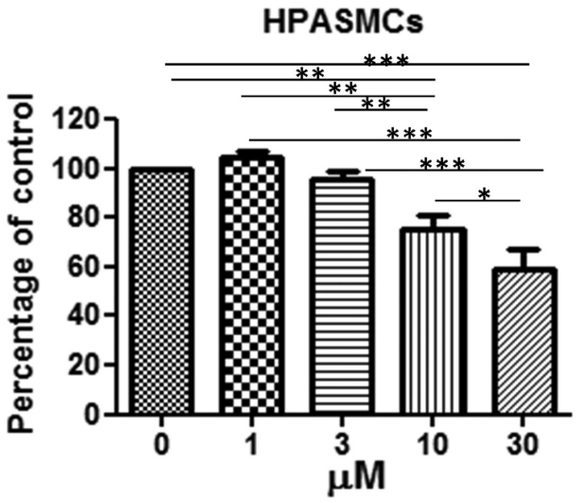

Abstract S39 Figure 2 Bay41–2272 inhibits HPASMC proliferation, data were presented as mean±SEM, n = 3. *p < 0.05; **p < 0.005; ***p < 0.001

determine the effects of Bay 41–2272, the tool compound for riociguat, on remodelling processes in pulmonary vascular cells.

Methods We used primary human endothelial (HPAECs) and smooth muscle cells (HPASMCs) as our target cells. Proliferation was measured using the CyQUANT proliferation kit after cells were treated with various concentration of Bay 41–2272 (kind gifted by Bayer Pharmaceuticals Ltd) for 72 h in the presence of 15% serum. Apoptosis was measured using Cell death ELISA kit and DAPI staining after cells were treated with various concentration of Bay 41–2272 for 24 and 48 h in the absence of serum.

Results Bay41–2272 treatment increased HPASMC apoptosis after 24 and 48 h (Figure 1) by Cell death ELISA; this was further confirmed by DNA condensation assay (DAPI staining). Bay 41–2272 treatment also increased HPAEC apoptosis at 24 h. It was not clear at 48 h treatment whether HPAEC cell death was significant in the absence of serum. Bay 41–2272 treatment reduced HPASMC proliferation (Figure 2), but had no effect on HPAECs.

Conclusions Our preliminary indicate that Bay 41–2272 increases apoptosis and inhibits proliferation, at least in HPASMCs, *in vitro*. Further studies are needed to fully characterise these effects on remodelling processes and to compare sGC stimulators, such as Bay 41–2272 to Type V phosphodiesterases.

Images in pleural disease

S40 IMPROVING THE PATIENT JOURNEY: THORACIC ULTRASONOGRAPHY AS AN ADJUNCT TO DECISION MAKING AND DIAGNOSTIC PATHWAYS IN PLEURAL DISEASE

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Background and method Pleural disease represents a growing source of referrals to respiratory services. Physicians increasingly provide many of the diagnostic and therapeutic interventions these patients require independent of colleagues in radiology or thoracic surgery. This changing practice can streamline diagnostic pathways within individual centres, and is reflected in BTS guidelines and the need for respiratory physicians to train in thoracic ultrasonography (TUS).

Patients referred to our tertiary-level service undergo in-depth TUS to help determine their diagnostic pathway; assessing factors including the nature of any pleural fluid, positioning of intercostal vessels, and movement of the underlying lung. We reviewed our procedural database (January 2010 to June 2014) and clinical records to identify cases where TUS influenced clinical decision making or subsequent investigations.

Results Procedural triage: 359 patients underwent assessment for diagnostic procedures to obtain pleural tissue during the study period. 64 patients were directed to have TUS-guided cutting needle pleural biopsies due to co-morbidity or after TUS identified heavily septated fluid and/or absent lung sliding (representative of adherent lung) that would prevent local anaesthetic thoracoscopy (LAT). One patient was referred for surgical biopsies after TUS identified septated fluid and an at-risk intercostal vessel that would prevent safe intervention by the physician team.

Advanced LAT: 294 LATs were scheduled during the study period. Four LATs were converted "on the table" to TUS-guided cutting needle biopsies after TUS identified increasing septation within the pleural space; a secure diagnosis was obtained in all cases.

95 LATs (32.3%) required Boutin needle pneumothorax induction under TUS guidance. This was successful in 77 cases (81.1%); in those LATs (n = 18) where pneumothorax formation failed an attempt to obtain pleural tissue was made in 10 cases using TUS-guided cutting needle biopsies, making a secure diagnosis in 6 patients.

Conclusion TUS can greatly improve the patient's journey from presentation with pleural disease to diagnosis and should be utilised in all cases. TUS allows selection of the most appropriate means of obtaining diagnostic pleural tissue and facilitates more complex procedures. As interventional respiratory physicians become familiar with the capabilities of TUS this type of advanced practice may become increasingly widespread.

S41 LOOKING BEYOND THE PLEURA – A SYSTEMATIC REVIEW OF THORACIC ULTRASONOGRAPHY TO DIAGNOSE LUNG CONSOLIDATION IN RESPIRATORY FAILURE

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10.1136/thoraxjnl-2014-206260.47

Background and method The use of thoracic ultrasound (TUS) by physicians is increasingly commonplace in light of recent BTS guidelines and changes to training curricula. At its simplest, TUS enhances patient safety during interventions through the identification of pleural fluid and underlying structures. However, TUS training documents in the UK (Royal College of Radiologists) and US (American College of Chest Physicians) acknowledge a need for the ultrasonographer to recognise features of underlying lung, including consolidation.

