Beth Israel Deaconess Medical Center | HARVARD MEDICAL SCHOOL TEACHING HOSPITAL | The Silverman Institute For Health Care Quality and Safety

Intravenous metronidazole: a drug shortage case study

Jeffrey Pearson, PharmD[1]; Ruchira Kumar, PharmD[1]; Howard Gold, MD[2]; Monica Mahoney, PharmD, BCPS AQ-ID[1]; Christopher McCoy, PharmD, BCPS AQ-ID[1]

BIDMC [1]Department of Pharmacy, [2]Silverman Institute for Health Care Quality and Safety & Division of Infectious Diseases

Introduction/Problem

- Drug shortages are a routine problem plaguing healthcare institutions, especially antibiotic shortages
- In Aug 2017, all preparations of IV metronidazole went on backorder with no estimated recovery date
- Prior to the acute shortage, BIDMC was using ~2,750 metronidazole IV bags per month
- If that use continued, BIDMC would exhaust its IV metronidazole supply by mid-September 2017

Aim/Goal

- To develop a strategy for conserving the available supply of intravenous metronidazole, using a POE-based ordering algorithm, decision support, pharmacy, and antimicrobial stewardship resources

The Team

- Howard Gold, MD, Medical Director of Antimicrobial Stewardship (AST)
- Christopher McCoy, PharmD, BCPS AQ-ID, Associate Director of Antimicrobial Stewardship
- Monica Mahoney, PharmD, BCPS AQ-ID, Pharmacy Infectious Diseases Clinical Coordinator
- Jeffrey Pearson, PharmD, PGY-2 Infectious Diseases Pharmacy Resident
- Ruchira Kumar, PharmD, Clinical Pharmacist
- Antimicrobial stewardship team, pharmacy purchasing team, and drug shortage task force

The Interventions

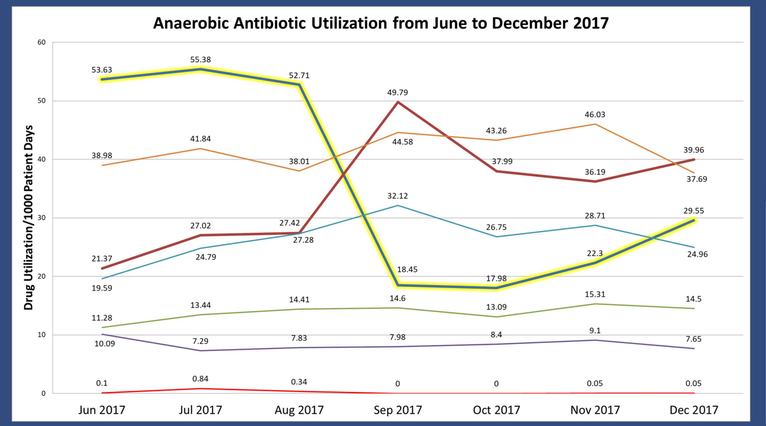
- Broadcast Email

- cPOE Restrictions

- Daily Shortage Email

- Vigilanz

Results



Anaerobic antibiotic utilization from June-December 2017. Please click on the graphic to enlarge

Lessons Learned

- Using an interdisciplinary, targeted approach, we are able to swiftly respond to an acute drug shortage
- A coordinated effort among pharmacists, physicians, and nurses can lead to rapid changes in clinical practice

Next Steps

- Continue to monitor the metronidazole shortage situation, which has not fully resolved
- Continue to monitor intravenous metronidazole use to ensure that implemented interventions continue to be effective, with a goal metronidazole PO to IV ratio of 3:1 (1.35:1 as of December 2017)
- Further explore the application of cPOE decision support for future drug shortages, including education on possible alternative agents
- Formally implement an automated pharmacy protocol for intravenous to oral conversion

For more information, contact:

