

An Automated System for Analyzing the Application of TTE Appropriate Use Criteria

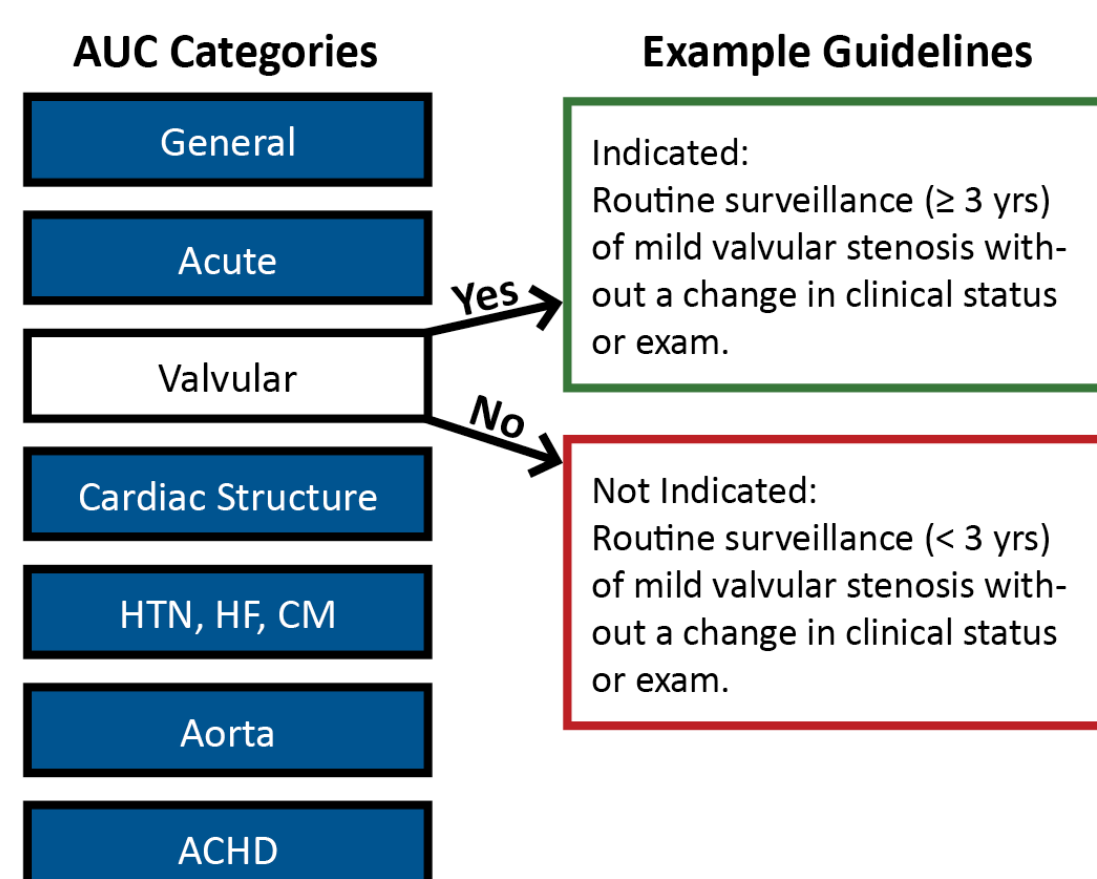
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ABSTRACT

Transthoracic Echocardiograms (TTEs) are frequently performed inappropriately as defined by the appropriate use criteria (AUC) jointly published by the American Heart Association (AHA) and American College of Cardiology (ACC)¹⁻³. To characterize this problem, we developed a program to automatically analyze TTEs from an electronic health record system and categorize them based on the AUC guidelines. Using the Medical Information Mart for Intensive Care III (MIMIC-III) database⁴, more than 99% of the 30,320 TTEs were classified into one of six main AUC categories: general; acute; valve; cardiac structure; hypertension, heart failure, or cardiomyopathy (HTN, HF, CM); aorta; and adult congenital heart disease (ACHD). Future development will incorporate additional clinical data in order to determine TTE appropriate use rates for entire health systems.

