

## Introduction

- Timely redosing of antibiotics during pediatric surgery is important for prevention of surgical site infections (SSIs)
- Redosing is recommended when a procedure exceeds one to two half-lives of an antibiotic
- Redosing guidelines are frequently revised by expert societies such as the Infectious Disease Society of America (IDSA), leading to national challenges to reliably adjusting practice habits
- Traditional educational interventions have been ineffective in changing adherence to established redosing regimens
- The aim of this project was to standardize intraoperative antibiotic redosing by utilizing the electronic medical record (EMR) and leveraging preexisting work of surgeons, pharmacists, and anesthesiologists

## Methods

- Interdisciplinary quality improvement project to improve timing and dose accuracy of antibiotic redoses with a goal of increasing our compliance to at least 70%, with a long-term goal of 100%
- Definition of redose compliance
  - Time: administered within 15 minutes of time indicated
  - Dose: dose given +/- 10% of specified weight-based dose
- Inclusion criteria
  - Patients undergoing procedures from May 2014 through September 2017 greater than two hours in duration to warrant antibiotic redosing
  - Any procedure status: Elective, urgent or emergent
- Exclusion criteria
  - Antibiotics requiring greater than six hour redosing
  - Multiple antibiotics from same class given during a procedure
  - Antibiotic class changed during the procedure
  - No patient weight recorded in EMR
- Non-electronic countermeasures
  - Order set compliance report-out to surgical chiefs (January 2015)
  - Revision of antibiotic guidelines with correspondence to providers (July 2015)
  - Antibiotic redose guideline badge cards distributed to providers (September 2015)

## Methods

- EMR-based countermeasures
  - Electronic order entry by member of surgical team for first dose (October 2014)
  - Weight-based antibiotic dose suggestions in anesthesia medication administration workflow
  - Best practice reminders in electronic anesthesia record (September 2015)
    - Click-box in left column to continuously display time of next dose with link to medication administration window
    - Antibiotic given and time since last dose continuously displayed in right column
    - Pop-up alert five minutes prior to time of next indicated redose

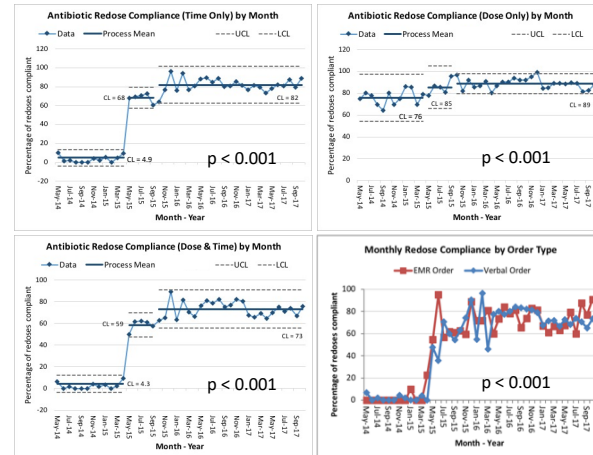
The screenshot shows the EMR interface with several key elements highlighted in red boxes:
 

- A table of medication orders with columns for drug name, dose, and status.
- A yellow alert box titled 'Antibiotic Redosing Due!' with a warning icon and text: 'General anesthesia continues for infants and patients with nasal dysfunction.'
- A medication administration window for cefazolin (ACEF) 100 mg (mg) showing a '300 mg' dose and a '100 mg' amount.

## Results

- Of 17,736 surgeries from May 2014 through September 2017, 2,341 (13%) required antibiotic redosing
- A total of 3,052 antibiotic redoses were administered
  - 1,723 redoses given in cases with a verbal order for first dose
  - 1,329 redoses given in cases with the first dose ordered electronically
- First break in statistical process control (SPC) for time and dose compliance occurred in May 2015, with increase in mean compliance from 4% to 59%
- Second break in SPC chart in October 2015 after implementation of electronic reminders, with mean compliance of 73%
- Overall redose compliance rose from 4% to 73%, an 18-fold increase ( $p < 0.001$ )
- Verbal vs. electronic order for first dose did not impact redose compliance

## Antibiotic Redose Compliance



## Conclusions

- Real-time alerts and customized reminders built into the electronic anesthesia record are an important part of this interdisciplinary initiative to generate long-term change in practice habits for routine tasks performed by the anesthesiologist, such as redosing of antibiotics with specified redosing intervals

## References

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- Knox MC, Edey M. Educational antimicrobial stewardship intervention ineffective in changing surgical prophylactic antibiotic prescribing. *Surg Infect (Larchmt)* 2016; 17: 224-228.
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