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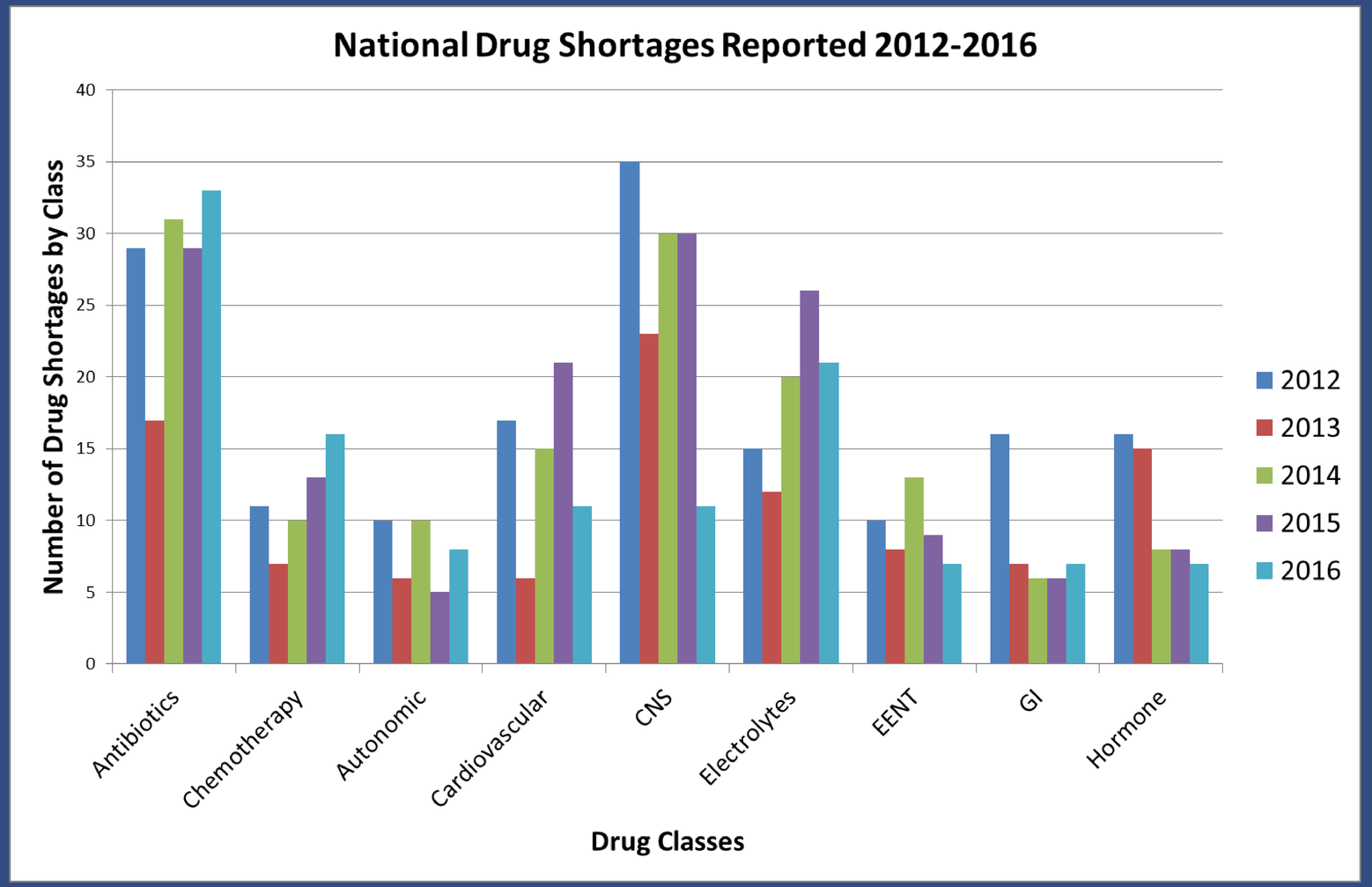

Data courtesy of Erin Fox at the University of Utah Drug Information Service (erin.fox@hsc.utah.edu)

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From: BIDMC Communications
Sent: Fri 9/1/2017 11:27 AM
To: Physicians-BIDMC; Physicians-HouseStaff; Pharmacy Department
Cc:
Subject: IV Metronidazole - Nationwide Shortage Requires Action

To: All Physicians, Nurse Practitioners, Physician Assistants, Nursing Directors and Pharmacists