INTRODUCTION

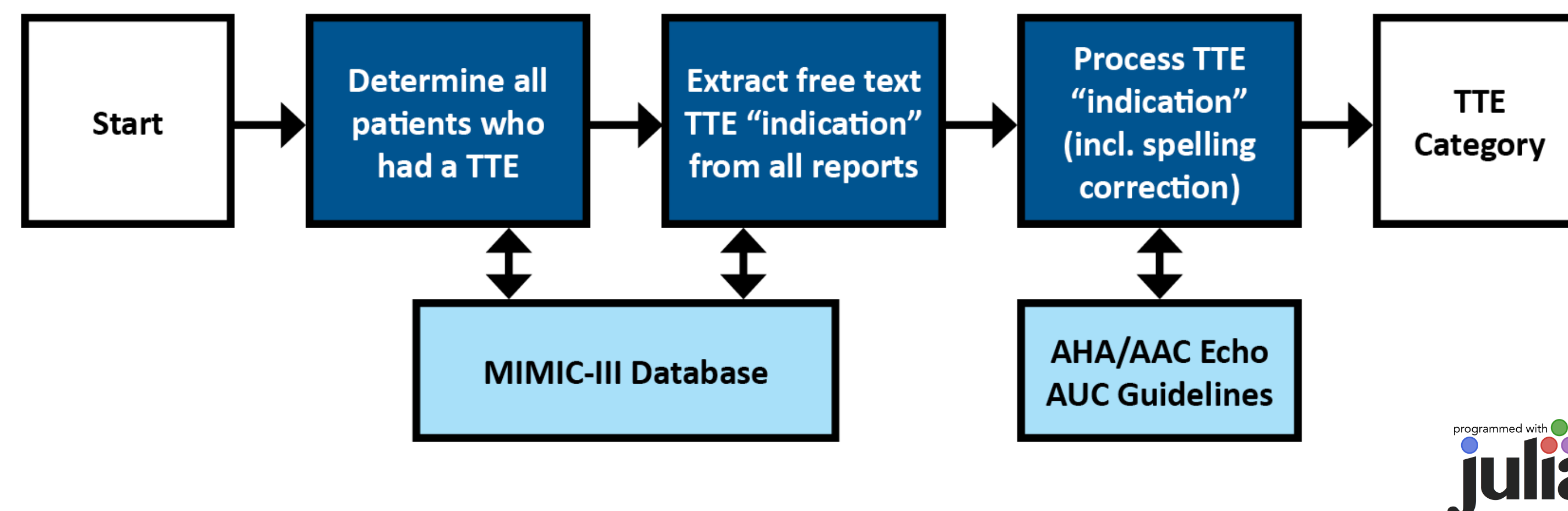
- TTE is a powerful, noninvasive tool for the assessment of cardiac structure and function
- Medicare alone spends >\$1B annually on TTE⁵
- AHA/ACC AUC guidelines¹:



- Guideline based training improves AUC rates^{2,3}

Purpose: To develop a system to automatically classify TTEs into one of seven AUC defined categories

