End of Study Report to Mesothelioma UK

To be completed in typescript and submitted by the Principle Investigator

1. Details of the Principle Investigator

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Has the PI changed since the last progress report:	No

2. Details of the study

Full title of the study:	Assessment of Chest Wall Motion Using Structured Light Plethysmography (SLP) in Mesothelioma and Benign Pleural Disease
Name of Research Ethics Committee (REC)(if applicable):	*NRES Committee west midlands – the black country*
REC reference number:	10/H1202/58
Date of favourable ethics opinion:	18/02/2016
Sponsor (if applicable):	*University Hospitals Birmingham NHS Foundation Trust (formerly Heart of England NHS Foundation Trust)*

3. End of Study and/or termination dates

Was the study completed or did it terminate without completion?	The study completed to time and target.
Date the study completed/terminated early:	July 2018

4. Study summary

Please provide a general summary of the project in lay mans terms. Please try to limit to 1 A4 sheet. Please include detail of any deviations from the original proposal.
Problems with fluid or thickening around the lung are associated with over 300,000 hospital admissions in England per year and there are many different diseases that can cause fluid or thickening around the lung. One of the most serious causes is mesothelioma, a cancer caused by asbestos, which has very bad chances of survival. It is difficult for doctors to be sure whether a patient has mesothelioma or another disease that looks the same on scans but has no effect upon survival. The time between having symptoms and having a diagnosis of mesothelioma is very stressful for families and their loved ones. The final test to diagnose mesothelioma involves taking a piece of tissue from around the lung, which often involves surgery and the surgery has it's own risks and side effects. The James Lind Alliance, a collective of patients, carers and healthcare professionals, identified a need for improvements in the process for diagnosing mesothelioma and preliminary tests showed that the movements of the chest were very restricted in people with mesothelioma compared to people with thickening or fluid around the lung that was caused by infection.[1,2] This study explored the potential to use a new test that measures movements of the chest as a part of the diagnostic pathway. A test called SLP involves shining a chequerboard of light onto the chest of the patient as they breathe normally for 5 minutes. The computer can then calculate how their chest is moving and their pattern of breathing. We invited patients who were having surgery to diagnose mesothelioma to have the SLP test as well before their surgery. We then compared the results of SLP to the results of surgery to see whether SLP could tell the difference between people who had mesothelioma and people who didn't. We also tested whether the SLP results were related to how long patients with mesothelioma survived after surgery. The results showed that SLP could not tell the difference between people with mesothelioma and those without it with enough accuracy for doctors to be confident of the diagnosis. We found that movements of the chest were more restricted in people who did not have mesothelioma compared to people who did have it; this was the opposite of what was expected. This may be because the test cannot measure 360 degrees around patients or it may be that people without mesothelioma have stiff tissue that forms a thick layer but the mesothelioma tumour may be more flexible. SLP did not have a link with how long patients with mesothelioma survived. We were able to check and confirm that an existing way of predicting survival (the Brims Decision Tree) worked in our patients as well as those the tree was made for.[3] This checking process is an important step for doctors to be confident that survival predictions are relevant for patients. We concluded that SLP should not be added to the tests to help diagnose mesothelioma. Patients found the test easy and acceptable so there may still be a use for chest movements to monitor patients with mesothelioma as they have treatment, this would need further research. References 1. Stephens RJ, Whiting C, Cowan K, James Lind Alliance Mesothelioma Priority Setting Partnership Steering Committee. Research priorities in mesothelioma: A James Lind Alliance Priority Setting Partnership. Lung Cancer Amst Neth. 2015 Aug;89(2):175–80. 2. Elshafie G, Kumar P, Djearaman M, Aliverti A, Naidu B. The Effect of Benign and Malignant Pleural Disease on Chest Wall Mechanics. Am J Respir Crit Care Med. 2017 Jul 14;196(2):241–2. 3. Brims FJH, Meniawy TM, Duffus I, de Fonseka D, Segal A, Creaney J, et al. A Novel Clinical Prediction Model for Prognosis in Malignant Pleural Mesothelioma Using Decision Tree Analysis. J Thorac Oncol Off Publ Int Assoc Study Lung Cancer. 2016 Apr;11(4):573–82.

Why is this research important? What impact do you think it will have in the short and long term?
Our results contradict previous results that showed mesothelioma had very different chest movements, so it was important to explore this further and either support or refute the previous findings. We were able to confirm the usefulness (externally validate) the Brims Decision Tree to assess survival, which is an essential step before the tree can be accepted in routine use. The tree can be widely used immediately to help provide people newly diagnosed with mesothelioma about their expected survival, should they wish to know this information and plan their life accordingly. Chest movements may be assessed in further research to see if they are helpful in assessing response to treatment in the longer term.
How has this research grant helped you?
The research has helped broaden my understanding of mesothelioma and the difficulties around its diagnosis. The patient contribution and willingness to take part in this study has been overwhelming and certainly help drive this research forward. Further research is needed to assess the clinical used of SLP in treatment to which we will strive to complete in the future.

5. Budget

Have there been any major deviations from the budget proposed at the start of the project?	No
If the budget is delivered directly from Mesothelioma UK, please provide a spending report with this document.	Statement to follow.

6. Other issues

Are there any other issues that you wish to report to the Committee, about this study:	No
Have you disseminated any results from this study to date: If Yes, please provide details and references.	Yes – partially The results were presented at the IASLC World Conference on Lung Cancer in Toronto Canada in Autumn 2018 reference: *Oswald N, Kerr A, Mehdi R, Turner A, Naidu B, Assessment of Chest Wall Motion Using Structured Light Plethysmography (SLP) in Mesothelioma and Benign Pleural Disease, JTO, October 2018, 13(10):S753 DOI:10.1016/j.jtho.2018.08.1283* The full paper has been drafted and is being submitted to the European Respiratory Journal Autumn 2020.

7. Declaration

Signature of Principle Investigator:	
Print Name:	Babu Naidu
Date of Submission:	19/08/2020