ResApp Announces Positive Preliminary Results from Adult Clinical Study

High accuracy achieved for the diagnosis of chronic obstructive pulmonary disease (COPD), asthma and pneumonia in adults, equivalent to overall accuracy in children

- **92%-100% accuracy for distinguishing adult patients with COPD, asthma and pneumonia from subjects with no discernible respiratory disease**
- **94% accuracy for distinguishing a group of patients with COPD or asthma from subjects with no discernible respiratory disease**
- **Successfully demonstrated differential diagnosis of asthma versus COPD and pneumonia versus asthma in adults with 95%-96% accuracy**

Perth, Western Australia, 21 June 2016 -- ResApp Health Limited (ASX: RAP), the developer of smartphone medical applications for the diagnosis and management of respiratory disease, today announced positive preliminary results from its first clinical study in adults underway at Joondalup Health Campus (JHC) in Perth, Western Australia. The study has enrolled a total of 322 adult patients. The preliminary results on a 143 patient subset of the available data, prepared by the team led by Associate Professor Udantha Abeyratne at The University of Queensland, demonstrate similarly high levels of sensitivity, specificity and accuracy as previously reported in ResApp's paediatric study.

These preliminary results show high levels of accuracy for distinguishing adult patients with COPD (96% accuracy), asthma (92% accuracy) or pneumonia (100% accuracy) from subjects with no discernible respiratory disease using ResApp's cough-based diagnostic technology. Distinguishing the group of asthma and COPD patients from the no respiratory disease group was also achieved at an accuracy of 94%. The differential diagnosis of asthma versus COPD, and pneumonia versus asthma was achieved at an accuracy in the range of 95% to 96%. The complete set of results, including sensitivity and specificity are given in the table below.

"These are a terrific set of preliminary results that provide an excellent indication that the algorithms which Dr Abeyratne's team originally developed for children are equally accurate in adults," said Dr Tony Keating, CEO and Managing Director of ResApp. "These results begin to build the foundation for our adult diagnostic clinical and regulatory strategy and significantly increase the addressable market for our technology."

As in the paediatric study, the performance of the algorithm was evaluated using the method of leave-one-out cross-validation against the clinical diagnosis provided by the JHC clinical team. This diagnosis was based on the clinical presentations, auscultation findings (listening to the internal sounds of the body using a stethoscope) and imaging as well as laboratory test results when clinically indicated for the diagnosis of a given respiratory disease. As smoking is an important factor in adult respiratory disease, the group of subjects with no discernible respiratory disease was split into two subgroups, one group with a history of smoking and the other with no history of smoking. Smoking history was self-reported.

ResApp notes that these results are preliminary and may change as the clinical study progresses and more patients are added to the dataset. Larger datasets and prospective studies will be needed to produce results with higher statistical validity. Recruitment of adult patients at JHC continues and enrollment of patients at the Wesley Emergency Center in Brisbane, Queensland has recently commenced.

Table of respiratory disease groups used in this preliminary analysis

Normal Group: Smokers (27 subjects)	Subjects with no discernible respiratory disease at the time of measurement with a history of smoking.
Normal Group: Non-smokers (52 subjects)	Subjects with no discernible respiratory disease at the time of measurement with no history of smoking.
COPD Group (22 subjects)	Patients with a diagnostic classification of one or more of the following: COPD, COPD with infective or non-infective exacerbation, emphysema. The diagnostic standard is the overall clinical assessment supported by either lung function tests, CT scans or both.
Asthma Group (25 subjects)	Patients with a diagnostic classification of either acute or chronic asthma. Some subjects have concomitant upper respiratory tract infection (URTI) and allergic nasal obstructions. Chronic asthma was diagnosed using lung function tests and acute asthma on history and examination.
Pneumonia Group (17 subjects)	Patients with a diagnostic classification of pneumonia with or without URTI. Only X-ray or CT confirmed pneumonias are considered.

*In addition to these groups, the available dataset includes patients diagnosed with other respiratory diseases and comorbidities that were not considered in this preliminary analysis.

Table of preliminary results

Target Group(s)	Control Group	Sensitivity	Specificity	Accuracy
COPD	Normal: Non-smokers			
(cough alone)		91%	92%	92%
(with age)		100%	98%	99%
COPD	Normal: Smokers			
(cough alone)		91%	93%	92%
(with age)		100%	93%	96%
Asthma	Normal: Non-smokers			
(cough alone)		96%	87%	90%
(with age and presence of runny nose)		92%	92%	92%
Asthma	Normal: Smokers			
(cough alone)		96%	96%	96%
(with age and presence of runny nose)		100%	96%	98%
Pneumonia	Normal: Non-smokers			
(cough alone)		100%	96%	97%
(with presence of runny nose)		100%	100%	100%
Pneumonia	Normal: Smokers			
(cough alone)		100%	100%	100%
(with presence of runny nose)		100%	100%	100%
Asthma and COPD	Normal: Non-smokers			
(cough alone)		87%	88%	88%
(with age, presence of runny nose and fever)		94%	94%	94%
Asthma and COPD	Normal: Smokers			
(cough alone)		94%	89%	92%
(with age)		96%	93%	95%
Asthma	COPD			
(cough alone)		88%	91%	89%
(with history of smoking)		96%	95%	96%
Pneumonia	Asthma			
(cough alone)		88%	80%	83%
(with presence of fever)		94%	96%	95%

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About ResApp Health Limited

ResApp Health Limited (ASX: RAP) is a digital health company developing smartphone applications for the diagnosis and management of respiratory disease. The technology is based on machine learning algorithms that use sound alone to diagnose and measure the severity of respiratory conditions without the need for additional hardware. The algorithms were initially developed by The University of Queensland with funding from the Bill and Melinda Gates Foundation. ResApp has a paediatric clinical study underway with preliminary results demonstrating accurate diagnosis of pneumonia, asthma/viral wheeze, bronchiolitis, croup and upper respiratory tract infections in children. ResApp recently initiated a clinical study in adults. Markets for ResApp's technology include telehealth use through partnerships with telehealth service providers, emergency department and regular clinic use by healthcare providers, at-home use by consumers and working with global aid and humanitarian organisations to deliver tools for the developing world.

For more information on ResApp, visit www.resapphealth.com.au