ID mythbusting

Inspired by One-day conference “ID for the primary care physician” by Dal ID folk in Halifax October 2013
The threat of antimicrobial resistance is completely overblown
Uh-Oh

• USCDC estimates that in the US, >2 million people are sickened every year with antibiotic-resistant infections, with at least 23,000 dying as a result.
  – The estimates are based on conservative assumptions and are likely minimum estimates

• ~250,000 people each year require hospital care for *C diff* infections

• *Up to 50% of all the antibiotics prescribed for people are not needed or are not optimally effective as prescribed*
Antibiotic Safety

Antibiotics are responsible for almost 1 out of 5 emergency department visits for adverse drug events.

Antibiotics are the most common cause of emergency department visits for adverse drug events in children under 18 years of age.
Just think!

• Do I need this abx in the first place?
• Do I need to continue abx any longer?
• Am I using the right dose?
• Am I using too broad an agent?
• Am I using the right drug for the likely bug?
• Is our group using only the same drug all the time?
Antimicrobial stewardship is... Using the right drug at the right time at the right dose for the right duration
Antibiotic stewardship at home

• A point prevalence (ONE DAY) study was performed to determine patterns of antimicrobial usage in NB and the proportion of orders that met criteria for appropriateness
  – Survey in all NB hospitals w/ >10 inpatient beds
  – 2244 patients admitted during study
    • 529 (23.6%) were on antimicrobials with a total of 691 Rxs
  – Of the antimicrobials used for treatment
    • 43% of orders were incomplete or inappropriate
    • 1 in 5 antibiotic orders had no documented indication for therapy
    • Orders not switched from IV to PO (5.8%)
    • Inappropriate dose (5.1%)
    • Treatment of asymptomatic bacteruria (4.1%)
    • Inappropriate therapy duplication (3.7%)
• Skyline site => Tools & Resources => Patient Care => Antimicrobial Stewardship => NB treatment guidelines
  – A pocket card pdf available with all the guidelines thus far on one 2-sided document
  – Suggestions for:
    • Pneumonia (CAP)
    • Cellulitis/Skin & soft tissue
    • Urinary Tract infections
    • C. difficile

For basic, straightforward infections...
Another myth...
Cellulitis that goes beyond its original circled margin after 48 hours needs IV or a switch to po

BUST THIS MYTH!
The Truth

- Cellulitis really needs a trial of 3–4 days of po antibiotics at minimum in the absence of clear systemic worsening

Taken from a talk by DiQuinzio’s ID Talk, Oct 2013. See also Kilburn SA et al Cochrane Database Syst Rev. 2010 Jun 16;(6):CD004299
THE TRUTH ABOUT CELLULITIS

• Expect it to look worse before it looks better for 24-48 hours
• If systemic symptoms and streaking improving but skin worsening, you are winning
  – Necrotic/damaged tissue continues to evolve and often exfoliates and therefore LOOKS worse
• Check dosage and compliance
• Drug reactions impossible to delineate
• If CLEARLY progressing despite approp abx, reassess special considerations and need for IV dosing.
Consider IV therapy for cellulitis ONLY if…

- lesion rapidly spreading
- systemic response is prominent
- significant comorbidities (asplenia, neutropenia, immunocompromise, cirrhosis, cardiac or renal failure, local trauma, or preexisting edema)

Cefazolin preferred therapy 2gIVq8h
And then add appropriate work-up
• If it progresses on PO Keflex when they came in....
• It is still UNLIKELY to be a resistant organism but the combination of underdosing, lymphedema, and poor PO absorption = low levels
• IV Cefazolin is a GREAT choice
What if you think MRSA is involved?

• You can ADD septra to Keflex
  – Don’t give bactrim alone b/c it doesn’t have good Strep coverage and chances are still odds on strep
  – (our local regimen disagrees…)

• Clinda will work but more GI s/e’s and more c.diff infxns, plus more $

• Doxy 😊 - underused and has >90% susceptibility to MRSA
!KEEP IN MIND Cellulitis mimics

• Is it “Bilateral cellulitis”?
• Is there a swollen neighbouring joint?
• Is there a draining sinus?
• Is there pain out of proportion?
• Is there edema beyond erythema?
• Are they toxic appearing?
• Do they have DVT risk factors?
Bilateral cellulitis or stasis dermatitis?

