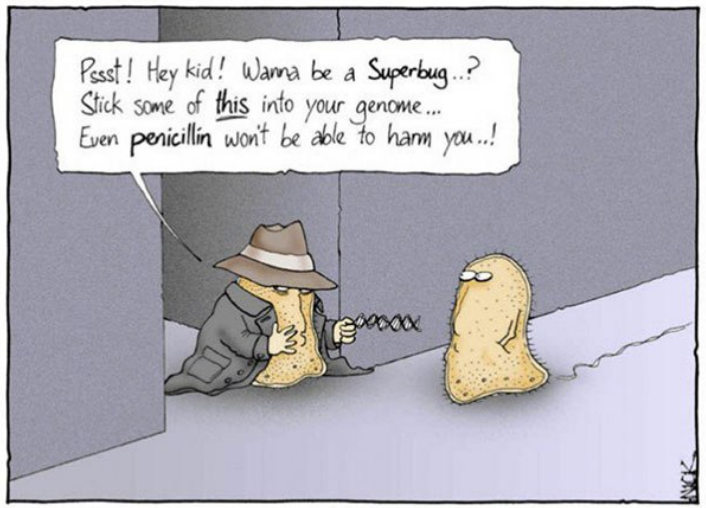
An Overview of Antimicrobial Stewardship at ASH



It was on a short-cut through the hospital kitchens that Albert was first approached by a member of the Antibiotic Resistance.

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UW TASP – April 27th, 2021

Outline

- Structure
- Policies
- Examples of Stewardship
- P & T Reporting
- Gaining Support!
- Tough Situations
- Upcoming!

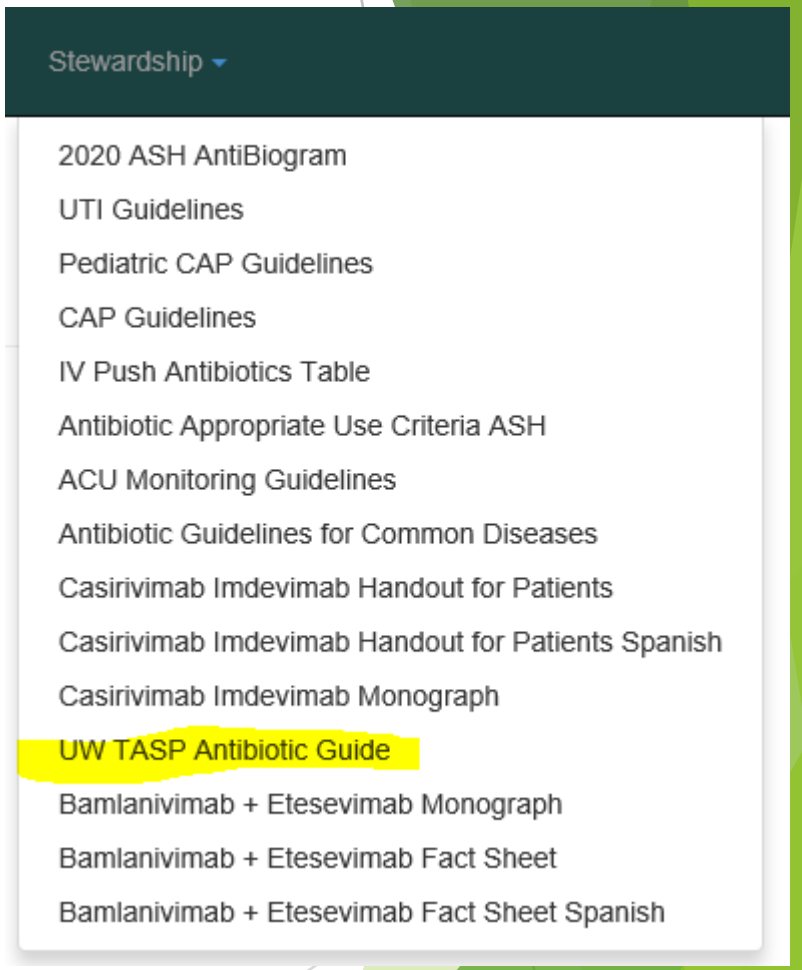
Scientists discover a new superbug.

