

# PPI Use and Adverse Effects in SATL Hospitals

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## Background

Proton Pump Inhibitors (PPI) are widely prescribed for GI disorders worldwide. With the advent of PPI, treatment of acid-related GI disorders has revolutionized and they have become one of the top selling medicines. Total cost expenditure is estimated at over \$11 billion annually in the US.(1) PPI have tremendous therapeutic benefit in treatment of PUD, dyspepsia, NSAIDs induced ulcer, for the treatment and maintenance of GERD, and for the eradication of H. pylori and hypersecretory disorders, such as Zollinger Ellison syndrome and Stress Ulcer Prophylaxis. There is a common belief that PPI have very low levels of toxicity and are perceived to be safe and cost effective.(2) However, evidence is mounting against it. NICE has published guidelines for PPI usage in different clinical indications. For most of these presentations, they are only intended for 4-8 weeks. In a minority of conditions (severe Barrett's esophagus), protracted courses may be required. However, inappropriate prescription of PPI continues to rise every year that adds to adverse effects including C.diff diarrhea, pneumonia, bone fractures, nutritional deficiencies, interference with antiplatelet metabolism, AKI and CKD(4) and healthcare costs. A study of 29,000 patients with admission and discharge on a PPI showed that 69% lacked medical indication and total PPI cost \$3,013,069 during first 30 days post-discharge.(4) Some reasons for PPI's misuse in hospitals are stress ulcer prophylaxis in non-ICU patients, failure to discontinue PPI before discharge and in ambulatory care settings include failure to reevaluate need for continuation, misuse of on-demand and step-down therapy and misdiagnosis of GI conditions.(5)

## Objective

To Compare PPI prescribed inpatient for appropriate & inappropriate indications in different SATL hospitals & their impact on the incidence of pneumonia, hypomagnesemia and C. diff compared to normal population

## Methods

Retrospective

52,712  
18+

Patients admitted to SATL hospitals & started on PPI

July 2017- July 2019

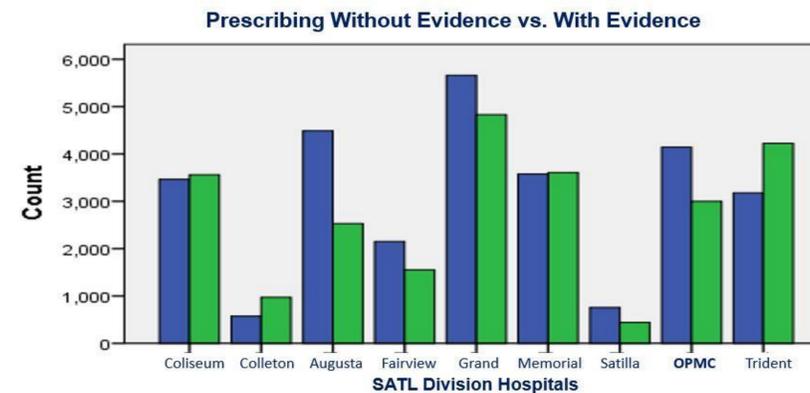
84 ICD-10 codes- NICE 2000

Regression Analysis

A QI project was conducted over a period of 6 months to improve appropriate prescribing of PPI's for patients being admitted to OPMC. The intent of our project was to improve PPI's prescribed for evidence based reasons, and decrease PPIs prescribed without evidence based reasons. Educative lectures and pocket sized cards were given to the residents during didactics and to the attending's and other hospital providers in Department meetings. Data was run after 6 months to observe the effects of intervention.

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## Results



Blue: without evidence based reasons  
Green: with evidence based reasons

### Rates for Pneumonia, Hypomagnesemia & C-Diff in patients on PPI's compared to Normal Population

	Sig (p)	Adj O.R	95% C.I
Pneumonia	.000	1.785	1.401-2.274
Hypomagnesemia	0.012	2.830	1.25-6.386
C- Diff	0.230	2.032	0.639-6.460

### Rates for Pneumonia in patients on inpatient PPI and on home PPI compared to Normal Population

	Sig (p)	Adj O.R	95% C.I
Inpatient PPI	.000	1.591	1.461-1.733
Home PPI	0.142	1.065	0.979-1.159

### Patients prescribed PPIs for evidence Vs. non-evidence based reasons before and after educational intervention

	No evidence	Evidence
Patients admitted on PPI	4710	3639
Before intervention	3953	2854
After intervention	757	785

## Discussion

- Study showed that all hospitals in the SATL division are prescribing PPI's without evidence-based indications at a significant rate. (Fig 1)
- Rates for Pneumonia, Hypomagnesemia and C. difficile are higher in patients on PPI's compared to normal population which are statistically significant for pneumonia and hypomagnesemia. (Fig 2)
- Patients who received inpatient PPI were 1.5 times as likely to develop pneumonia compared to patients who did not receive an inpatient PPI (p<.0005 [Sig.], 95% confidence interval [1.461, 1.733]). This p-value is significant at significance level  $\alpha=.05$ . (Fig 3)
- Patients who receive home PPI were 1.06 times as likely to develop pneumonia compared to patients who did not receive home PPI (p=.142 [Sig.], 95% confidence interval [.979, 1.159]). This p-value is not significant at significance level  $\alpha=.05$ . (Fig 3)
- Of 8349 admissions with an inpatient PPI in data, 3639 had evidence while 4710 did not. More patients were prescribed PPI for non-evidence based reasons than were for evidence based reasons. (Fig 4)
- Of 6807 patients admitted at OPMC with PPI before intervention, 2854 (41%) had evidence & 3953 (58%) did not. Among 1542 patients admitted after intervention, 785 (50%) had evidence and 757 (49%) did not. (Fig 4)
- Patients who received home PPI after intervention were 1.461 times as likely to have an evidence diagnosis code compared to patients who received an inpatient PPI before (p<.0005 [Sig.], 95% confidence interval [1.307, 1.633]). This p-value is significant at significance level  $\alpha=.05$ . (Fig 5)
- Limitations of our study are that the database source is from hospitals in SATL region only and it is a retrospective study, therefore, could not confirm decision-making process. Sample size could be the reason for C-Diff result not statistically significant.

## Conclusion

PPI's are over-prescribed for non-evidence based reasons at all SATL hospitals and they are associated with an increase in likelihood of Pneumonia, Hypomagnesemia and C-diff. Educational intervention at OPMC has resulted in improvement of appropriate prescription of PPI.

## References

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