



# A clinical audit of transthoracic echocardiography in Malaysia: A district hospital experience

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## ABSTRACT BACKGROUND

Echocardiography is a very useful tool that is able to aid in the diagnosis of various cardiac diseases. Transthoracic echocardiography in particular provides important valuable cardiac information allowing the clinician to make crucial decisions. Requests for such procedures have been increasing steadily throughout the years. With the growing number of patients and need to handle imaging workload, we now examine the use of echocardiography in a single district hospital with limited resources.

## OBJECTIVE

To evaluate and audit the usage of transthoracic echocardiography as an outpatient and inpatient basis.

## METHODS

This was a retrospective, cross-sectional, single center study of all patients that underwent transthoracic echocardiograms in Miri Hospital, Sarawak in the past 1 year from 1st January till 31st December 2017. The only exclusion criteria was patients whom echocardiography were requested but not performed for various reasons. Data retrieval was done by manual collection of echo request forms. SPSS version 21 was used to analyze the data.

## RESULTS

Echocardiograms were done for a staggering total of 3196 patients. 1734 (54%) were males while 1462 (46%) were females. There were 1015 inpatients and 2181 outpatients. The age ranged from a month old to 98 years old with mean age of  $49 \pm 23$ . The distribution of ages was skewed left. Based on the total number of patients seen in the hospital, 21% of admitted medical patients had echocardiograms done and 15% of medical clinic patients underwent echocardiograms. Indications vary and include Hypertension (35%), Heart Murmurs Evaluation (12.2%), Acute Coronary Syndrome (12.3%), Pre Chemotherapy (3%), Pre Operative Assessment (1.4%) with the others which were non specific contributing the remaining 36.1%. Sources of referral were mainly from Medical/Nephrology Department (54.4%), Paediatrics (12.2%), District Hospitals/Health Clinics (11.7%), Anaesthesiology (5.3%), Surgery

(4.8%), Obstetrics & Gynaecology (3.3%) and the rest (8.3%).

## CONCLUSIONS

This particular audit indicates that there is room for improvement for the service. We would need to streamline the indications to reduce imaging burden as well as adopt a more pragmatic approach in request for echocardiography in our current setting.

## KEYWORDS

Transthoracic, Echocardiography, Clinical Audit

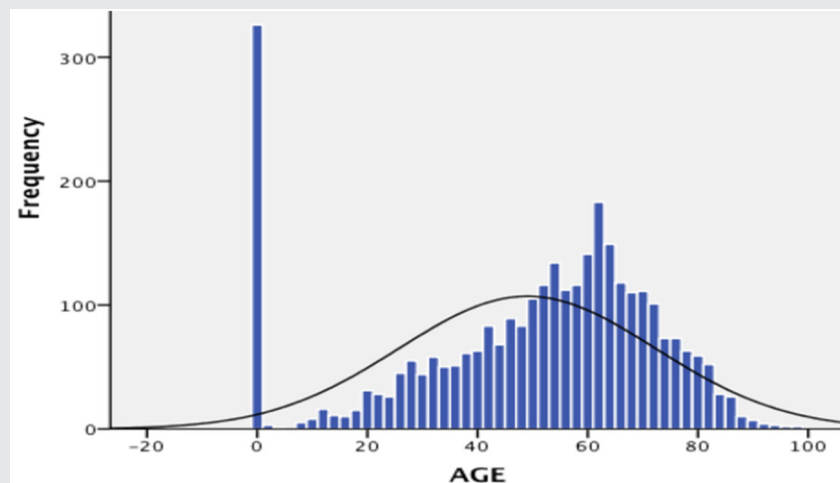
## INTRODUCTION

Echocardiography is an indispensable tool and usually acts as an adjunct to clinical assessment of cardiac patients.<sup>1</sup> Transthoracic echocardiography (TTE) in particular is one of the most widely used non invasive procedure in clinical setting especially as a bedside procedure in the Emergency and Intensive Care Units.<sup>2</sup> The cardiologist or sonographer performing the TTE requires sufficient clinical information about the patient as well as a clear indication of the test. These allows the echocardiographer to perform a detailed yet focused cardiac ultrasound which then provides an accurate objective assessment of the heart. Routinely, all of this information should be made available in an adequately filled written request form unless the test is being performed in an emergency setting.<sup>3</sup>

