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Emily Fox

Providence Portland Medical Center, Portland, Oregon, Emily.Fox@providence.org

Brent Footer

Providence Health and Services, Portland, OR, USA., brent.footer@providence.org

Angel Mendez

Providence Portland Medical Center, Portland, Oregon, Angel.Mendez@providence.org

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Evaluation of surgical antibiotic prophylaxis at a large, tertiary medical center

Emily Fox, PharmD; Brent Footer, PharmD, BCPS; Angel Mendez, PharmD Candidate

Background

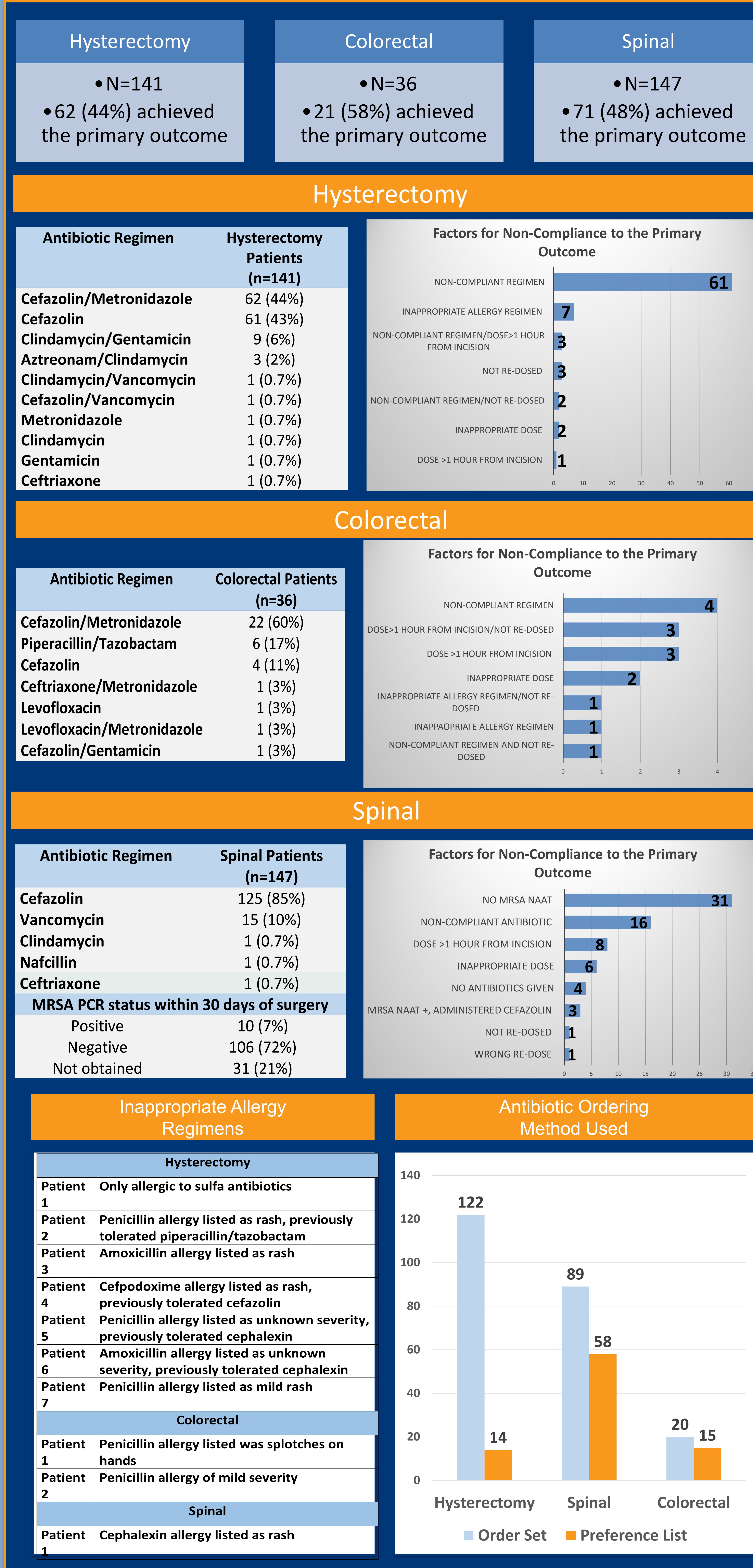
- Studies estimate surgical site infections (SSIs) contribute to ~1 million additional inpatient days per year and SSI mortality rate has been estimated to be 3%.
- Even a single SSI can have a large impact on a patient and institution. The cost of a single SSI is estimated to be upward of \$25,000 and increases the length of hospital stay by ~10 days.
- The Surgical Care Improvement Project (SCIP), a CMS program, was initiated in 2006 to provide standard quality measures to help reduce SSIs.
- Advances in infection control practices including stricter adherence to antimicrobial prophylaxis after the introduction of SCIP has led to a 17% decrease in SSIs reported to the NHSN from 2008-2014.
- Although large strides have been made toward limiting SSIs, surveillance remains an important component for continued reduction.
- Additionally, this institution has identified inappropriate or less than optimal prophylaxis as a potential contributor in several SSI cases.
- Recent studies have shown that facility-specific SSI monitoring and auditing, as well as pharmacist involvement in perioperative antibiotic selection, has demonstrated reduction in rates of SSIs.

