OPTIMIZING USAGE OF PRE-PROCEDURAL ANTIBIOTICS IN INTERVENTIONAL RADIOLOGY PROCEDURES

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BACKGROUND

- There is a tendency to overuse antibiotics in the healthcare system, despite large volumes of data to support limiting prescriptions for specific indications only.
  - Deviation from the recommended guidelines can be seen in up to half of hospitalized patients receiving antibiotics[1].
  - There are many short and long term negative effects associated with antibiotic usage:
    - Allergic reactions.
    - Medication side effects.
    - Antibiotic resistance in the individual and the population.
    - Opportunistic infections (e.g. C. *difficile* colitis).
    - Increased financial burden.
- While antibiotic prophylaxis prior to surgical procedures has been proven to prevent surgical site infections, shorter antimicrobial durations have been shown to be just as safe and effective [2].
- Similar evidence based guidelines have not been established for interventional radiology procedures.

BACKGROUND

- The Society of Interventional Radiology (SIR) developed guidelines for which interventional radiology procedures should have pre-procedural antibiotics[3].
- At our tertiary care academic interventional radiology practice, antibiotic prophylaxis guidelines were developed and implemented using:
  - The SIR guidelines.
  - A multi-disciplinary approach: Interventional radiology, infectious disease and pharmacy.
  - Regional data on known bacterial resistance patterns.
  - Additional ancillary literature regarding prophylaxis.
- The intent was to limit unnecessary antibiotic prophylaxis, which would in turn mitigate the adverse effects related to the unnecessary administration of these medications.

PURPOSE

1. Discern whether our pre-procedural antibiotic usage was significantly different from the SIR based guidelines.
2. Discern whether the rate of procedural related infectious complications changed after the implementation of the SIR based guidelines.
3. Quantify the change in cost of pre-procedural antibiotic usage before and after implementing the SIR based guidelines.

METHODS

- Retrospective analysis for a period of seven months before and after applying the SIR based guidelines
  - There were two arms: Total procedures and central line placements.
- In the central line arms, we analyzed the rate of central line associated bloodstream infections (CLABSI), as this was a well established standardized method to quantify infectious complications from a central line placement.

RESULTS

	2019: Pre-Guideline Implementation	2020: Post-Guideline Implementation
Total Procedures	4000	4083
Pre-Procedural Antibiotics	1506 (37.65%)	806 (19.74%)
Central Line Placements	1698	1478
Pre-Procedural Antibiotics	586 (34.51%)	175 (11.84%)
CLABSI	5 (0.29%)	4 (0.27%)

RESULTS

- The number of patients receiving pre-procedural antibiotics, both in the total procedure and sub-group of central line placements, decreased significantly over the two study periods.
  - The overall usage of antibiotics dropped 17.91% (37.65% to 19.74%) with an odds ratio of 2.46 (95% CL 2.22-2.72, $p<0.001$)
  - The usage of antibiotics in the central line arm dropped 22.67% (34.51% to 11.84%) with an odds ratio of 3.95 (95% CL 3.27-4.77, $p<0.001$).
- No statistically significant change in CLABSI rate was observed before and after implementing guidelines to the central line placement groups; the rate of CLABSI was 0.29% before, and 0.27% after ($p=0.89$).
- 35% decrease in total cost of antibiotics before and after the implementation of the guidelines.

CONCLUSION

- Guidelines related to pre-procedural antibiotic usage was not being utilized, and thus pre-procedural antibiotics was being overused.
- The reduction of pre-procedural antibiotic usage in patient's undergoing central line placement did not result in an increase in infectious complications, as quantified by CLABSI incidents.
- There was a 35% cost reduction in total antibiotic cost before and after implementing the SIR based guidelines.

CONCLUSION

This data suggests that by dropping our pre-procedural antibiotic administration, we can improve financial burden and decrease potential adverse effects associated with antibiotic administration, while simultaneously not significantly increasing the risk of post-procedural infection.

REFERENCES

- Magill SS, O'Leary E, Ray SM, et al. Assessment of the Appropriateness of Antimicrobial use in US Hospitals. JAMA Network Open. 2021;4(3):e212007. Doi: 10.1001/jamanetworkopen.2021.2007
- Bratzler DW, Dellinger EP, Olsen KM, et al. Clinical Practice Guidelines for Antimicrobial Prophylaxis in Surgery. Am J Health-Syst Pharm. 2013;70:195-283.
- Chehab MA, Thakor AS, Tulin-Silver S, et al. Adult and Pediatric Antibiotic Prophylaxis during Vascular and IR Procedures: A Society of Interventional Radiology Practice Parameter Update Endorsed by the Cardiovascular and Interventional Radiological Society or Europe and the Canadian Association for Interventional Radiology. 2018;29:1483-1501. Doi: 10.1016/j.jvir.2018.06.007