From: Antimicrobial Stewardship Team (AST)

Subject: **IV Metronidazole - Nationwide Shortage Requires Action**

What you need to know:

1. There is a nationwide shortage of intravenous (IV) metronidazole.
2. Multiple manufacturers are on backorder and the shortage may last for several months.
3. The institution has insufficient supplies of IV metronidazole to meet current demand.
4. Prescribers should **carefully consider the need for anaerobic antibiotic coverage**.
5. Oral (PO) metronidazole is very well absorbed in patients with a functional GI tract – **PO metronidazole should be used for all appropriate patients**.
6. Most indications for IV anaerobic coverage (e.g., intra-abdominal infection) can be treated with other options (see below for details).
7. IV metronidazole should be reserved primarily for :
   - severe-complicated *C. difficile* infection (ICU-level illness)
   - surgical prophylaxis
   - patients with severe beta-lactam allergy requiring IV anaerobic antibiotics

More detailed information:

- Cause of the shortage: one supplier reports a manufacturing issue, the others provide no explanation.
- **Consider the need for anaerobic** coverage - hospital-based aspiration pneumonia and most soft tissue infections do NOT require anaerobic treatment.
- Alternatives to IV metronidazole for anaerobic coverage:
  - PO metronidazole is highly bioavailable and can be given to patients with a functional GI tract.
  - Beta-lactam/beta-lactamase inhibitor combinations, e.g., piperacillin-tazobactam (supply also constrained) and ampicillin-sulbactam. NOTE: the newer inhibitor combinations, ceftolozane-tazobactam and ceftazidime-avibactam DO NOT have clinically useful anaerobic activity.
  - Meropenem may be appropriate for patients with mixed infections including drug-resistant Gram-negative bacteria and anaerobes (requires AST/ID approval).
  - Clindamycin has some utility (IV and PO), e.g., for soft tissue infection, but lacks uniform activity against clinically important anaerobes like *Bacteroides fragilis* and may promote *C. difficile* infection.
  - Tigecycline may be considered for patients with severe beta-lactam allergy and complicated intra-abdominal infection (requires AST/ID approval, has caveats relating to efficacy and toxicity).

Visit the ASHP drug shortage website for more information. For questions regarding this shortage please email the Antimicrobial Stewardship Team.

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View OMR Medications | **Medication Order Entry** | View PAML

Medication: **MetroNIDAZOLE**

Indication: -- Choose One --

Metronidazole (IV) is in critically short supply from ALL manufacturers.

Our current allocation is gradually recovering to 25% of our prior average use.
Please utilize the enteral route when possible, and attempt to convert from IV to PO as soon as possible.

Short term use (48-72h) may be appropriate
Consider alternative agents. See Antimicrobial Stewardship Team's email for more information.

Reason for the Shortage
Manufacturing issues made worse by IV bag shortage.

ESTIMATED RECOVERY: Gradual but unpredictable

Updated: 12/28/17

Continue | Back | Cancel

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From: Pearson,Jeffrey C. (BIDMC - Pharmacy) Sent: Mon 11/13/2017 8:20 AM

To: **Pharmacists**; **Infect Dis Fellows**; Liu,Ji Tong (BIDMC - Pharmacy); Joyal,Kayla F. (BIDMC - Pharmacy); Gold,Howard; Mehrotra,Preeti (BIDMC - Infection Control); Blair,Barbra M., MD (HMFP - Medicine); Stead,Wendy (HMFP - General Medicine); Eliopoulos,George (HMFP - Infectious Disease)

Cc:

Subject: Antibiotic Shortage Report 11-13-17

Good morning everyone,

The ever-increasing number of antibiotic shortages has led to the expansion of this report outside of our beta-lactam antipseudomonal agents. We now have the addition of **IV doxycycline** to our collection of antibiotics to avoid unless absolutely necessary. **There are no current shortages on oral doxycycline**, so that can be a first-line alternative if appropriate. Doxycycline has been added to a list that already includes **IV erythromycin** (since 2016), **IV metronidazole** (since Sept. 2017), and **ceftazidime** (since Oct. 2017).

