

**Physiotherapy Lung Ultrasound (LUS) Examinations**

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# Introduction / Purpose

This document aims to provide specific guidance for physiotherapists performing ultrasound examinations of the lungs and expands on [CORP/POL/455](http://fcsp.xfyldecoast.nhs.uk/trustdocuments/Documents/CORP-POL-455.docx) – “*Management of Ultrasound by Non-Radiologists and Non-Sonographers”* (1).

# General Principles / Target Audience

This procedure applies to physiotherapists who have completed (or who are working towards) their competencies in diagnostic lung ultrasound (LUS), to inform their clinical practice, and who are employed by, or working on behalf of Blackpool Teaching Hospitals (BTH).

This procedure applies to paediatric and adult patients at BTH who have been referred to the physiotherapy service, or who have been identified by a member of the physiotherapy team, as having an indication for respiratory physiotherapy input and requiring the use of LUS as part of the assessment process.

LUS can be used on any of the BTH in-patient or out-patient areas at the discretion of the treating physiotherapist.

# Definitions and Abbreviations

**BTH** Blackpool Teaching Hospitals NHS Foundation Trust

**CMPE** Christies Medical Physics Engineering

**COPD** Chronic Obstructive Pulmonary Disease

**CSP** Chartered Society of Physiotherapists

**GE** General Electric

**LUS** Lung Ultrasound

**LUSS** Lung Ultrasound Score

**MDT** Multi-disciplinary Team

**MECU** Medical Enhanced Care Unit

**PPE** Personal Protective Equipment

**PACS** Picture Archiving and Communication System

**QA** Quality Assurance

**RcR** Royal College of Radiologists

**US** Ultrasound

# Responsibilities (Ownership and Accountability)

The responsibility for the implementation of this procedure lies with the individual directorate whose staff are performing the LUS imaging. It is suggested that this service is supported by a lead for LUS, who can ensure adequate governance of the service and prevent disrepute of the service.

# Procedure

BTH physiotherapy staff are advised to read the following publication from the CSP: “*Practice Guidance for Physiotherapists using Point of Care Ultrasound (POCUS) in Physiotherapy Practice”*, PD0139 (2022 (2)) alongside this procedural document.

## Introduction

As a real-time, bedside, point-of-care diagnostic tool, LUS can aid physiotherapists in identifying and assessing the impact of pathologies such as a pneumothorax, interstitial syndrome, consolidation (including pneumonia, atelectasis, or contusion) and pleural collections (effusion, empyema, haemothorax) more quickly and accurately (Le Neindre et al, 2022 (3)).

With its enhanced diagnostic accuracy LUS can increase the efficacy of a physiotherapist's diagnostic thinking, treatment choices, and the efficacy of therapeutic interventions (as an outcome measure), with an overall goal of positively enhancing the outcomes for patients in their care (Hew & Tay, 2016 (4)).

## Clinical Indications

The use of LUS may be indicated as part of a physiotherapy respiratory assessment, and to evaluate physiotherapy treatments or interventions performed by the wider multi-disciplinary team (MDT):

### As an adjunct to a respiratory assessment (Kruisselbrink et al, 2017 (5))

Including but not limited to:

* Unexplained respiratory symptoms (dyspnoea, pleuritic chest pain)
* Unexplained respiratory signs (tachypnoea, desaturation, abnormal physical examination, i.e. Abnormal or absent breath sounds on auscultation)
* High work of breathing
* Unclear chest radiograph finding
* Suspicion of pneumothorax, interstitial syndrome, pleural effusion, or consolidation

### As a monitoring tool (outcome measure)

Including but not limited to:

* Response to physiotherapy treatment/intervention
* Response to MDT treatment/intervention
* Semi-quantitative measure of lung aeration with the Lung Ultrasound Score (LUSS)
* Mechanical ventilation: Weaning failure/recruitment strategies
* Pathology progression
* Fluid tolerance/responsiveness
* To guide future physiotherapy interventions
* Serial scanning as part of ongoing assessments over time

## Requests / Referrals

Staff must review referrals received from other professionals to undertake a LUS scan and make their own decision as to whether a scan is indicated as part of their own physiotherapy assessment and treatment planning process (CSP ‘Practice Guidance’, 2022 (2)).