Structure

- Pharmacist-driven, reports to P & T monthly
  - “Stewardship Moments” also integrated into other committee reports
- Inpatient Stewardship
  - 2021 Goal: Reduce carbapenem usage
  - Daily antibiotic census filled out by pharmacy
  - Recommendations given daily to hospitalists
  - Acceptance rates documented in Excel file
- Outpatient Stewardship
  - 2021 Goal: Reduce fluoroquinolone prescribing for UTI by 5% from 2020
  - Monthly feedback emailed to physicians

Policies

- Zosyn Extended-Infusion Policy
- IV to PO Policy
- Appropriate Use Criteria
- Institution-specific antibiotic prescribing guidelines (inpatient)
- Antibiogram
- Central location on Intranet for distribution of stewardship materials
- Procalcitonin available on-site



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Antibiotic Susceptibility Patterns of Commonly Isolated Bacteria for 2020

Bolded numbers below represent **percent of susceptible isolates**

		Total # of Isolates	Ampicillin	Ampicillin-Sulbactam	Cefazolin	Cefepime	Ceftriaxone	Ciprofloxacin	Clindamycin	Erythromycin	Gentamicin[2]	Levofloxacin	Linezolid	Nitrofurantoin[1]	Oxacillin	Penicillin G	Piperacillin-tazobactam	Tetracycline	Trimethoprim-Sulfamethoxazole	Vancomycin	# of ESBL-Positive Isolates	# of VRE Isolates
Gram Negative	*Enterobacter cloacae*[4]	27	--	--	--	--	--	--	--	--	96	--	--	--	--	--	92	--	96	--	--	--
	Escherichia coli (non-urine)	66	48	71	69	68	81	72	--	--	84	--	--	-	--	--	93	--	66	--	11	--
	Escherichia coli (urine)	478	52	81	83	81	90	79	--	--	92	--	--	93	--	-	96	--	76	--	40	--
	Klebsiella pneumoniae (urine + non-urine)[3]	69	--	95	94	--	95	96	--	--	97	98	--	13	--	--	98	--	89	--	4	--
	Proteus mirabilis (urine + non-urine)[3]	59	67	84	74	81	88	82	--	--	89	81	--	--	--	--	96	--	77	--	--	--
	Pseudomonas aeruginosa	52	--	--	--	90	--	88	--	--	94	--	--	--	--	--	94	--	--	--	--	--
Gram Positive	*Enterococcus faecalis*	87	98	--	--	--	--	--	--	--	--	82	--	97	--	96	--	--	--	100	--	4
	Staphylococcus aureus (ALL)	186	--	--	--	--	--	57	70	50	96	57	100	--	62	--	--	92	90	100		
	Methicillin Resistant (MRSA)	70	--	--	--	--	--	14	48	12	95	14	100	--	--	--	--	--	80	100		
	Methicillin Sensitive (MSSA)	116	--	--	--	--	--	84	84	73	97	84	--	--	100	--	--	100	96	100		
	Coagulase-Negative *Staphylococcus* spp.	49	--	--	--	--	--	73	73	34	92	75	--	--	55	--	--	100	84	97		
	Streptococcus pneumoniae[4,5]	20	--	--	--	--	--	--	--	--	--	--	--	--	--	95	--	--	--	100		

-- Denotes antibiotics that are not routinely tested against or known to be clinically relevant treatment options for the specific organisms

1. For treatment of uncomplicated urinary tract infection only
2. Gentamicin susceptibility indicates synergy with a beta-lactam (e.g., ampicillin) and should not be used alone to treat enterococcal infections
3. Reported together due to non-urinary isolates < 30
4. Organisms with <30 isolates should be interpreted with caution, as small numbers may bias the group susceptibilities
5. Data are from 12/18 to 11/20. Based on non-meningitis breakpoints

Antibiotic susceptibility of 80 or above may be considered a drug of choice

Template source: Nebraska Medicine ASAP (https://asap.nebraskamed.com/wp-content/uploads/sites/3/2017/07/Antibiogram-template.xlsx)

E. coli is stratified into urine/non-urine to assist outpatient providers

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Antibiotic Appropriate Use Criteria