Pneumonia leading to respiratory failure is a common cause of admission to medical and intensive care units worldwide and associated with significant morbidity and mortality, particularly when diagnosis is delayed. Diagnosis can be challenging and existing tools (clinical examination, CXR or CT) have their recognised flaws. TUS may be an alternative solution, offering patients a bedside investigation that provides clinicians with instant feedback to inform treatment decisions.

We searched MEDLINE, EMBASE and the Science Citation Index Expanded (inception to October 2013) for studies relating to the diagnostic use of TUS in adults with acute respiratory failure due to radiographic consolidation, focusing on studies using CT as their reference standard. Two reviewers independently extracted data from eligible studies and assessed study quality using QUADAS-2.

Results Three cohort studies, all based in an ICU setting, with a total of 134 participants met inclusion criteria. Two studies were at high risk of potential bias, whilst the third had limitations of applicability. The reported sensitivity (0.91 to 1.00) and specificity (0.78–1.00) of TUS in expert hands for CT-detected consolidation was superior to that for CXR (sensitivity 0.38 and 0.68; specificity 0.89 and 0.95). Outside the inclusion criteria, a number of studies of patients with consolidation but no respiratory failure also suggested TUS might have greater diagnostic sensitivity than CXR.

Conclusion TUS remains, at present, a technology with limited evidence to support a front-line role in the assessment of patients with respiratory failure to detect lung consolidation. However, the evidence available is promising and well-designed clinical studies are necessary to ascertain whether TUS can influence relevant outcomes for patient benefit.

S42 SAFETY AND ACCEPTABILITY OF BEDSIDE ULTRASOUND-GUIDED TRANSTHORACIC LUNG NEEDLE ASPIRATION (TLNA) IN PNEUMONIA

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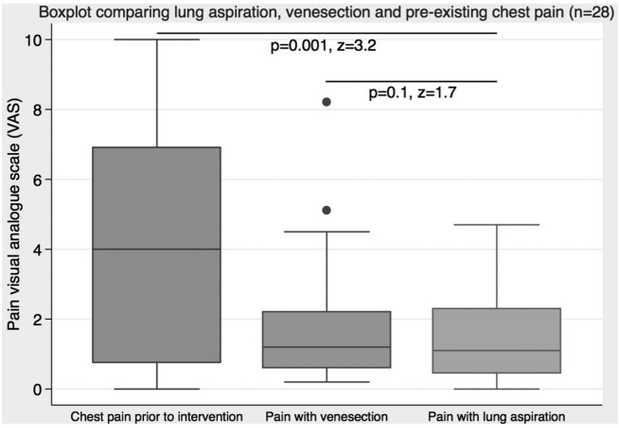
Given the increasing importance of establishing a microbiological aetiology in pneumonia, we undertook a study assessing the safety and acceptability of bedside ultrasound-guided TLNA (REC No. 09/H0605/12). TLNA has previously reported to have been predominantly undertaken without radiological control.



Abstract S42 Figure 1

Methods Participants with community- or hospital-acquired pneumonia completed a baseline assessment of chest pain and pain associated with phlebotomy using a 10 cm visual analogue scale (VAS). Post procedure, participants assessed pain associated with TLNA, and undertook a Likert-based evaluation of the procedure.

Up to 3 mg/kg lidocaine was used to anaesthetise the skin and pleura. An ultrafine 25G needle, attached to a 20 ml luer lock syringe containing 3.5 ml 0.9% sodium chloride solution was inserted into consolidated lung under direct ultrasound guidance by a Respiratory Physician. 0.5 ml of the sodium chloride was injected followed by aspiration with gentle agitation (3 mL of sodium chloride remaining in the syringe as a carrier solution). The needle was then withdrawn. Any pleural fluid present was also aspirated separately.

Samples underwent culture and 16S rRNA gene analysis.

All participants had follow-up chest X-rays post procedure to evaluate for pneumothorax. Participants were systematically assessed while inpatient, and again at 30 days, to assess for any adverse events.

Results 28 participants underwent TLNA, 27 using ultrasound (and one using CT-guidance). No patients experienced haemoptysis or pneumothorax. All patients either 'strongly agreed' (most commonly) or 'agreed' with the statements: 'The lung fluid sample to diagnose your pneumonia was tolerable'; and 'I would have the lung fluid sample again if my doctors thought it was essential'. The VAS-assessed pain of TLNA was significantly lower than any pre-existing chest pain, being similar to any pain associated with venesection (see Figure).

At day 30, one patient had mild ongoing pain at the site of both TLNA and subsequent chest tube insertion, although the relative contribution of each procedure to this pain was unclear.

TLNA increased culture or sequencing-based aetiological diagnosis from 3/28 to 14/28 (18/28 when including pleural fluid analysis).

Conclusions Physician-performed bedside ultrasound-guided TLNA appears safe and well-tolerated.

S43 REAL WORLD EXPERIENCE OF THE USE OF PET-CT FOR DISTINGUISHING BETWEEN BENIGN PLEURAL DISEASE AND MALIGNANT MESOTHELIOMA

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Patients presenting with pleural disease on a background of asbestos exposure pose a diagnostic dilemma. Malignant mesothelioma and benign pleural disease have similar radiological appearances but markedly different prognoses. Definitive histological diagnosis is gold standard, however, there are small case series where PET-CT has been compared to pleural biopsy. These have suggested cut-off standardised uptake values (SUV) of 2.0–3.0, with reported sensitivity of 94.1–100% and specificity of 94–100% for excluding pleural malignancy.

It has been suggested that where the CT appearances are more in keeping with a benign aetiology, pleural avidity on PET-CT may be able to adequately distinguish between benign and malignant disease, identifying a low-risk population that can be observed in preference to proceeding to thoracoscopy.

We are a cardiothoracic centre which utilises PET-CT in this way. We aimed to review our single-centre experience to see if our outcomes were consistent with the reported data.