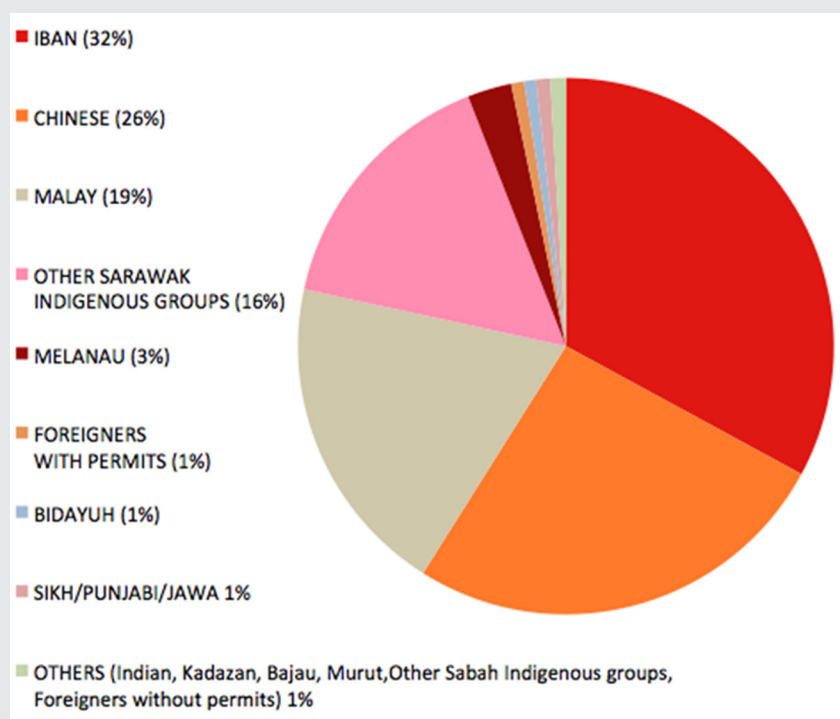
Requests for such procedures have been increasing steeply throughout the years by various departments including Medical, General Surgery, Obstetrics & Gynaecology and Anaesthesiology. In addition to that, by being non-invasive and widely available, TTE can easily be over-requested leading to unnecessarily long waiting lists as outpatient and inappropriate requests resulting in a large number of normal echocardiographic findings.

In recent years, few national echocardiography societies have addressed this issue by creating documents containing appropriateness criteria which serve as a guide to physicians at the time of requesting such a test.<sup>4, 5</sup> However,

**Figure 1: Age Distribution**



**Figure 2: Racial Distribution**



implementation of such echocardiography request criteria have yet to be assessed completely in the hospitals in our country.

With the increasing number of patients and need for efficient management of imaging workload, we now examine the use of echocardiography in a single district hospital with limited resources.<sup>6</sup>

**METHODS**

This was a retrospective, cross-sectional, single

center study of all patients that underwent transthoracic echocardiograms in Miri Hospital, Sarawak in the past 1 year from 1st January till 31st December 2017. The only exclusion criteria was patients whom echocardiography were requested but not performed for various reasons.

So far there is only one available echocardiography machine which is Philips HD 15 ultrasound machine which was utilized to perform the echocardiographic studies.

Data retrieval was done by manual collection and review of echo request forms and reports

SPSS version 21 was used to analyze the data.

**RESULTS**

Echocardiograms were done for a staggering total of 3196 patients in the past entire year.

In terms of gender, a total of 1734 patients (54%) were males while 1462 (46%) were females. There were 1015 inpatients and 2181 outpatient studies.

The age ranged from a month old to 98 years old with mean age of 49 ± 23. The distribution of ages was skewed left (**Figure 1**).