METHODS



RESULTS

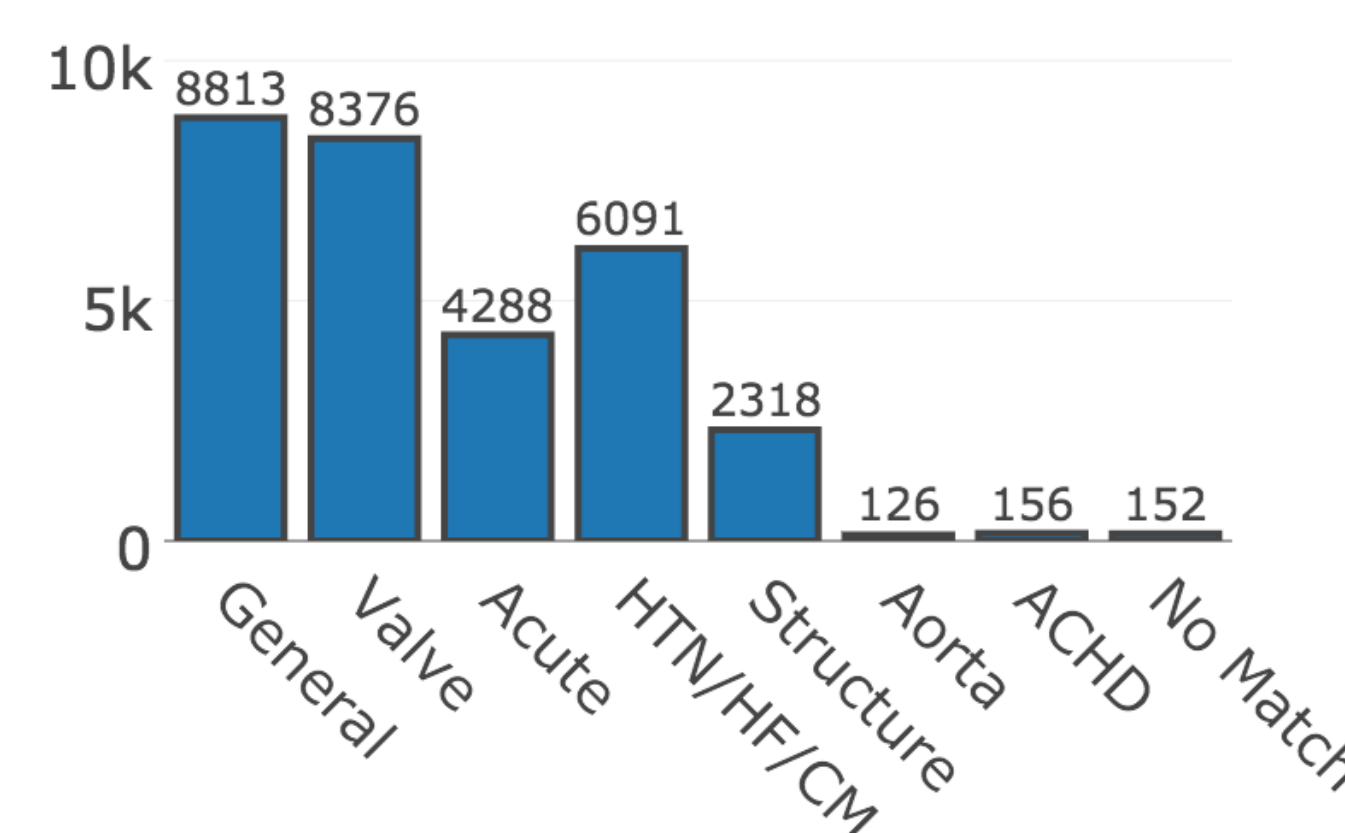
Population Characteristics

Patients (n)	18487
TTEs (n)	30,320
TTEs per pt (n)	1.6 (1-2)
Inpatient (%)	38
Age (years)	68 (56-79)
Sex (% F)	56
Height (in)	67 (64-70)
Weight (lbs)	170 (144-201)
BMI	26.8 (23.4-31.3)

Uncategorized Reasons

Total	152
No Indication	45
Non-specific	76
Uncommon	31

TTE Categories



Spelling Correction

TTEs Recategorized (n)	1552
Would have been uncategorized (n)	176

CONCLUSIONS

- It is possible to automatically classify TTEs into categories defined by the AHA/ACC AUC guidelines
- The most common AUC category for TTE in the MIMIC-III database was "General" followed by "Valve", "HTN/HF/CM", "Acute", and "Structure".
- Spelling correction is an important factor in processing TTE indication free text (despite short length).
- Our TTE categorization algorithm is an important first step towards assessing TTE AUC guideline adherence across entire health systems for quality improvement.

FUTURE DIRECTIONS

- Refine term match weighting algorithm
- Validate classification against trained cardiologists
- Apply program to Lifespan Health System (IRB in progress)
- Further develop program to classify appropriateness of each TTE using additional clinical data

REFERENCES

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