Author's response to reviews

Title: The Utility of Pocket-Sized Echocardiography to Assess Left Ventricular Systolic Function Prior to Permanent Pacemaker Implantation

Authors: Lawrence Lau, BSca. email: umlau23@myumanitoba.ca Robin Ducas, MD. email: umducasr@cc.umanitoba.ca Jacques Rizkallah, MDb. email: jacquesyr@yahoo.com Davinder S Jassal, MDb. email: djassal@sbgh.mb.ca Colette M Seifer, MBb. email: cmseifer@sbgh.mb.ca

Institutions: aFaculty of Medicine, University of Manitoba, Winnipeg, Manitoba, Canada. bSection of Cardiology, Department of Internal Medicine, Faculty of Medicine, University of Manitoba, Winnipeg, Manitoba, Canada. Corresponding Author: Dr. Colette Seifer MB (Hons), FRCP (UK) Y3019 St Boniface Hospital Winnipeg, Manitoba, Canada R2H 2A6 phone: (204) 235-3826 fax: (204) 233-2157

Authors:

Lawrence Lau (umlau23@myumanitoba.ca)
Robin Ducas (umducasr@cc.umanitoba.ca)
Jacques Rizkallah (jacquesyr@yahoo.com)
Davinder S Jassal (djassal@sbgh.mb.ca)
Colette M Seifer (cmseifer@sbgh.mb.ca)

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Author's response to reviews: see over
February 18, 2015

Attention: Editor-in-Chief
Dr. Rosa Sicari, CNR Institute of Clinical Physiology

Re: Revised MS 8246469191502499: The Utility of Pocket-Sized Echocardiography to Assess Left Ventricular Systolic Function Prior to Permanent Pacemaker Implantation

Dear Dr. Sicari:

Thank you for your review of our manuscript entitled, “The Utility of Pocket-Sized Echocardiography to Assess Left Ventricular Systolic Function Prior to Permanent Pacemaker Implantation.” Attached you will find detailed responses to the two reviewers in addition to a revised manuscript with changes noted in red text. We hope that you will find our revised manuscript acceptable for publication in Cardiovascular Ultrasound.

Should anything further be required, please do not hesitate in contacting me.

Sincerely,

Dr. Colette Seifer MB (Hons), FRCP (UK)
Associate Professor, Director, WRHA Arrhythmia Program
Associate Head Section of Cardiology, Department of Internal Medicine and
Associate Chief of Cardiology, Cardiac Sciences Program
Y3019 Bergen Cardiac Care Centre, St Boniface Hospital
Winnipeg, Manitoba R2H 2A6
phone: (204) 235-3826
fax: (204) 233-2157
email: cmseifer@sbgh.mb.ca
1. "I think that it’s simplistic to limit the evaluation to ventricular function only, but the concept of triage in patients candidate to PPM should be extended to the evaluation of all the structural heart diseases. This concept should be further developed in the discussion section."

We agree with the review on this comment. Under the limitations and future directions section on page 10 of the revised manuscript, we have added the following statements. “Finally, although this study validated the use of PSE in assessing LVEF, if more extensive information on cardiac structure and function is required clinically prior to PPM implantation sTTE is superior to that of PSE. For example, other cardiomyopathies including hypertrophic cardiomyopathy, noncompaction of the left ventricle, and arrhythmogenic right ventricular dysplasia may present with bradyarrhythmias and a high risk of SCD due to tachyarrhythmias. It follows that there are limitations in training a sonographer only to interpret LVEF; broader training with PSE in other aspects of echocardiography may be important to provide more extensive use of this technology.”

2. "The statistical section is missing. In the new version of the work the authors should add this paragraph."

As recommended by the reviewer, on page 6 of the revised manuscript, under Methods, we have added a statistical analysis section. Specifically, we have added the following statements: “Statistical analysis was performed with GraphPad Prism 6 (GraphPad Software, Inc., San Diego, CA). Data are presented as percentages and the mean ± SD. The Cohen’s kappa coefficient was used to measure inter-observer concordance for categorical variables with confidence intervals of 95%. The Chi-squared test was used to calculate sensitivity, specificity, positive predictive value, and negative predictive values, accordingly.

3. "The discussion section is too long and need to be shortened focusing the attention on the results of the study and their practical application.”

We thank the reviewer for this suggestion. As recommended, the discussion section in the revised manuscript has been shortened to reflect the most relevant aspects of the research, with redundancies removed. The language surrounding “sonographic trainee” and “echocardiologist” has been revised to be more consistent.
Reviewer #2

1. “The authors included a rather ‘healthy’ patient population: only 8 patients (by the cardiologist’s judgment, table 3) or 10 (by the trainee’s judgment) had any degree of LV dysfunction, and even less (5/4) had significant LVD in the range where consequences like an ICD are to be contemplated. At the same time, the cardiologist judged 5 cases as uninterpretable. I find it difficult to draw meaningful conclusions out of this low number of ‘end points’.

The baseline characteristics of landmark clinical trials including patients undergoing pacemaker implantation, such as AFFIRM and CTOPP, are similar to the demographics of patients included in this study. Regarding LVEF specifically, 74% of patients in AFFIRM had LVEF > 50% measured with echocardiography, while 70% of patients in CTOPP had “normal” LVEF observed clinically or measured with echocardiography. Ghani et al. reported in a smaller study that 79% of patients had an LVEF > 40% in a pacemaker clinic prior to implantation. Our study found that 82% of patients had an LVEF > 50%. While a large proportion of the study demography had no LVSD, these numbers are representative of a pacemaker population, in which LVSD is relatively uncommon. As several images were uninterpretable, his study reflects the reality of performing PSE in a triage setting, and may suggest the need for further echocardiographic evaluation in patients where PSE is insufficient. This paragraph doesn’t fully address the concerns raised by the reviewer, ie the low number of patients for end points: this is considered a limitation in our study.

2. “Only a minority of cases (28/39%) had a standard echocardiography in addition to the PSE study within a reasonable time window. Concordance was 100/96% in this subset with respect to EF estimation. Although not very likely, it can thus not be completely excluded that both trainee and cardiologist went wrong with their interpretation of the PSE images in the other 61% of cases. In a controlled study situation like this one, and before suggesting the use of PSE in less controlled areas, in this reviewer’s opinion there should be a ratio of PSE vs. standard echocardiography close to 1:1.”

The primary purpose of this investigation was to examine the ability for a trainee without prior experience in echocardiography to be trained to collect and interpret PSE images in a pacemaker patient population. This study demonstrated this was possible, as there was good inter-observer concordance. Although the accuracy of PSE compared to standard echocardiography was not systematically examined, a subset of patients underwent LVEF determination with both PSE and standard TTE and the authors felt that this was a relevant piece of data to share. The discussion about accuracy on page 9 and 10 will include that this was not the primary objective of this study. Additionally, this limitation is addressed directly in the limitations and future directions section on pages 9 and 10 of the revised manuscript, in which we have added: Although this study commented on the accuracy of PSE compared to sTTE in a subset of patients, this was not the primary objective. Image accuracy has been previously well described in various other patient populations. Finally, although this study validated the use of PSE in assessing LVEF, if more extensive information on cardiac structure and function is required clinically prior to PPM implantation sTTE is superior to that of PSE.