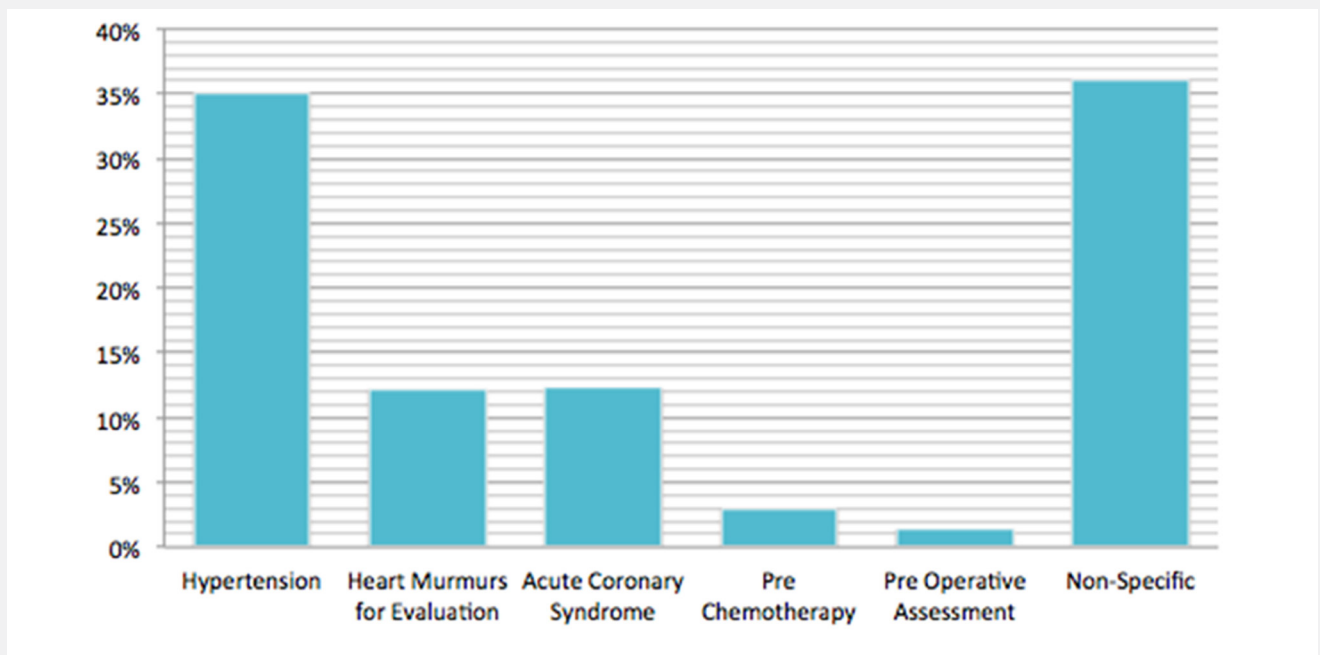
Racial distribution as in **Figure 2** were as follows: Iban (32%), Chinese (26%), Malay (19%), Other Sarawak indigenous groups which consists of Kenyah, Kayan, Kedayan, Murut, Punan, Bisayah, Kelabit, Berawan and Penan (16%), Melanau (3%), Foreigners (1%), Bidayuh (1%), Sikh/Punjabi (1%) and remaining 1% consisted of Indian, Kadazan and Bajau.

Based on the total number of medical patients seen in the hospital in 2017, 20.6% of admitted medical patients had echocardiograms done and 14.5% of medical clinic patients underwent echocardiograms. There were 4914 medical patients admitted while 14944 medical patients seen in clinics for the year 2017.

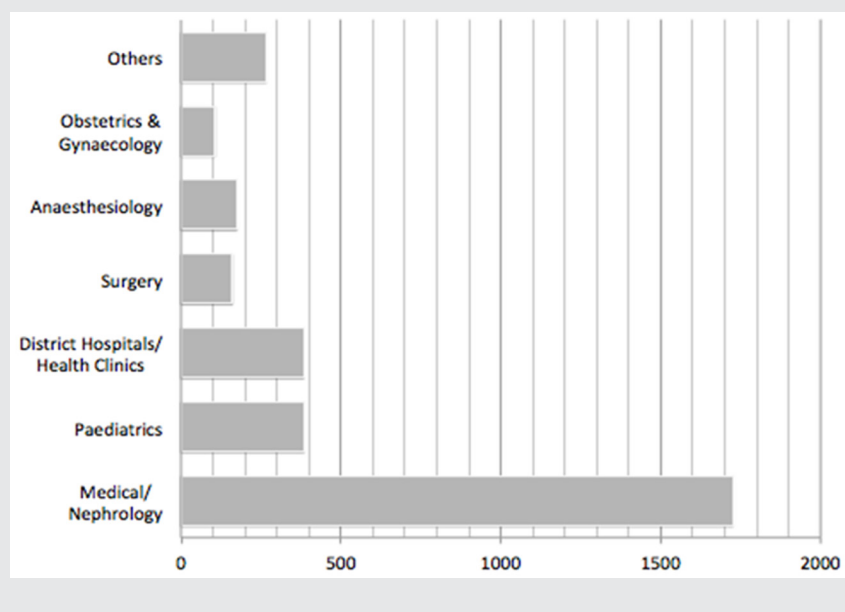
Indications vary and included Hypertension (35%), Heart Murmurs Evaluation (12.2%), Acute Coronary Syndrome (12.3%), Pre Chemotherapy (3%), Pre Operative Assessment (1.4%) with the others which were non specific contributing the remaining 36.1%. The non specific indications included but not limited to looking for heart failure, infective endocarditis, left ventricular thrombus, pericardial effusion and pulmonary hypertension. These percentages are illustrated in **Figure 3**.