Staff must only scan within their scanning responsibilities as a physiotherapist. Staff must not scan because someone else tells them to do so on their authority and/or to address shortages in the radiology/sonography workforce (CSP ‘Practice Guidance’, 2022 (2)).

### Exclusions

Including but not limited to:

* Patients with no evidence or concerns of abnormal lung pathology
* Significant surgical emphysema
* Dressings overlying multiple scan regions
* Allergy to lubricant jelly
* Patients with skin sensitivity/rash/sores on the thorax

### Cautions

Including but not limited to:

* Transmissible infection
* Thoracic wounds/burns

## Equipment

BTH Physiotherapists have 24-hour access to a department diagnostic ultrasound machine for all clinical and training requirements. This ultrasound machine can be pre-booked for training sessions but must always be made available for clinical use if needed.

In line with verbal agreements from ward, unit, and/or department leads, physiotherapists may utilise ultrasound machines located in various BTH clinical areas (i.e. critical care, Medical Enhanced Care Unit (MECU), Cardiothoracic Intensive Care).

### Equipment Maintenance and Servicing

BTH Medical Engineering maintains an annual service contract for the physiotherapy department ultrasound machine with Christie's Medical Physics & Engineering (CMPE) (Customer ID: 506742). The management of the service contract is maintained by the contracts manager (ATLAS). Any breakdowns or damage to equipment must be reported to the department's LUS lead in the first instance.

### Equipment usage

All staff using the physiotherapy ultrasound equipment are to be signed off as trained in the use of each ultrasound machine they use under the BTH medical devices Corporate Procedure [CORP/POL/036](http://fcsp.xfyldecoast.nhs.uk/trustdocuments/Documents/CORP-POL-036.docx) – “*Management of Medical Devices”* (6).

### Equipment Cleaning and Decontamination

Please refer to BTH Standard Operating Procedure [RAD/US/SOP/001](http://fcsp.xfyldecoast.nhs.uk/trustdocuments/Documents/RAD-US-SOP-001.docx) – “*Decontamination of Ultrasound Equipment* (7)*”.*

### Personal Protective Equipment (PPE)

Please refer to BTH Corporate Procedure [CORP/PROC/421](http://fcsp.xfyldecoast.nhs.uk/trustdocuments/Documents/CORP-PROC-421.docx) – “*Implementation of the Personal Protective Equipment (PPE)”* (8)

### Ultrasound Gel

Ultrasound gel in single-use sachets is best practice and must be used in the following scenarios:

* Where there is contact with or near non-intact skin (any alteration in skin integrity such as a rash or surgical wound).
* Where the examination is near an indwelling invasive device, such as an intravenous line or drain.
* For examinations on severely immunocompromised individuals (i.e. cancer, transplant, cystic fibrosis, COPD, dialysis).
* In an intensive-care, high-dependency, or equivalent clinical setting.

Further guidance can be found here (9):

<https://www.gov.uk/government/publications/ultrasound-gel-good-infection-prevention-practice/good-infection-prevention-practice-using-ultrasound-gel>

## Examination Environment

* As LUS is a point-of-care imaging technique, LUS scans will be performed in multiple different locations and environments.
* Staff should ensure the examination area has adequate space for the manoeuvrability of equipment around the patient’s bed / chair and allows easy access from all sides.
* Staff should utilise height-adjustable equipment to enable the operator to adopt an ideal scanning position to maximise comfort and minimise the risk of injury, both immediate and long term.
* Staff should utilise adjustable room lighting with easily accessible dimmer controls and shaded windows to eliminate light.
* All imaging supplies (gel and wipes) are stored on the US machine for easy access.

# Specifications of the LUS Examination

## Patient Consent

Verbal consent will be gained from the patient as per [CORP/PROC/102](http://fcsp.xfyldecoast.nhs.uk/trustdocuments/Documents/CORP-PROC-102.docx) – “*Consent to Examination or Treatment”* (10)and this will be documented in their medical record. During the LUS scan patients should be treated with dignity and respect in line with [CORP/POL/002](http://fcsp.xfyldecoast.nhs.uk/trustdocuments/Documents/CORP-POL-002.docx) – “*Providing dignity and respect to patients”* (11).