Antibiotic Class	Appropriate	Inappropriate
Anti-pseudomonal penicillins (piperacillin-tazobactam)	Empirical coverage of nosocomial infections to include sepsis, intra-abdominal infection, and nosocomial pneumonia for 72 hours pending culture and susceptibility results (consider cefepime/metronidazole first) Non-severe infections caused by extended-spectrum β-lactamase producing organisms Neutropenic fever (consider cefepime only first per Infectious Disease Society of America guidelines) Polymicrobial infections when covering for *P.aeruginosa,*	Double-coverage with other anaerobic agents (metronidazole) Skin and soft tissue infections EXCEPT severe diabetic foot infection (consider vancomycin if purulent, cefazolin if non-purulent) Empiric treatment for non-severe infections in patients without risk for Pseudomonas (example: CAP) Treatment for meningitis or endocarditis Severe infections due to ESBL-producing organisms
Carbapenems (meropenem, ertapenem)	Necrotizing pancreatitis Severe infection with history of infection/colonization in the past 6 months with a documented extended-spectrum β-lactamase (ESBL) producer Life-threatening infections due to *Acinetobacter* spp. known to be resistant to 3rd generation cephalosporins History of Type I – IgE-mediated allergy to penicillin and its derivatives Continuation of outpatient therapy	Non-IgE penicillin allergy Treatment resulting from a presumed contaminated culture A culture report demonstrating non-ESBL producing organism

Criteria to educate on prescribing of certain broad-spectrum antibiotics (carbapenems, Zosyn, cefepime)

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Antibiotic Guidelines for Common Diseases (Inpatient Use Only)

These guidelines are intended to provide initial guidance, but do not replace clinical judgement. Doses of drugs recommended are not adjusted for renal/hepatic failure

Disease	Common Organisms	First-Line	Alternative Therapy	Comments
Diabetic Foot Infection With Osteomyelitis 	*Staphylococcus aureus* *Staphylococcus epidermidis*	Vancomycin (pharmacy to dose)	Vancomycin (pharmacy to dose)	*Staphyloccocus aureus* is the most commonly isolated organism in osteomyelitis
Intra-Abdominal Infection, Community-Acquired 	Enteric Gram-Negative Rods Anaerobes	**If not septic:** Ceftriaxone 2g IV daily **PLUS** Metronidazole 500mg PO/IV every 8 hours **If septic:** Piperacillin-tazobactam 3.375g IV every 8 hours	**For severe penicillin allergy:** Levofloxacin 750mg IV/PO daily **PLUS** Metronidazole 500mg PO/IV daily every 8 hours	For uncomplicated biliary infections, consider using ceftriaxone alone - anaerobic coverage not typically needed
Neutropenic Fever 	*Pseudomonas aeruginosa* *Staphylococcus epidermidis*	**If not septic:** Ceftazidime 2g IV every 8 hours **If septic:** Cefepime 2g IV every 8 hours **PLUS** Vancomycin (pharmacy to dose) (see comments)	**For severe penicillin allergy:** Aztreonam 2g IV every 6 to 8 hours **PLUS** Ciprofloxacin 400mg IV/PO every 8 hours **PLUS** Vancomycin (pharmacy to dose)	Consider vancomycin only if mucositis, line infection, colonization, history of infection, or skin/skin structure infection is present

Guidelines for most common infections seen in our hospital as per antibiogram – 5 pages! Clinical pearls included to help with the “why” behind the “what”

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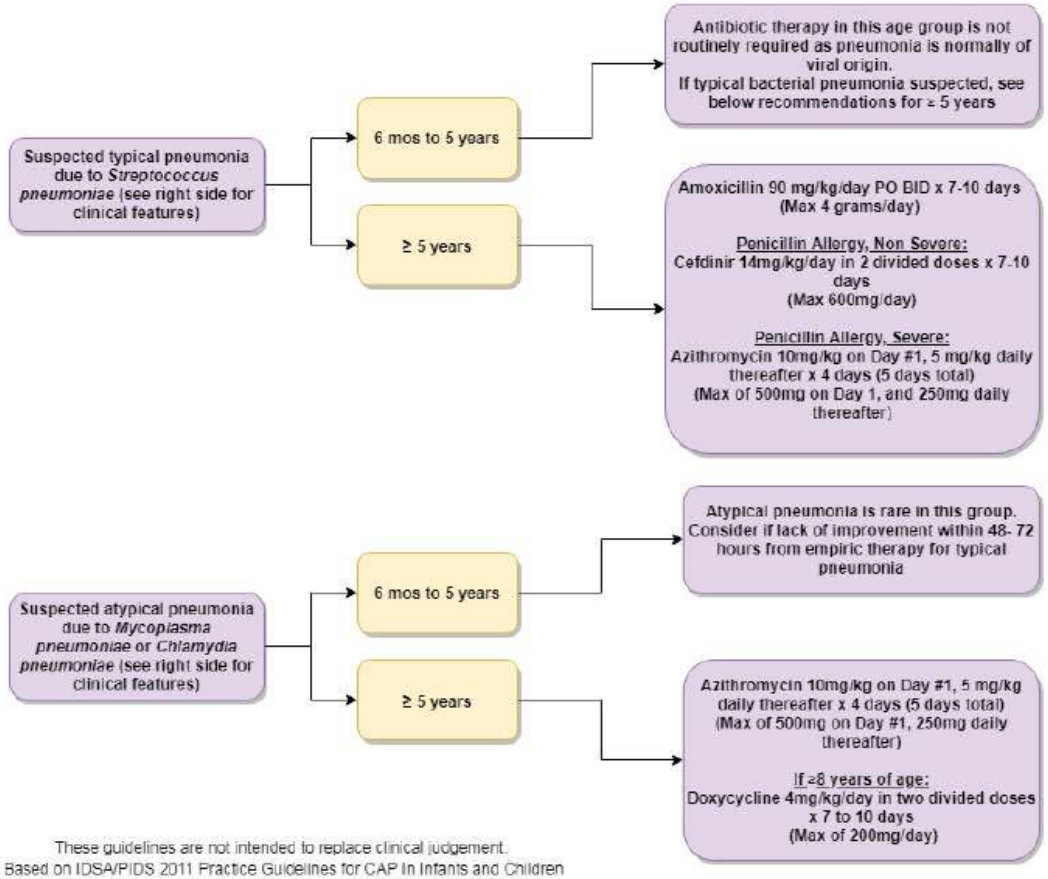
Antibiotic Algorithm for Community-Acquired Pneumonia (Outpatient, Pediatric Only)



