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Effect of Electronic Medical Record (EMR) Intervention on Appropriateness of Transthoracic Echocardiogram (TTE) Orders

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Background

- Given the variety of clinical indications for TTE, its use has rapidly increased, and now accounts for nearly half of U.S. spending on cardiac imaging.
- Prior studies report 10-15% of TTEs are done for inappropriate indications.
- In addition to cost, inappropriate TTEs can lead to potentially harmful downstream testing and procedures.
- We developed an EMR-based decision-support algorithm based on 2011 AUC for Echocardiography, and hypothesized that this would reduce inappropriate TTEs performed in our institution.

Methods

- From October-December 2016 (pre-intervention), consecutive TTEs ordered in the inpatient, outpatient, and emergency department settings were included.
- In May 2017, a decision-support algorithm was incorporated into the EMR.
- Chart review was performed for TTEs ordered from June-August 2017 (early-intervention) and from June-August 2018 (late-intervention) to determine appropriateness based on the 2011 Appropriate Use Criteria for Echocardiography.

Results

Table: Demographics

Variables	Overall (n=1576)
Age	68.57 (+/- 10.50)
Male	97.00% (1529)
Coronary Artery Disease	45.30% (714)
Myocardial Infarction	10.79% (170)
Diabetes	42.96% (677)
Chronic Kidney Disease	34.39% (542)
Heart Failure	34.84% (549)
Stroke/Transient Ischemia Attack	8.57% (135)
Atrial Fibrillation	31.92% (503)
Hypertension	22.78% (359)
Obese (BMI >= 30)	44.92% (708)