• Ask yourself “What is the probability of simultaneous, symmetrical, bilateral infections?”

• Ask the patient “When did your legs last look like the skin elsewhere on your body?”
  • Cellulitis is an ACUTE process – NOT days to weeks

• Most ‘bilateral cellulitis’ is stasis dermatitis
Moving on...
(1) Anytime you write a Rx for a UTI, you MUST CULTURE THE URINE; and
(2) All urine dips with leuks and nitrites require a Rx for UTI
Urine Specimens
When to Pass

• **No symptoms - DO NOT TEST**
  – Do not treat asymptomatic bacteriuria except
    • Pregnancy
    • Undergoing urologic procedure

• **Women with symptoms of uncomplicated UTI, no vaginal discharge - NO NEED FOR CULTURE**
  – > 90% probability of acute cystitis
  – **STOP SENDING THESE FOR CULTURE**

• *Bent S, et al. JAMA. 2002;287(20):2701-2710*
• *IDSA guidelines: Clin Infect Dis 2011;52(5):e103–e120*
Urine Specimens
When to test

- CT/GC testing
- Diagnosis of Complicated UTI
- h/o Multi-drug resistance
- Pyelonephritis or sepsis

- Complicated UTI
Prevalence of asymptomatic bacteriuria in select populations

- **Women**
  - Healthy, premenopausal 1-5%
  - Pregnant 2-10%
  - DM 9-27%
  - Postmenopausal 3-9%
  - LTC 25-50%!!!

- **Men**
  - Elderly, community 4-19%
  - Elderly, LTC 15-40%

Johnston, ID, QEII, Hfx 2013 from CID 2005; 40:643-54
Prevalence of asymptomatic bacteriuria in select populations

• Spinal cord injury
  – with intermittent catheter use 25-90%
  – Spincterotomy and condom 57%
• Hemodialysis 28%
• Indwelling catheter use
  – Short term 9-23%
  – Long term 100%, yes 100%

Johnston, ID, QEII, Hfx 2013 from CID 2005; 40:643-54
Therefore, if a nurse, MD, family member dips demented gran’s urine in the nursing home because it is cloudy and foul-smelling, and gran is afebrile, still demented, without a major change in her cognitive status, it is OK to **DO NOTHING** even if the urine has nitrites, leuks, bacteria...

Johnston, ID, QEII, Hfx 2013
• And more importantly, STOP SENDING URINE FOR CULTURE WITHOUT AN INDICATION
• And perhaps more importantly, STOP DIPPING URINES WITHOUT REASON...
OK, new myth to bust...
Everyone with suspected strep needs antibiotics STAT
Clinical scoring systems improve diagnosis

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absence of cough</td>
<td>1</td>
</tr>
<tr>
<td>Swollen and tender anterior cervical nodes</td>
<td>1</td>
</tr>
<tr>
<td>Temperature &gt; 100.4°F (38°C)</td>
<td>1</td>
</tr>
<tr>
<td>Tonsillar exudates or swelling</td>
<td>1</td>
</tr>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>3 to 14 years</td>
<td>1</td>
</tr>
<tr>
<td>15 to 44 years</td>
<td>0</td>
</tr>
<tr>
<td>45 years and older</td>
<td>-1</td>
</tr>
</tbody>
</table>

Cumulative score: _____

Reasons NOT to treat even if you are Centor >3

1. In the US, we treat ~10M cases of presumed strep throat annually
   - the rate of severe allergic rxn to abx is 0.24% (24 000 people)
   - 10% of ppl who get an abx will have diarrhea (1 M people)
     • some will get c diff.
2. If you have strep throat and don’t take abx, you get better on your own (6.5 days instead of 7).
3. What about the feared ‘suppurative complications...’?
   - You can’t ‘prevent’ sinusitis by giving abx for strep throat
     (Cochrane Database Syst Rev. 2006 Oct 18;(4):CD000023)
   - NNT to prevent peritonsillar abscess is b/w 50 and 225;
   - NNT to to prevent AOM is >200
4. Antimicrobial stewardship...
Is this enough in an era of Antibx stewardship?
What about the feared ‘post-strep sequelae?’