With that in mind, please prioritize anti-pseudomonal beta-lactam coverage with **cefepime** today and avoid **pip/tazo** unless necessary. Continue to de-escalate coverage expeditiously whenever possible.

Cefepime 111 g

Piperacillin/tazobactam 335.25 g

Antibiotics to avoid:

Ceftazidime -Alternatives: cefepime, piperacillin/tazobactam

IV metronidazole -Alternatives: PO metronidazole, other anaerobic coverage

IV doxycycline -Alternatives: PO doxycycline

IV erythromycin -Alternatives: PO erythromycin, IV azithromycin

Thanks, and let me know if you have any questions,
Jeff

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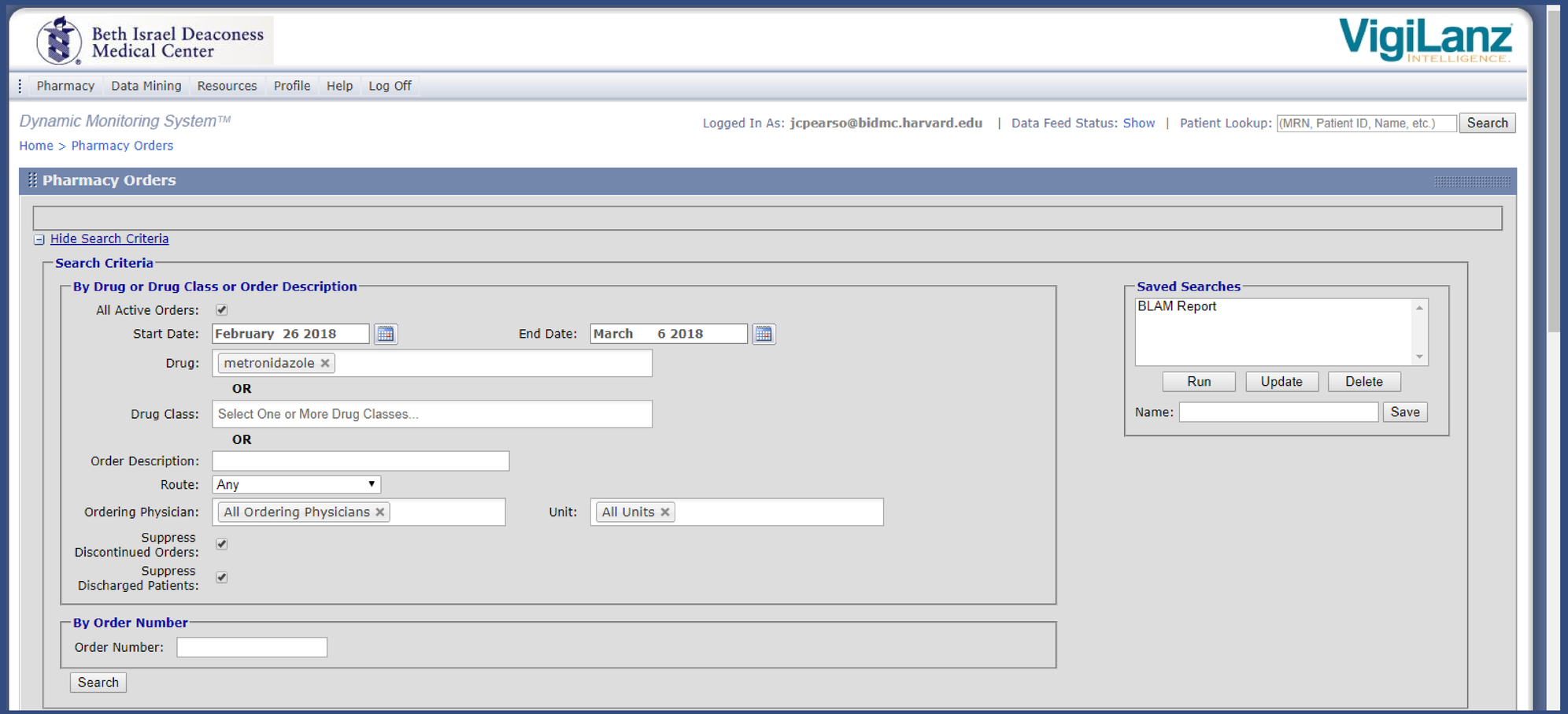