Figure 1

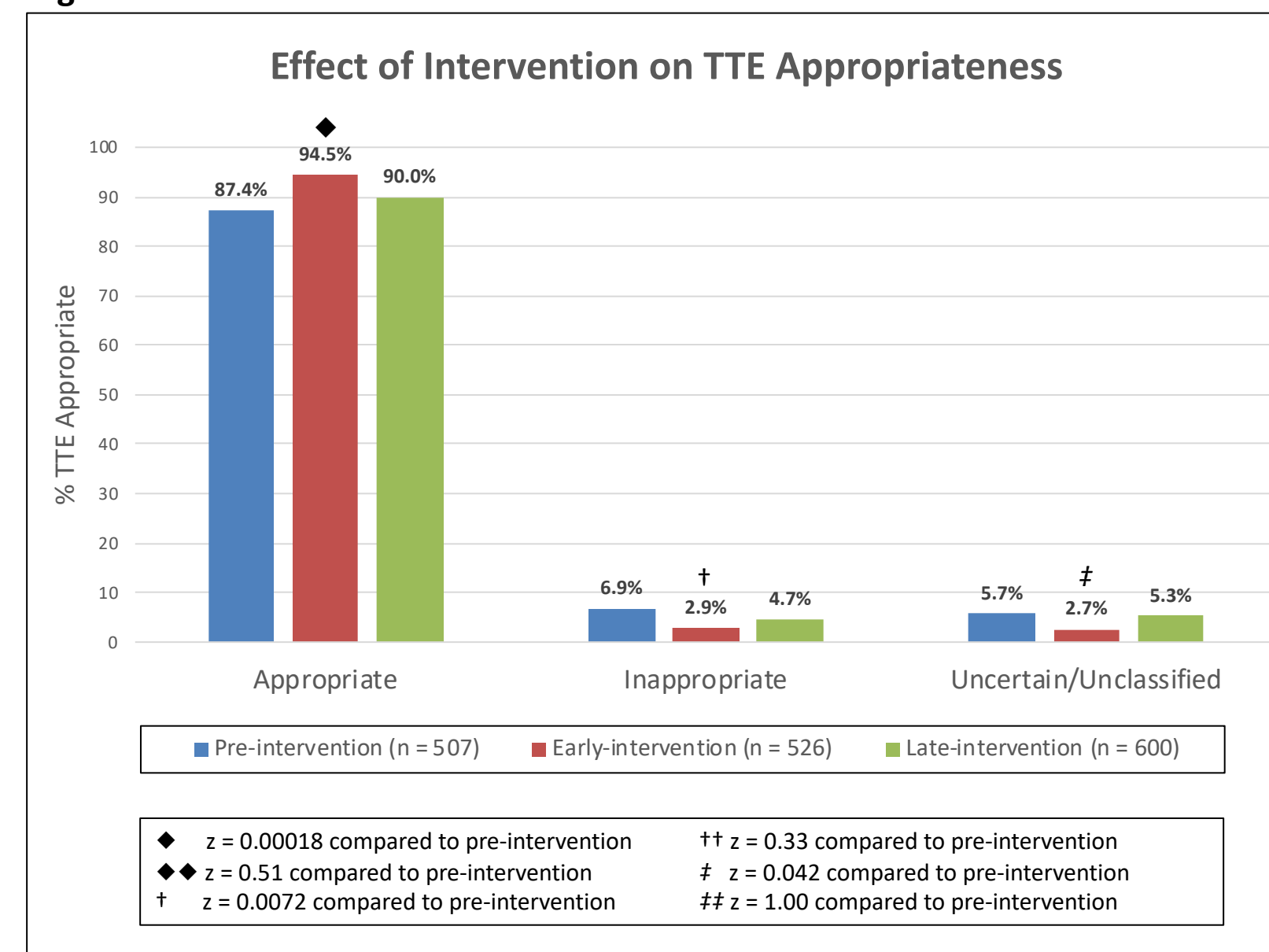
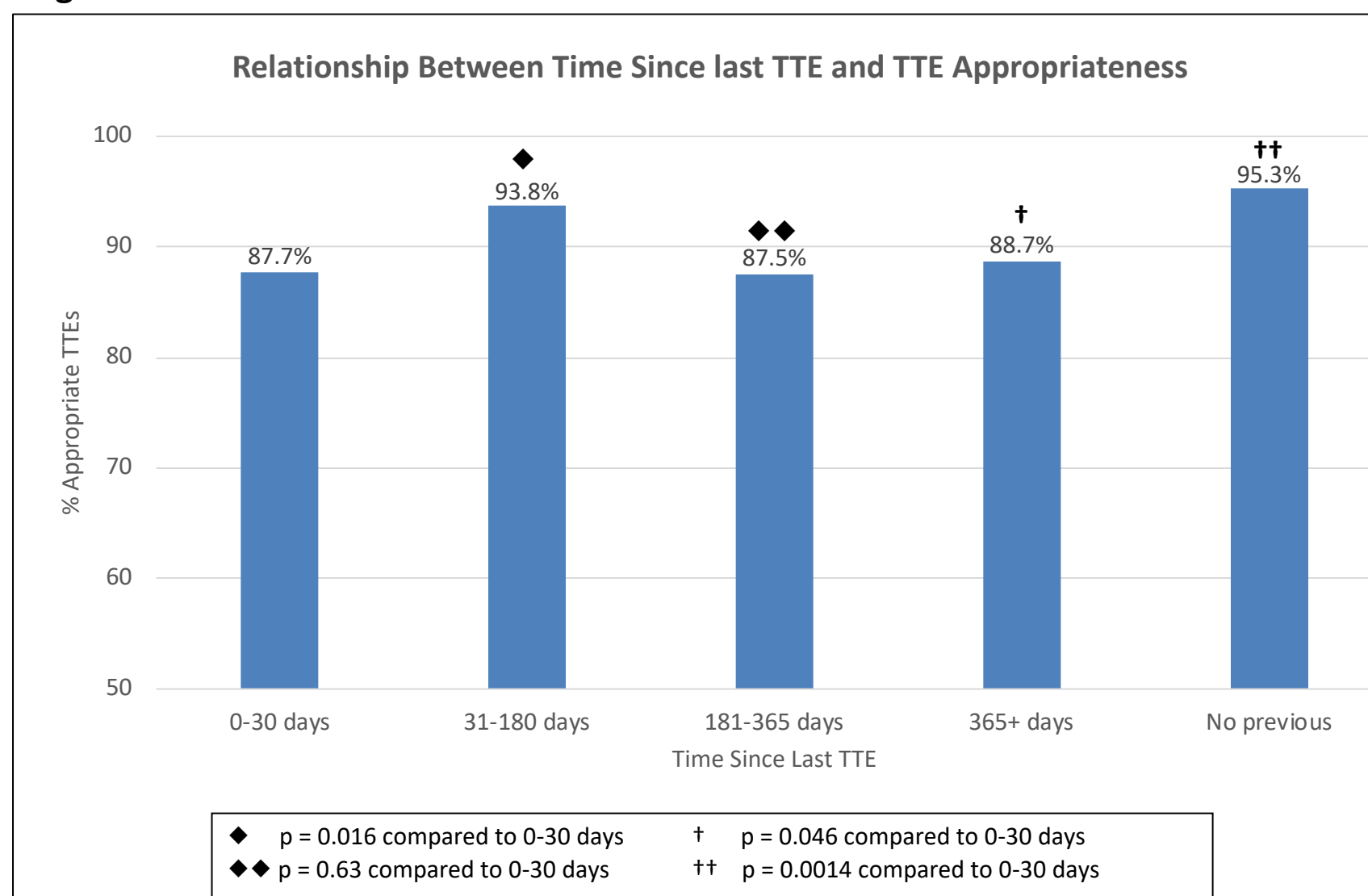


Figure 2



- Appropriate TTEs increased from 87.6% pre-intervention to 94.5% early-intervention but decreased to 90.0% late-intervention (Figure 1).
- Among patients with no previous TTEs in our system, 95.3% of TTEs were appropriate, compared with 87.7% of TTEs for patients with prior TTEs within 30 days prior (Figure 2).

Conclusions

- This EMR intervention initially led to a significant increase in appropriate TTE orders and concomitant significant decrease in inappropriate TTE orders, but the effect decayed after a year.
- Repeat TTEs, especially those performed within 30 days of priors, were less likely to be appropriate, whereas TTEs performed on patients with no priors were more likely to be appropriate.

Future Directions

- EMR-based interventions to flag TTE orders for patients with very recent TTEs may help further decrease redundant testing.
- Additional efforts could evaluate EMR-based interventions that focus on common inappropriate TTE indications.
- Further studies could evaluate addition of educational interventions to complement and reinforce each EMR decision-support tool.

Disclosures

The authors have no potential conflicts of interest related to this work to disclose.