If the patient does not have the mental capacity as per [CORP/GUID/083](http://fcsp.xfyldecoast.nhs.uk/trustdocuments/Documents/CORP-GUID-083.docx) – “*Implementing the Mental Capacity Act 2005”* (12), consent will be sought in their best interests.

## Pre-scan

* Demonstration of appropriate attitude and professional manner
* Explanation of procedure and its risks to the patient (as appropriate)
* Checking patient’s details/entry into the machine as appropriate
* Confirmation of indication and checking any supportive imaging
* Positioning of patient and machine ergonomically

## Scan

* A systematic examination of lung and pleura as per the accreditation programme.
* Minimum of 3 zones on each hemithorax (upper, lower, and posterolateral regions)
* Recognition of normal thoracic structures and adjacent organs
* Identification of the ultrasound appearances of normally aerated lung
* Recognition of pleural fluid, consolidation, interstitial syndrome, or pneumothorax

## Post-scan

* Adequate documentation and storage of images as appropriate
* Informing patients and reporting findings (as appropriate)
* Identification of the need for a further scan or alternative imaging
* Recognition of normal thoracic structures and adjacent organs
* Cleaning and storage of equipment

## Interpretation

Image interpretation is an integral part of an ultrasound examination. A permanent record of the LUS scan interpretation should be made after the usage of any BTH ultrasound equipment.

All abnormal findings should be adequately demonstrated on the archived images, or an explanation recorded of why this has not occurred. The record of the interpretation should be documented in the patient's clinical record.

## Documentation

Adequate documentation is essential for quality patient care and should be in line with [CORP/POL/567](http://fcsp.xfyldecoast.nhs.uk/trustdocuments/Documents/CORP-PROC-567.docx) – “*Health Record: Generic Clinical Record Keeping Standards Procedure”* (13).

For physiotherapy LUS documentation the I-AIM acronym (Indication, Acquisition, Interpretation, and Management Decision-making) from Kruisselbrink et al (2017 (5)) is the preferred format.

* There must be a permanent record of the ultrasound examination and its interpretation.
* Images of all appropriate areas, both normal and abnormal, should be recorded.
* Any limitations of the study should be included within the report.
* Images should be labelled with the patient identification, facility identification, examination date, and side (right or left) of the anatomic site imaged.
* An official interpretation of the ultrasound findings should be included in the patient’s medical record.
* Retention of the ultrasound record should be consistent both with clinical needs and with relevant legal and local requirements.
* Reporting should be in accordance with “*Standards for the Reporting and Interpretation of Imaging Investigations”* (Royal College of Radiologists, 2018 (14)).

## Image Storage

Where pathways exist, the storage of LUS images on PACS is recommended in line with departmental guidelines to allow access to the study by other health professionals.

## Escalation of Image Findings

A physiotherapist must refer their patient to an appropriate practitioner (consultant, sonographer, radiologist) if they detect imaging findings that are outside of their scope of imaging practice to interpret and/or understand the clinical significance.

# Image Review and Quality Assurance (QA)

The use of LUS by physiotherapists will be continuously monitored through self-reporting of completed scans on the “LUS scan tracker” located on the departmental Teams channel.

An review of scan frequency will be completed each month as a measure of continued LUS scanning experience to highlight any potential decrease in an individual's LUS capability.

# References and Associated Documents

1. **BTHFT - Policy.** Management of Ultrasound for staff Practicing Independently of the Radiology Department. [Online] 11 07 2024. [Cited: 11 03 2025.] http://fcsp.xfyldecoast.nhs.uk/trustdocuments/Documents/CORP-POL-455.docx. CORP/POL/455.

2. **Chartered Society of Physiotherapy.** Information Paper: Practice Guidance for Physiotherapists using Point of Care Ultrasound (POCUS) in physiotherapy practice. [Online] 04 2022. [Cited: 11 03 2025.] https://www.csp.org.uk/system/files/publication\_files/PD139\_POCUSPracticeGuidance\_e1\_Apr22.pdf. Reference: PD0139.