These guidelines are not intended to replace clinical judgement.
Based on IDSA/PIDS 2011 Practice Guidelines for CAP in Infants and Children Older Than 3 Years of Age and Community Acquired Pneumonia in Children from UpToDate

Clinical Pearls

Children 1-6 mos of age with suspected bacterial pneumonia should be hospitalized

Antibiotic therapy is not necessary for children with a positive flu swab in the absence of clinical, lab, or radiographic findings that suggest bacterial coinfection

Clinical Features of Typical Pneumonia

- Children of all ages
- Abrupt onset
- Ill-appearance
- Chills
- Moderate to severe respiratory distress
- Focal auscultatory findings
- Localized chest pain
- WBC count >15,000/microL (if obtained)
- Elevated acute phase reactants (if obtained)

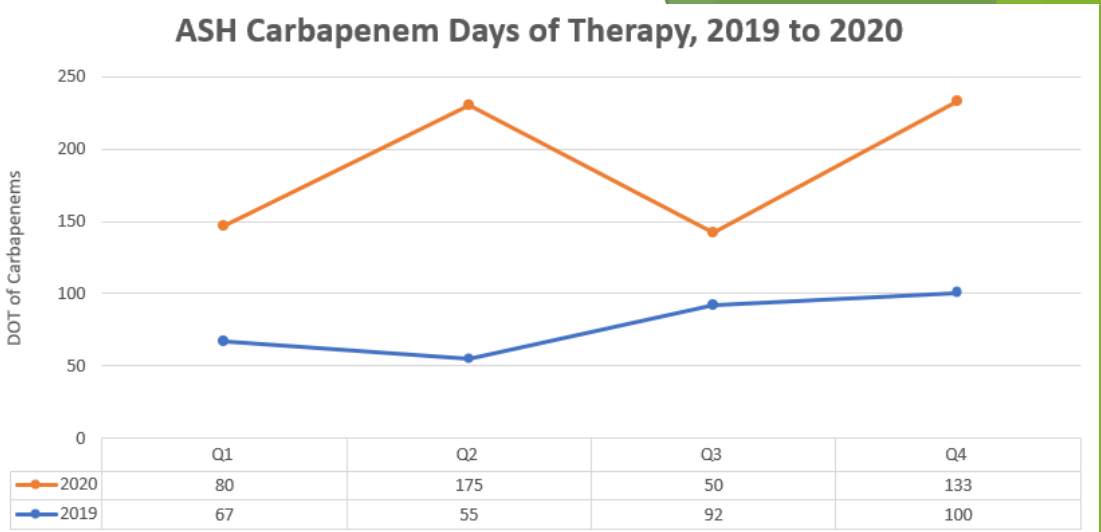
Clinical Features of Atypical Pneumonia

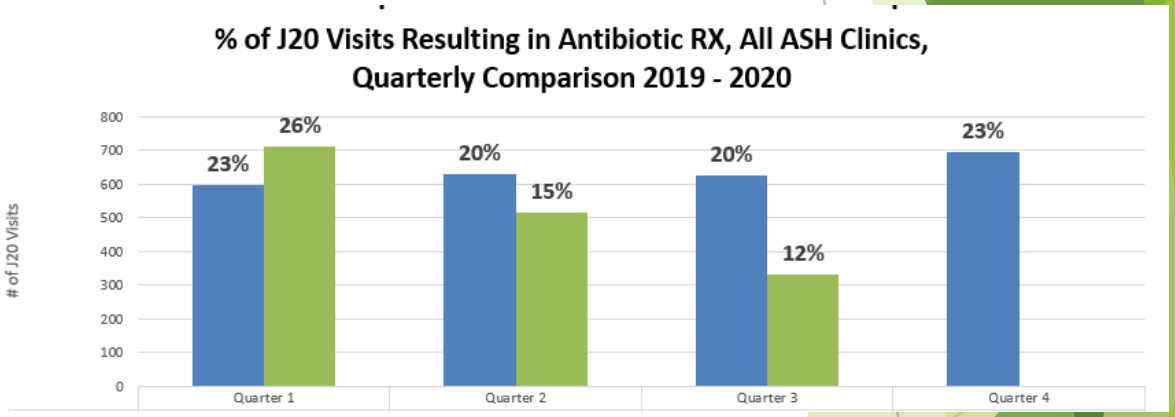
- Children of all ages (most common in children >5 years)
- Abrupt onset with constitutional findings (malaise, myalgia, headache, rash, conjunctivitis, photophobia, sore throat, headache)
- Gradually worsening nonproductive cough
- Wheezing
- Extrapulmonary manifestations or complications (eg, Stevens-Johnson syndrome, hemolytic anemia, hepatitis, etc)
- Interstitial infiltrates

For outpatient stewardship: algorithms on the Intranet for Pediatric CAP, CAP, & UTI (more to come!)

P & T Reporting

- Inpatient: # of interventions per month, broken down by accepted/not accepted (Excel template that I use is below)
- Outpatient: Quarter-to-quarter comparison (bar graph on right)
- Days of Therapy of carbapenems (broken down by appropriate or inappropriate) – chart shows overall use





JUNE INTERVENTIONS

Date	Patient	FIN	Intervention Type	Initial Regimen	Recommended Regimen	Intervention Accepted?
4/22/21	Bear, Pooh	123456770	De-Escalation	Ceftriaxone 2g qd	Cefazolin 2g q8h	Yes

JUNE TOTAL

Total No. of Patients Reviewed	#N/A
Total No. of Interventions	1