• Literature shows that you don’t reduce post-strep glomerulonephritis with abx

• Since 1961 there have been ZERO cases of rheumatic fever reported in the literature in the US. You would need to treat ~1.25-1.5M cases of strep to prevent one rheumatic fever
  – (and, by the way, only 1/3 of rheumatic fever get heart probs)
Moving on...
Everytime you investigate Diarrhea, get a stool culture, O&P and stool for c.diff

Inspired by this must-read article: Hatchett T and Farina D. Infectious Diarrhea: when to test and when to treat CMAJ 2011 Feb 22 183(3):339-44
<table>
<thead>
<tr>
<th>Agent</th>
<th>Nonbloody diarrhea</th>
<th>Bloody diarrhea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacterium</td>
<td>• Enterotoxigenic <em>Escherichia coli</em> (traveller’s diarrhea)</td>
<td>• <em>Aeromonas</em> spp</td>
</tr>
<tr>
<td></td>
<td>• <em>Vibrio parahaemolyticus</em></td>
<td>• <em>Campylobacter</em> spp</td>
</tr>
<tr>
<td></td>
<td>• <em>Shigella</em> spp</td>
<td>• <em>E. coli</em> producing Shiga-like toxin (e.g., <em>E. coli</em> O157:H7 and other strains)</td>
</tr>
<tr>
<td></td>
<td>• <em>Salmonella</em> spp</td>
<td>• <em>Shigella</em> spp</td>
</tr>
<tr>
<td></td>
<td>• <em>Yersinia</em> spp</td>
<td>• <em>Salmonella</em> spp</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• <em>Yersinia</em> spp</td>
</tr>
<tr>
<td>Virus</td>
<td>• Norovirus</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Rotavirus</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Adenovirus</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Astrovirus</td>
<td></td>
</tr>
<tr>
<td>Parasite</td>
<td>• <em>Giardia lamblia</em></td>
<td>• <em>Entamoeba histolytica</em></td>
</tr>
<tr>
<td></td>
<td>• <em>Cryptosporidium</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• <em>Isospora</em> or <em>Cyclospora</em> spp</td>
<td></td>
</tr>
<tr>
<td>Toxin</td>
<td>• <em>Clostridium difficile</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• <em>Staphylococcus aureus</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• <em>Bacillus cereus</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• <em>Clostridium perfringens</em></td>
<td></td>
</tr>
</tbody>
</table>
WHO TO TEST...

Nonbloody diarrhea

Is the patient one of the following?
- Resident in a closed facility (e.g., long-term care facility)
- Daycare worker
- Food handler
- Health care worker

No

Assess severity: does the patient have any of the following?
- Dehydration
- Fever
- Underlying comorbid illness

No

Symptomatic treatment; no need for testing

Yes

Nausea prominent symptom

Add test for:
- Norovirus
- Rotavirus
- Adenovirus

History of ingesting raw shellfish

Add culture for Vibrio

History of antibiotic use in last 3 months

Add assay for C. difficile toxin

History of antibiotic use in last few weeks?

Order assay for C. difficile toxin

Bloody diarrhea

Order stool culture for:
- Salmonella
- Shigella
- Campylobacter
- Escherichia coli O157
- Yersinia

Consider EIA for Shiga-like toxin

Diarrhea > 7 days, or associated with history of travel or community outbreak

Add stool examination for ova and parasites
Diarrhea CAN be treated emperically without sending any sh*!