3. **Aymeric Le Neindre, Louise Hansell, Johan Wormser, et al.** Thoracic ultrasound influences physiotherapist's clinical decision-making in respiratory management of critical care patients: a multicentre cohort study. *Observational Study Thorax. 2023 Feb;78(2):169-175. Epub 2022 Mar 23.* [Online] 02 2023. [Cited: 11 03 2025.] https://pubmed.ncbi.nlm.nih.gov/35321941/. PMID: 35321941 DOI: 10.1136/thoraxjnl-2021-218217.

4. **Mark Hew, Tunn Ren Tay.** The efficacy of bedside chest ultrasound: from accuracy to outcomes. *Review Eur Respir Rev. 2016 Sep;25(141):230-46.* [Online] 09 2016. [Cited: 11 03 2025.] https://pubmed.ncbi.nlm.nih.gov/27581823/. PMID: 27581823 PMCID: PMC9487212 DOI: 10.1183/16000617.0047-2016.

5. **Richelle Kruisselbrink, Vincent Chan, Gian Alfonso Cibinel, Simon Abrahamson, Alberto Goffi.** I-AIM (Indication, Acquisition, Interpretation, Medical Decision-making) Framework for Point of Care Lung Ultrasound. *Review Anesthesiology. 2017 Sep;127(3):568-582.* [Online] 09 2017. [Cited: 11 03 2025.] https://pubmed.ncbi.nlm.nih.gov/28742530/. PMID: 28742530 DOI: 10.1097/ALN.0000000000001779.

6. **BTHFT - Policy.** Management of Medical Devices. [Online] 18 05 2021. [Cited: 11 03 2025.] http://fcsp.xfyldecoast.nhs.uk/trustdocuments/Documents/CORP-POL-036.docx. CORP/POL/036.

7. **BTHFT - Procedure.** Decontamination of Ultrasound Equipment. [Online] 10 06 2021. [Cited: 11 03 2025.] http://fcsp.xfyldecoast.nhs.uk/trustdocuments/Documents/RAD-US-SOP-001.docx. RAD/US/SOP/001.

8. —. Implementation of the Personal Protective Equipment (PPE) Regulations 1992. [Online] 14 06 2024. [Cited: 11 03 2025.] http://fcsp.xfyldecoast.nhs.uk/trustdocuments/Documents/CORP-PROC-421.docx. CORP/PROC/421.

9. **UK Health Security Agency.** Guidance: Good infection prevention practice: using ultrasound gel. [Online] Updated: 30/01/2025. [Cited: 11 03 2025.] https://www.gov.uk/government/publications/ultrasound-gel-good-infection-prevention-practice/good-infection-prevention-practice-using-ultrasound-gel.

10. **BTHFT - Procedure.** Consent to Examination or Treatment. [Online] 18 08 2021. [Cited: 11 03 2025.] http://fcsp.xfyldecoast.nhs.uk/trustdocuments/Documents/CORP-PROC-102.docx. CORP/PROC/102.

11. **BTHFT - Policy.** Providing dignity and respect to patients. [Online] 06 12 2022. [Cited: 19 06 2023.] http://fcsp.xfyldecoast.nhs.uk/trustdocuments/Documents/CORP-POL-002.docx. CORP/POL/002.

12. **BTHFT - Guideline.** Implementing the Mental Capacity Act 2005 and Apply the Supporting Code of Practice. [Online] 09 04 2024. [Cited: 11 03 2025.] http://fcsp.xfyldecoast.nhs.uk/trustdocuments/Documents/CORP-GUID-083.docx. CORP/GUID/083.

13. **BTHFT - Procedure.** Health Record – Generic Clinical Record Keeping Standards Procedure. [Online] 23 03 2023. [Cited: 11 03 2025.] http://fcsp.xfyldecoast.nhs.uk/trustdocuments/Documents/CORP-PROC-567.docx. CORP/PROC/567.

