Dear Editor,

Echocardiogram forms an integral part of the Duke’s criteria and is central to the diagnosis of infective endocarditis (IE).\[1\] Transthoracic echocardiogram (TTE) has been found to have a lower sensitivity for detection of vegetations (40–60%)\[2\] as compared to transesophageal echocardiogram (TEE) (94–100%).\[3\] Yet, TTE is routinely ordered in cases of suspected endocarditis. The American Heart Association (AHA) guidelines recommend TEE as the initial test to rule out endocarditis in high-risk individuals: Patients in which the window for a TTE would be obscured (for example, obese patients), patients with prosthetic valves, patients with pre-existing valvular abnormalities, congenital heart diseases, previous IE, new murmur, heart failure, other stigmata of IE, patients with bacteremia from
organisms known to be a cause of endocarditis and patients for which clinicians have a high suspicion of endocarditis.[4]

We performed a retrospective quality improvement study to evaluate any incremental benefit from ordering TTE in high-risk patients with suspected infective endocarditis (IE). The study also looked into the cost analysis of ordering TTE prior to TEE.

The study period was from May 2009 to June 2011. Using standardized billing codes, patients were selected based on the following criteria: Final diagnosis of IE, underwent both TTE and TEE and had presence of vegetations on TEE.

We included 27 high-risk patients who fulfilled the inclusion criteria. We found that TTE detected evidence of vegetations in only 29.6% of the patients. Sensitivity was especially low for detection of vegetation on mitral and tricuspid valves [Table 1].

This study demonstrated the limitations of TTE in detection of endocarditis as represented by valvular vegetation, valvular flow abnormalities and ring abscess. With a sensitivity of 29%, TTE would seem to be a poor choice for the initial evaluation of IE. Given that TTE is especially inferior to TEE in detecting vegetation in the mitral (11%) and tricuspid (16.7%) valves. In our study, all patients with tricuspid endocarditis had a history of IV drug use. Therefore, in patients with a history IV drug use, performing TEE as an initial diagnostic test would be a reasonable option. Also, it is known that patients with pre-existing mitral valve disease are susceptible to mitral valve endocarditis, so they might also be considered for TEE as an initial diagnostic tool. Ring abscess was seen on 2 TEEs (one aortic valve and one mitral valve) within our sample population, and TTE was not able to identify either of these.

We also looked at the sensitivity of TTE in diagnosing regurgitant lesions. The sensitivity of TTE was 78% [Table 2]. We used TEE as the gold standard test, and compared TTE to this.

From a financial standpoint, ordering TEE initially has the potential to curb significant health care spending while sacrificing little in terms of diagnostics. National Medicare reimbursement rates for TTE and TTE are $367 and $513, respectively. In this study of 27 subjects for example, more than $9,000 could have been saved if TEE had been done as the initial diagnostic test.

**CONCLUSION**

TTE does not add any beneficial information and is not cost-effective when applied to high-risk patients.

**REFERENCES**

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**Table 1: Summary of cases with vegetation on TEE and TTE**

| Vegetation on TEE | Vegetation on TTE | TTE sensitivity | P  |
|-------------------|------------------|-----------------|----|
| Aortic            | 12               | 50%             | 0.0016 |
| Mitral            | 9                | 11%             | 2.7 × 10 ⋅ 7 |
| Tricuspid         | 6                | 16.7%           | 0.00027 |
| Pulmonic          | 0                | N/A             | 0  |
| Total             | 27               | 29.6%           | 1 × 10 ⋅ 10 |

TTE: Transesophageal echocardiogram, TTE: Transthoracic echocardiogram

**Table 2: Cases with valvular flow abnormalities on TEE and TTE**

| Regurgitation on TEE | Regurgitation on TTE | TTE sensitivity | P  |
|----------------------|----------------------|-----------------|----|
| Aortic               | 9                    | 88%             | 0.34 |
| Mitral               | 9                    | 67%             | 0.03 |
| Tricuspid            | 5                    | 80%             | 0.27 |
| Pulmonic             | 0                    | N/A             | 0  |
| Total                | 23                   | 78%             | 0.057 |

TTE: Transesophageal echocardiogram, TTE: Transthoracic echocardiogram