• Traveler’s diarrhea can be treated with FQ (adults) or Septra (children) *without a stool sample*
• Diarrhea lasting more than 10-14 days may be treated with Metronidazole if clinical suspicion of Giardia *without a stool sample*
• If febrile, toxic or invasive disease suspected send stool sample prior to empiric treatment.
• If you suspect an outbreak, then culture
• CAVEAT: **Beware of increasing resistance to FQ and the risk of antibiotic therapy in Shiga-producing Toxin EC**
It’s the Law Reporting Notifiable Diseases and Conditions

Report as soon as suspected by telephone

- Acute Flaccid Paralysis (AFP)
- Anthrax
- Botulism
- Cholera
- Diphtheria
- Disease occurring more frequently than expected or in a rare or unusual form
- Group A Streptococcal Disease Invasive
- Haemophilus Influenzae Type b Invasive Disease (Hib)
- Hepatitis A
- Influenza Virus of Pandemic Potential
- Measles
- Meningitis (Bacterial)
- Meningococcal Disease Invasive
- Paratyphoid
- Plague
- Poliomyelitis
- Rabies
- Respiratory Outbreak in Long Term Care (LTC)
- Rubella
- Severe Acute Respiratory Syndrome (SARS)
- Shellfish Poisoning (Amnesic, Domoic, Paralytic)
- Smallpox
- Tuberculosis
- Typhoid
- Vero-toxigenic E. coli
- Viral Hemorrhagic Fevers (Crimson-Congo, Ebola, Lassa, Marburg, Rift Valley and others)
- West Nile Virus (WNV)

Report by next business day

- Acquired Immunodeficiency Syndrome (AIDS)
- Adverse Event Following Immunization (AEFI)
- Amobiasis
- Brucellosis
- Campylobacteriosis
- Chancroid
- Chlamydia
- Clostridium difficile
- Congenital Rubella Syndrome
- Creutzfeldt-Jakob Disease – Classic (CJD)
- Creutzfeldt-Jakob Disease – New Variant (vCJD)
- Cryptosporidiosis
- Cyclosporiasis
- Enterohemorrhagic E. coli
- Giardiasis
- Gonorrhea
- Group B Streptococcal Disease of Newborn
- Hantavirus Pulmonary Syndrome (HPS)
- Hepatitis B
- Hepatitis C
- Hepatitis D
- Hepatitis E
- HTLV I and II
- Human Granulocytic Anaplasmosis (HGA)
- Human Immunodeficiency Virus (HIV)
- Influenza – Laboratory Confirmed
- Legionellosis
- Leprosy (Hansen’s Disease)
- Listeriosis
- Lyme Disease
- Lymphogranuloma Venereum
- Malaria
- Meningitis (Viral)
- Methicillin Resistant Staphylococcus Aureus (MRSA)
- Mumps
- Pertussis
- Pneumococcal Disease Invasive
- Q Fever
- Relapsing Fever
- Rocky Mountain Spotted Fever
- Salmonellosis
- Shigellosis
- Syphilis
- Tetanus
- Toxoplasmosis
- Trichinelllosis
- Tularemia
- Vancomycin Resistant Enterococcus (VRE)
- Yellow Fever
- Yersiniosis

Report Notifiable Diseases to Public Health Services

After Hours: To locate the Medical Officer of Health on call, please contact QEII Locating at 473-2222.

South Shore Health
Tel: 543-0850
Fax: 543-6024

South West Health
Tel: 742-7141
Fax: 742-6062

Annapolis Valley Health
Tel: 542-6310
Fax: 542-6333

Colchester East Hants Health Authority
Tel: 893-5820
Fax: 893-2614

Cumberland Health Authority
Tel: 667-3319
Fax: 893-2614

Pictou County Health Authority
Tel: 752-5151
Fax: 893-2614

Cape Breton District Health Authority
Tel: 563-2400
Fax: 563-2005

Guysborough Antigonish Strait Health Authority
Tel: 867-4500 ext. 4800
Fax: 863-5111

Capital Health
Tel: 481-5800
Fax: 481-5889
(Brief reminder: ECOLI 0157)

• E coli with a shiga toxin
• Presentations: watery diarrhea; bloody diarrhea; hemorrhagic colitis; HUS; death
• Classic: afebrile, bloody diarrhea with significant abdominal cramping
• Sources: undercooked beef, produce, water, petting zoos, person-to-person
• low inoculum (<100 organisms)
(ECOLI O157)

• Notify the lab or call the microbiologist if suspecting a case - *not necessarily picked up on routine culture*

• Supportive care

• Antibiotics contraindicated
Another sh*TT!y myth...
C. diff is part of normal intestinal flora and antibiotics suppress indigenous bowel flora which leads to subsequent overgrowth of C. diff
The truth about C diff...