14. **The Royal College of Radiologists.** Standards for interpretation and reporting of imaging investigations, Second edition. [Online] 2018. [Cited: 11 03 2025.] https://www.rcr.ac.uk/our-services/all-our-publications/clinical-radiology-publications/standards-for-interpretation-and-reporting-of-imaging-investigations-second-edition/. BFCR(18)1.

| Appendix 1: Equality Impact Assessment Form | | | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Department** | Physiotherapy | | | **Service or Policy** |  | | | **Date Completed:** | | | | 10.10.24 | | |
| **GROUPS TO BE CONSIDERED**  Deprived communities, homeless, substance misusers, people who have a disability, learning disability, older people, children and families, young people, Lesbian Gay Bi-sexual or Transgender, minority ethnic communities, Gypsy/Roma/Travellers, women/men, parents, carers, staff, wider community, offenders. | | | | | | | | | | | | | | |
| **EQUALITY PROTECTED CHARACTERISTICS TO BE CONSIDERED**  Age, gender, disability, race, sexual orientation, gender identity (or reassignment), religion and belief, carers, Human Rights and social economic / deprivation. | | | | | | | | | | | | | | |
| **QUESTION** | | | **RESPONSE** | | | | | | | **IMPACT** | | | | |
| Issue | | | Action | | | | Positive | | | | Negative |
| What is the service, leaflet or policy development?  What are its aims, who are the target audience? | | | Lung ultrasound (LUS) policy  All patients suitable for LUS | | |  | | | |  | | | |  |
| Does the service, leaflet or policy/ development impact on community safety   * Crime * Community cohesion | | | No | | |  | | | |  | | | |  |
| Is there any evidence that groups who should benefit do not? i.e. equal opportunity monitoring of service users and/or staff. If none/insufficient local or national data available consider what information you need. | | | No | | |  | | | |  | | | |  |
| Does the service, leaflet or development/ policy have a negative impact on any geographical or sub group of the population? | | | No | | |  | | | |  | | | |  |
| How does the service, leaflet or policy/ development promote equality and diversity? | | | Applies to all patients | | |  | | | |  | | | |  |
| Does the service, leaflet or policy/ development explicitly include a commitment to equality and diversity and meeting needs? How does it demonstrate its impact? | | | No | | |  | | | |  | | | |  |
| Does the Organisation or service workforce reflect the local population? Do we employ people from disadvantaged groups | | | Not applicable | | |  | | | |  | | | |  |
| Will the service, leaflet or policy/ development   1. Improve economic social conditions in   deprived areas   1. Use brown field sites 2. Improve public spaces including creation of green spaces? | | | Not applicable | | |  | | | |  | | | |  |
| Does the service, leaflet or policy/ development promote equity of lifelong learning? | | | Yes | | |  | | | |  | | | |  |
| Does the service, leaflet or policy/ development encourage healthy lifestyles and reduce risks to health? | | | Yes | | |  | | | |  | | | |  |
| Does the service, leaflet or policy/ development impact on transport?  What are the implications of this? | | | No | | |  | | | |  | | | |  |
| Does the service, leaflet or policy/development impact on housing, housing needs, homelessness, or a person’s ability to remain at home? | | | No | | |  | | | |  | | | |  |
| Are there any groups for whom this policy/ service/leaflet would have an impact? Is it an adverse/negative impact? Does it or could it (or is the perception that it could exclude disadvantaged or marginalised groups? | | | Yes- +ve impact as an alternative imaging option. | | |  | | | |  | | | |  |
| Does the policy/development promote access to services and facilities for any group in particular? | | | No | | |  | | | |  | | | |  |
| Does the service, leaflet or policy/development impact on the environment   * During development * At implementation? | | | No | | |  | | | |  | | | |  |
| **ACTION:** | | | | | | | | | | | | | | |
| **Please identify if you are now required to carry out a Full Equality Analysis** | | | | | | |  | | **No** | | **(Please delete as appropriate)** | | | |
| **Name of Author:**  **Signature of Author:** | | **Simon Hayward** | | | | | | | **Date Signed:** | | | | **28.10.24** | |
|  | | | | | | | | | | | | |  | |
| **Name of Lead Person:**  **Signature of Lead Person:** | |  | | | | | | | **Date Signed:** | | | |  | |
|  | | | | | | | | | | | | |  | |
| **Name of Manager:**  **Signature of Manager** | |  | | | | | | | **Date Signed:** | | | |  | |
|  | | | | | | | | | | | | | | |