Purpose

- This retrospective analysis aims to review surgical antimicrobial prophylaxis for appropriateness based on patient-specific factors and hospital system guidelines.
- Primary outcome: compliance to Providence hospital system guidelines. Contributing factors:
 - Compliant antibiotic selection
 - Hysterectomy: Cefazolin plus metronidazole
 - Colorectal: Cefazolin plus metronidazole
 - Spinal: Cefazolin if MRSA PCR negative and no history of MRSA
 - Compliant antibiotic administration time
 - Compliant dosing and re-dosing
- Opportunities for pharmacist-involvement and education were identified for implementation.

Objectives

- This study is a single-center retrospective chart review.
- The study was reviewed and approved by the Institutional Review Board (IRB) at our institution.
- Electronic health record (EHR) was used to perform chart review and identify the study population.
- Study population:
 - Patients who underwent hysterectomy, colorectal, or spinal surgery
- Study period:
 - June 1st, 2019 through August 31st, 2019



Discussion

Clinical Outcomes

- Primary outcome adherence issues varied by type of surgery.
- For hysterectomy, 62 of 141 surgeries (44%) achieved the primary outcome.
 - Primary contributor of non-compliance being selection of an antibiotic regimen inconsistent with system-wide guidelines.
 - Cefazolin monotherapy was considered non-compliant in the setting of this analysis. If cefazolin monotherapy was considered compliant, 118/141 surgeries (84%) would have achieved the primary outcome.
- For colorectal surgeries, 21 of 36 (58%) achieved the primary outcome.
 - Primary contributor of non-compliance being inappropriate antibiotic regimens and dose timing.
 - Additionally, it was identified that history of resistant infections may not be accounted for when making antibiotic prophylaxis choices, with 3 SSIs resulting from multi-drug resistant organisms in patients with MDRO history.
- For spinal surgeries, 71 of 147 (48%) achieved the primary outcome.
 - Primary contributor of non-compliance being no MRSA PCR within the 30 days prior to surgery.
- For all surgeries, education on true penicillin allergies and cross-reactivity rates could provide benefit.
- Allergy regimens given for non-severe allergies:
 - Hysterectomy 7 instances
 - Colorectal 2 instances
 - Spinal 1 instance

Study Limitations

- Retrospective chart review with select data collected manually.
- This data represents a snap-shot in time during a three month period.

Conclusions:

- Each surgery requires a unique intervention.
- Consistency as an institution regarding surgical antibiotic selection is needed and adherence to institutional EPIC order sets could improve antibiotic selection.
- Thorough evaluation of allergy severity may result in less allergy regimens (with worse clinical trial outcomes) being used.
- Evaluation of relevant patient history, including history of MDROs or MRSA colonization via PCR, may result in more optimum choices.
- PPMC *E.Coli* susceptibilities are ~88% and may warrant alternate antibiotics, in select surgeries, based on surgeon discretion.

Going Forward:

- Cyclic auditing resulted in increased discussion/education.
- Changes still being considered by surgery leadership.
- Future data collection will be performed once changes are implemented to determine improved guideline adherence.

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