C. difficile strains causing C diff infection are acquired **exogenously**

- Some strains found to cause ‘epidemics’, also spores live in environment and HCW hands

A “3–Hit” Disease

1. Disruption of the normal colonic flora
2. Exposure to toxigenic C. difficile
3. Host factors (McFarland LV JID 1990)
   • host susceptibility
   • increased age
   • severity of underlying disease
   • GI manipulation (enema, NG tube, surgery)
   • antacids, stool softeners
   • PPI
     • ... THEREFORE PRESCRIBE ALL MEDS APPROPRIATELY
Spores can survive in environment for months

Oral-fecal route

Clostridium difficile spores and vegetative cells are ingested

Spores
Vegetative cells

Most vegetative cells are killed in the stomach, but spores can survive the acid environment

C. difficile multiplies in the colon

Toxin production

Stomach

Small bowel

C. difficile spores germinate in the small bowel upon exposure to bile acids

Flagellae facilitate C. difficile movement; a polysaccharide capsule discourages phagocytosis

Diarrhea

Gut mucosa facilitates adherence to the colonic epithelium
Suspecting C diff…

• Diarrhea can be watery or mucoid diarrhea ± blood
• Usually starts 1–2 weeks after start of antibiotics (1 day to 6 weeks)
• Incubation period once exposed to c diff is less than 7 days, median is 2 days
RFs for Severe Disease

• ↑ age
• Malignancy
• Renal failure
• Immunosuppression
• Use of anti-peristaltic drugs

• Again, therefore, prescribe antibiotics and other meds *appropriately*...
Large Canadian Surveillance study looking at CDI 2004/2005

- 1430 adults with HA CDI were identified in 29 hospitals over 6 months
- 22% of adults with HA–CDI had an adverse outcome within 30 days
  - GI bleed, toxic megacolon, bowel perf, OR colectomy 3%
  - ICU admission 2%
  - Fatalities directly related to CDI 2.2% – 31 people!

Treatment of CDI

• Stop antibiotic if possible
  • ~20–25% will resolve with this alone!
• Read the Card on Skyline it is really helpful and is adapted from VCHA Tx guidelines 2011; basically…
  • Flagyl PO for mild or moderate
  • Vanco PO for severe or complicated
  • Repeat as above x1 for recurrence
  • Ask for help for second recurrence
For those who love Grading systems...

<table>
<thead>
<tr>
<th>Clinical definition</th>
<th>Supportive clinical data</th>
<th>Recommended treatment</th>
<th>Strength of recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial episode, mild or moderate</td>
<td>Leukocytosis with a white blood cell count of 15,000 cells/μL or lower and a serum creatinine level less than 1.5 times the premorbid level</td>
<td>Metronidazole, 500 mg 3 times per day by mouth for 10–14 days</td>
<td>A-I</td>
</tr>
<tr>
<td>Initial episode, severe*</td>
<td>Leukocytosis with a white blood cell count of 15,000 cells/μL or higher or a serum creatinine level greater than or equal to 1.5 times the premorbid level</td>
<td>Vancomycin, 125 mg 4 times per day by mouth for 10–14 days</td>
<td>B-I</td>
</tr>
<tr>
<td>Initial episode, severe, complicated</td>
<td>Hypotension or shock, ileus, megacolon</td>
<td>Vancomycin, 500 mg 4 times per day by mouth or by nasogastric tube, plus metronidazole, 500 mg every 8 hours intravenously. If complete ileus, consider adding rectal instillation of vancomycin</td>
<td>C-III</td>
</tr>
<tr>
<td>First recurrence</td>
<td>...</td>
<td>Same as for initial episode</td>
<td>A-II</td>
</tr>
<tr>
<td>Second recurrence</td>
<td>...</td>
<td>Vancomycin in a tapered and/or pulsed regimen</td>
<td>B-III</td>
</tr>
</tbody>
</table>

* The criteria proposed for defining severe or complicated CDI are based on expert opinion. These may need to be reviewed in the future upon publication of prospectively validated severity scores for patients with CDI.
And don’t prescribe probiotics…

“Administration of currently available probiotics is not recommended to prevent primary CDI, as there are limited data to support this approach and there is a potential risk of bloodstream infection (C-III)”

IDSA 2010 guidelines
You wannanotha myth ta bust?
10% of penicillin allergic patients will have an allergic reaction to cephalosporins.
In reality...

