therapy. This low proportion (9.5%) is in stark contrast to the USA where, mainly as a result of policy directives in line with the goal of TB elimination in the USA [6], 74–79% of patients diagnosed with LTBI commence treatment [7, 8]. In our cohort of contacts, low treatment rates for LTBI appeared to be mainly a consequence of physicians' reluctance to offer LTBI treatment rather than low patient uptake of treatment.

In conclusion, in a setting where more than half of all screened contacts were born overseas and the background incidence of TB is low, contacts of patients with TB have a significantly increased risk for TB compared to the general overseas-born population of Australia. Most contacts who develop active TB are diagnosed with TB at the time of the initial screening, thus efforts should be made to ensure at least one screening visit for every identified contact at risk. Few contacts received treatment for LTBI in this study setting, due to physicians' reluctance to prescribe preventive treatment.

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Support Statement: C.C. Dobler is supported by a University of Sydney Postgraduate Award Scholarship. There was no other study funding. The funders of the research scholarship had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Statement of Interest: None declared.

Acknowledgements: We acknowledge Rose Ampon (Woolcock Institute of Medical Research, University of Sydney, Sydney, Australia) for performing the database linkage. We also acknowledge Con Tsiavos (Sydney West Area Health Service, Sydney, Australia) who wrote the script for data extraction from the CSS database. Our thanks go to Jeremy McAnulty (New South Wales Ministry of Health, Sydney, Australia), who granted access to the New South Wales TB notification database and Amanda Christensen, (New South Wales TB Program Manager; New South Wales Ministry of Health) who facilitated the data linkage.

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DOI: 10.1183/09031936.00183812

Using the Chartis system to selectively target a lung segment with a persistent air leak

To the Editor:

Persistent air leak (PAL) is an important complication of pneumothorax, especially of secondary pneumothorax. PAL increases not only the morbidity and mortality of patients, but also the length of hospital stay and costs. When a chest drain and suction fail to stop the PAL, surgical intervention is recommended according to the British Thoracic Society guidelines on pneumothorax treatment [1]. Pleurodesis is considered as an alternative treatment when surgical repair is impossible due to an underlying comorbidity. Diverse chemical and biological substances, including autologous blood [2], talc [3, 4], fibrin [5] and antibiotics [6], have demonstrated various efficiencies to treat PAL. Recently, an endobronchial valve (EBV) was successfully utilised to treat PAL [7–9]. Targeting the lung lobe or segment with an air leak is a prerequisite for stopping PAL using EBV. In the present study, we report a novel way of identifying the precise location of an air leak with a catheter-based device (Chartis system; Pulmonx Inc., Redwood City, CA, USA), which can measure airway pressure and flow.

A 49-year-old male presented to the emergency department with dyspnoea. His medical history included recurrent right-sided pneumothorax, for which he had received a video-assisted thoracoscopic lobectomy 3 years earlier. Chest computed tomography revealed pneumothorax on the left side. The air leak did not show any downward trend during a 45-day period after pleural tube placement. Pleurodesis with tetracycline was performed through the chest tube and proved to be futile on the PAL.

Before EBV was carried out to treat the PAL, we performed an assessment using the Chartis system to determine the exact lobe or segment with PAL. As most cases of spontaneous pneumothorax originate from the upper lobes, the left upper lobe (LUL) was selected to be assessed as a priority. After the main bronchus of the LUL was occluded by the balloon of the Chartis catheter, a negative pressure (-10 cmH_2O) was exerted to the exhaust port of the thoracic drainage bottle. The patient's inspiratory pressure was overlapped with the negative pressure created by the vacuum, but the former dominated in the pressure waveform (fig. 1). However, after the catheter was inserted into the bronchus B1 and the balloon sealed the S1 segment, a significant and constant negative pressure was observed (fig. 1b). An EBV (Zephyr; Pulmonx Inc.) was deployed in bronchus B1, and the air leak decreased dramatically after the treatment. 3 days after EBV placement, the air leak stopped and the chest tube was removed.

EBV placement has evolved as an alternative pneumothorax treatment to surgical repair after the failure of chest tube placement, especially in patients not suitable for invasive interventions. Before the deployment of an EBV, when the patient was still undergoing treatment with chest tube drainage, a balloon-catheter occlusion method is used to identify the lobe and segment containing the air leak [7–9]. Lobar and segmental airways can be occluded sequentially by the balloon *via* the working channel of bronchoscopy. A substantial decrease of the air leak implies the occlusion of lobar or segmental airways connected to the culprit air leak. Although this method is not complicated, it was criticised for subjective judgement and non-quantitativeness. Recently, a new digital thoracic drainage system, which allows assessment of the leakage objectively and accurately, was used to guide the EBV placement [10].

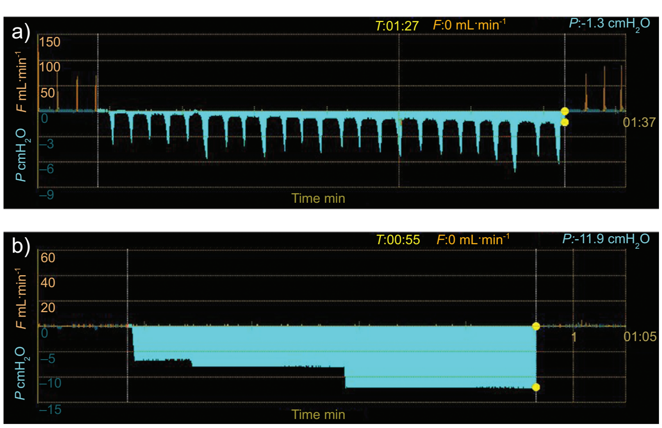

FIGURE 1. Using the Chartis system (Pulmonx Inc., Redwood City, CA, USA) to identify the lung segment with an air leak. a) When the balloon has occluded the lobar bronchus of the left upper lobe, the negative pressure generated by the vacuum was displayed as a low-level (<2 cmH_2O) continuous negative pressure at both the inspiratory and expiratory phases. b) Occlusion of bronchus B1 resulted in a high-level sustained negative pressure, concealing the negative pressure of the inspiratory manoeuvre. *T*: time; *P*: pressure; *F*: flow.

In the present study, we described how to target air leak location using the Chartis system, which was applied to assess collateral ventilation before endobronchial lung volume reduction. The Chartis system integrates a one-way valve into the console and can measure the air flow and collateral resistance simultaneously and dynamically. In the case of pneumothorax, the negative pressure can be conducted from thoracic cavity to the airways through the fistula, and finally to the console through the catheter. In this patient, when the balloon had occluded the lobar bronchus of the LUL, indicated by the disappearance of the airflow, the negative pressure created not only by inspiratory manoeuvre but also by the vacuum could be detected. The latter was manifested as a low-level (<2 cmH_2O) continuous negative pressure at both the inspiratory and expiratory phases. However, occlusion of bronchus B1 resulted in a high-level sustained negative pressure concealing the negative pressure created by the inspiratory manoeuvre. The source of air leakage was localised at the apical segment of the LUL. Separation of apical segment from other parts of LUL made the negative pressure from thoracic cavity transfer directly to the Chartis console though the lung with air leak without redistribution in the whole LUL.

In conclusion, the Chartis system may be used to identify the segment of lung with an air leak and selectively guide the EBV placement. Selectively targeting one segment of lung may conserve the lung function of chronic obstructive pulmonary disease patients with limited respiratory reserve, and make EBV treatment affordable for more patients.

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Statement of Interest: None declared.

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DOI: 10.1183/09031936.00184712