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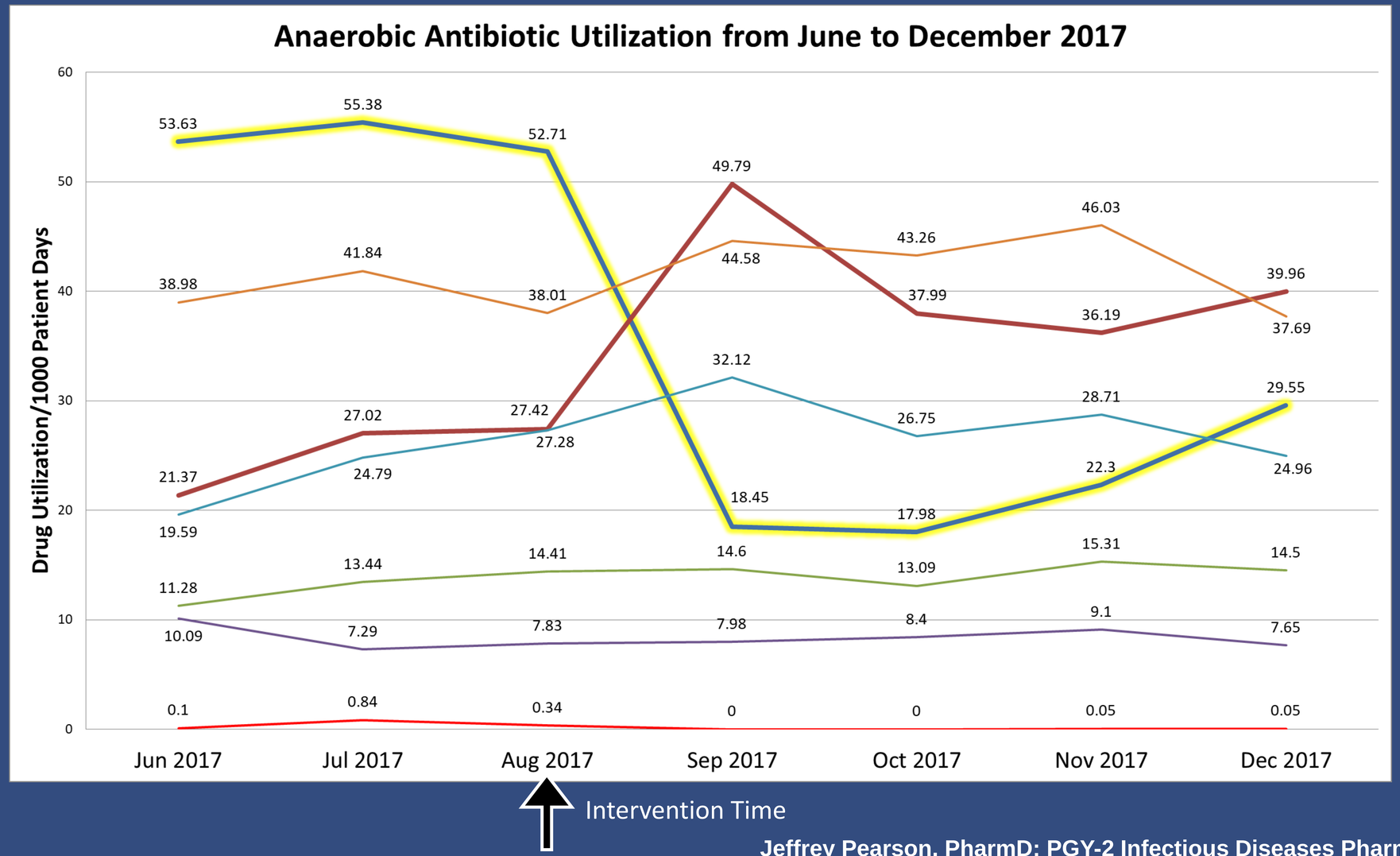

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