- The 10% crossreactivity myth stems from the 1960s when manufacturing plants made both penicillin and cephalosporins in the same building and there was a chance of contamination. When patients had an allergy, it was to the contaminant penicillin and not the cephalosporin.
PENS AND CEFS

• Firstly, only 3-10% of people who say they have a penicillin allergy actually have one.
• Of patients with ANYPHYLACTIC reactions to penicillin, only 1/1000 will have an ANYPHYLACTIC reaction to a cephalosporin
PENS AND CEFS

• The rate of cross-reactivity between penicillins and 3rd and 4th generation cephalosporins is particularly negligible.

• The rate of cross-reactivity against 1\textsuperscript{st} generation penicillins is about 1%  
  – NB this also coincides with the base rate of having a rxn to a cephalosporin full-stop...

• Maybe it’s time to just stop talking about cross-reactivity!
Penicillin myths refs

• Anne, S et al. Risk of administration cephalosporin antibiotics to patients with histories of penicillin allergy. Annals of Allergy, Asthma and Immunology 1995; 74: 167-70


• Herbert M et al. Medical myth: ten percent of patients who are allergic to penicillin will have serious reactions if exposed to cephalosporins. Western Journal of Medicine 2000; 172: 341
One last myth to bust...
Everyone who gets a tick bite should just get a dose of doxy!
Lyme dz...

• Caused by *Borrelia burgdorferi*
• Transmitted by *Ixodes scapularis*, (engorged nymph and adult stages)
• Saint John is a Lyme endemic area
  – In all of NB, we diagnosed Lyme Dz 15 times between 2005 & August 2012

Depts. Of Health NB, NS & PEI
Removal of Ticks

- Use fine–tipped tweezers (forceps)
- Grasp the tick as close to the skin’s surface as possible
- Pull upward with steady, even pressure
- Do NOT twist or jerk
- Clean the bite area
- AVOID folklore remedies (nail polish, petroleum jelly, heat)

From Lynn Johnston’s ID talk, October 2013
Love your tick

- **Unengorged ticks pose essentially no risk**
- The overall risk of acquiring Lyme Dz in endemic areas is 1.2-3.2 (≥20% of ticks are infected).
- The risk of disease increases with degree of engorgement (10-25%), which equates with duration of attachment

CID 2006;43:1089-134
Consider the doxy if...

- Prophylaxis (single dose doxycycline) may be considered if: (NNT:36)
  - Adult or nymphal tick attached ≥ 36h, and
  - Can be started within 72h of removal, and
  - Endemic area (≥ 20%) ticks infected, and
  - Doxycycline not contraindicated

Nadelman et al Prophylaxis with a single dose doxy for prevention of lyme after IX Scap tick bite. NEJM 2001 345(2); 79-84.
Why not just give doxy to everyone?

- Because the adverse event rate associated with receiving doxycycline was 30% and included nausea, vomiting, diarrhea and rash (Placebo was 11%)
- And the development of EM from the tick bite was 0.4% in the doxy group and still only 3.2% in the placebo group
Reminder: Erythema migrans

- Typically within 7-14d (3-30) of bite
- Should be ay least 5 cm for secure diagnosis
- Usually expands in size over 24-48 hours
- Secondary lesions may be < 5 cm
- Can vary in appearance (oval, round, ± central clearing, ± partially purpuric, ± central vesicles/pustules)
Reminder: Treating EM

- Use Doxy or Amoxil for 14-21 days
- If you suspect more complicated Lyme, then talk to ID and/or read about it...
C’est tout