Total No. of Interventions Accepted	1
Acceptance Rate	100%

Lessons Learned

- During my journey, I have run into some very common challenges:
  - Buy-in from providers
  - Concerns about multi-drug resistant organisms
  - Providers feeling more comfortable with certain antibiotics vs. others
  - Lack of initial engagement

- Support is very key in making stewardship work!

Gaining Support!

- Relationships!
- Education
  - When I make my recommendations or go on rounds, I try to educate primarily on the side effects of antibiotics
  - I share UW TASP lectures with applicable hospital staff members
- Local data
  - When an adverse drug reaction to an antibiotic is discovered in-house, I discuss the case at P & T
  - This has increased engagement and buy-in
  - To help with concerns about multi-drug-resistant organisms: I found out how many ESBLs we isolated in 2020 and created a table breaking down where each originated from

Multi-Drug Resistant Organism Statistics:

Bug	Inpatient	Outpatient
ESBL+ *Escherichia coli*	Total = 24 isolates - 16 urinary isolates - 3 blood isolates - 2 wound isolates - 3 "other" isolates	Total = 27 isolates - 24 urinary isolates - 1 wound isolate - 1 respiratory isolate - 1 "other" isolate
ESBL+ *Klebsiella* spp.	Total = 4 isolates - 3 urinary isolates - 1 wound isolate	1 urinary isolate

Tough Situations

- There have been situations where buy-in was not possible
  - 72-hour carbapenem restriction was approved by P & T – pharmacist calls provider at 72 hours to request D/C
  - Continuations outside Criteria were documented and reported to P & T
  - The restriction did not impact Days of Therapy
- Antimicrobial stewardship is being added as a peer review process trigger
- Additionally, antimicrobial stewardship will be added to a score card sent yearly
  - Peer-to-peer ranking, individualized graph showing antibiotics prescribed past year

Future Ideas/Projects

- Vancomycin AUC Protocol (in progress)
- Dalbavancin formulary request