Sources of referral (**Figure 4**) were mainly from Medical & Nephrology Department (54.4%), Paediatrics (12.2%), District Hospitals & Health Clinics (11.7%), Anaesthesiology (5.3%), Surgery (4.8%), Obstetrics & Gynaecology

**Figure 3. Indications for Transthoracic Echocardiography from 1st January to 31st December 2017**



**Figure 4: Sources of Referral**



(3.3%) and the remaining 8.3% was contributed by other departments which are Orthopaedics, Ophthalmology, Otorhinolaryngology, Dental, Emergency & Psychiatry.

**DISCUSSION**

The time frame for inpatient TTE was within a day to a week depending on the urgency of the request, number of planned echocardiographic studies on that respective day as well as the

complexity of each respective case. This is in contrast to the outpatient TTE which were performed from as early as 2 weeks to 8 weeks period.

Based on the total number of patients, an average of 9 echocardiograms were being done daily by a single echocardiographer. There was also a substantial number of paediatric cases. The racial distribution was almost similar as the population of Miri except that in terms of echocardiograms, there were more chinese than the malay patients.

This audit was similar with the one by Aje A et al in terms more males had echocardiograms done, mean age was very similar 49 with 51 and Hypertension was the commonest indication. The audit on the indications was a challenging task in view of factors such as no clear documentation, illegible handwriting on forms, unnecessary repetition and questionable indications.<sup>2</sup> As in another audit, numerous request details were also missing.<sup>2</sup>

Unfortunately, we were unable to perform a detailed analysis on the missing details as most of the manual request forms were not available. However, it was noted by the echocardiographer that aside from the indication, three details commonly missing or filled wrongly were the race, telephone numbers and occasionally the missing signature of the specialist/consultant in charge. Due to the diverse racial groups, it was noted that the doctors occasionally could not precisely identify the race. On the other hand, the telephone numbers in the clinical notes were

not updated or out of service whereas missing supervisor's signature was attributed to the hectic clinic schedule or ward.

Further study is currently being undertaken to analyze whether the echocardiographic requests follow the appropriateness criteria or the established indications by international guidelines.<sup>4,5</sup> So far in this study, we were able to ascertain that most of the normal TTE reports were due to routine evaluation of patients with ischaemic heart disease and heart failure.<sup>7</sup> According to this study, Therefore it is prudent for the clinician to determine whether it is necessary to repeat a TTE after assessment of patient's clinical status.

### CONCLUSIONS

Amongst the published clinical audits on echocardiography, the focus was either on the entire service, Emergency or in ICU settings. This particular audit indicates that there is room for improvement for the service. Although this is an experience in a single center, we believe many other institutions with TTE facilities face similar challenges in regards to the workload and whether all echocardiographic studies were truly indicated in the first place. We would need to streamline the indications to reduce imaging burden as well as adopt a more pragmatic approach in request for echocardiography in our current setting.<sup>2,6</sup>

As TTE becomes more readily available, there has been concerns that such a procedure should be monitored closely to avoid any abuse.<sup>2</sup> Therefore a more structured and innovative method of requesting an echocardiographic study along with storing the results would not only fulfill that need but allow a more detailed analysis of the usage in the future. Such an endeavor is currently being undertaken in Miri Hospital, Sarawak.

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Conflict of Interest: None

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