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Developing a 'pleural team' to run a reactive pleural service

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Abstract – Pleural disease is increasingly recognised as an important subspecialty within respiratory medicine, especially as cases of pleural disease continue to rise internationally. Recent advances have seen an expansion in the options available for managing patients with pleural disease, with access to local-anaesthetic thoracoscopy, indwelling pleural catheters and thoracic ultrasound all becoming commonplace. Pleural teams usually consist of a range of practitioners who can optimise the use of specialist services to ensure that patients with all types of pleural disease – who have traditionally needed extended admissions – are managed efficiently, often entirely as outpatients. A pleural service can also provide improved opportunities for enhancing procedural skills, engaging in clinical research, and reducing the costs of care. This article explores the justification for dedicated pleural services and teams, as well as highlighting the various roles of hospital personnel who might be most useful in ensuring their success.

KEY WORDS: Pleural, service, team, effusion, management

Introduction

Pleural disease is now increasingly recognised as a distinct entity within respiratory medicine and, much as for other sub-specialties, there is the suggestion that standards of care can be increased by dedicated services. No solid template exists for what constitutes a formal pleural team as the care of patients with pleural disease often draws on a broad range of skills from across the spectrum of healthcare professionals. Nevertheless, the central aim should always be to reduce the lengthy admissions and protracted diagnostic pathways historically associated with pleural disease.[1] This article explores the justification and increasing need for specialist pleural teams, potential members, and suggests strategies to maximise their success in the face of common scenarios and hurdles.

The increasing burden of pleural disease

Evidence suggests that the incidences of some pleural diseases are on the rise internationally. The UK peak of mesothelioma in men is expected around 2015[2] and pleural infection, often linked to underlying pneumonia, has also been increasing in both adults and children.[3,4] Admissions to hospital resulting from pneumonia rose by a third between 1997 and 2005,[5] with an increasingly elderly population most susceptible.[6] Up to 57% of these patients develop a pleural effusion during the course of their illness,[7] with many requiring some form of pleural intervention. Furthermore, increased cross-sectional imaging has undoubtedly contributed to the number of small effusions being detected in both acute medical and oncology patients. Pleural involvement in malignancy is common[8] and frequently causes significant symptoms in those who usually have poor-prognosis metastatic disease.[9] There are likely to be over 40,000 cases of malignant pleural effusion (MPE) each year in the UK[10] and, as people diagnosed with malignancy continue to live longer while the number of new cases is escalating, efficient malignant effusion management is going to become even more important.

Over 50 different systemic conditions are known to affect the pleura,[11] and a number of these may co-exist in any one patient. Careful history and examination can lead to a diagnosis but, as pleural disease tends to manifest in a limited number of ways, further investigation is usually warranted for treatment to be targeted correctly.

Pleural investigations – the modern approach

The move towards specialty triage and care means that many junior doctors have limited exposure to pleural procedures, with chest drain management also increasingly unfamiliar to non-respiratory nursing staff. The potential issues resulting from this were highlighted by a National Patient Safety Agency (NPSA) report, which noted 27 deaths or incidences of serious harm caused by chest drain insertion over a 3 year period, alongside multiple accounts of poor management.[12] This was backed up shortly afterwards by a large-scale survey of acute trusts[13] and has led to a push towards using thoracic ultrasound (US) for all drain insertions. There are also compelling data for the use of ultrasound guidance for more 'simple' thoracentesis, with an elegant study by Diacon *et al.*[14] showing that US was both superior in identifying aspiration sites and able to improve patient safety. This weight of evidence has now been formalised in the British Thoracic Society guidelines on pleural disease,[15] with 'real-time' ultrasound guidance strongly recommended for all pleural procedures.

The basis for a pleural team

All of the above has meant that the medical management of pleural disease has become progressively more reliant on specialist input. On top of this, over the past decade there have been significant advances in the investigation and treatment options for pleural disease, making the management of pleural disease far more complex and nuanced.

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The traditional default management for any kind of significant pleural collection was admission to hospital for insertion of an intercostal drain. For those with malignancy, this usually resulted in an average inpatient stay of around 7 days,[16] with potential delays if tissue diagnosis was required. Patients with pleural infection or a persistent air leak can require significantly longer admissions, often culminating in referral for surgical procedures.[17,18] Driven therefore in part by the spiralling costs of inpatient care and the need for rapid cancer diagnosis, as well as a desire to improve patient experiences, advancements such as pleural-specific cross-sectional imaging, local-anaesthetic ('medical') thoracoscopy, intrapleural thrombolytic therapy, and the use of indwelling pleural catheters (IPC) have become more mainstream.[19] Such developments mean that many pleural patients can be safely and effectively managed as outpatients for almost the entirety of their disease course. The common aims of all pleural teams are to promote admission avoidance and procedural safety, and to provide a universally accessible and reliable service.

Fig 1. The core services provided by a pleural team and the hospital staff who might form part of it.

Pleural team personnel

The core members of individual pleural teams will vary greatly from centre to centre, based largely upon which facilities are available locally and how well-established they are. At the heart of any team, there must be an enthusiastic physician with an interest in pleural disease. Fig 1 and Table 1 suggest the specialties, departments and staff roles that should be seen as central to a comprehensive pleural service. It should be noted that, although often more convenient, not all resources need be on a single site. Indeed, using a well-established referral service might be more efficient than trying to introduce a new local one. In addition, multiple roles might be performed by single individuals without any compromise in quality or efficiency, and some responsibilities are heavily interchangeable between services.

Medical services

Respiratory physicians will typically form the fulcrum around which a pleural team operates, but this role may be filled equally well by acute medical physicians. They will typically be able to maintain an overview of all the components of the service, and will necessarily determine its structure and long-term direction. Advanced thoracic procedural skills are desirable, although close links with surgical colleagues or radiologists might make possession of these skills less important. The historical dearth of good-quality, large-scale randomised trials in pleural medicine is slowly being addressed, often providing an opportunity for those running pleural teams to engage easily in clinical research. This, and the need for some form of intervention in the majority of patients, makes pleural medicine attractive to specialist respiratory trainees. A dedicated pleural registrar, although not vital, can be of significant benefit to the efficiency of a pleural service. They may take the form of a trainee on rotation, a clinical fellow or a research fellow, and are often able to be more flexible in reviewing patients when compared to a respiratory registrar with additional clinical commitments. Competence in thoracic ultrasound (to Royal College of Radiologists Level 1 standard) is now a mandatory part of the Joint Royal Colleges of Physicians' Training Board core curriculum for respiratory trainees,[20] and regular exposure to pleural medicine all but guarantees that this can be achieved rapidly.

Table 1. Potential roles and responsibilities of members of a pleural team.

Team members	Potential roles*
Lead physician	• **Establish and maintain direction of pleural team** • **Liaison between other team members** • **Advanced pleural intervention** (eg medical thoracoscopy, indwelling pleural catheter insertion and removal, flutter valve insertion for pneumothorax, etc) • **Advanced thoracic ultrasound** • Review of inpatient and rapid-access community referrals • Establish dedicated pleural clinic for other referrals and follow up • Establish **pleural interventional list** • **Teaching and training** of other team members and junior ward staff • Supervision or undertaking of pleural research and audit
Pleural specialty registrar, pleural clinical fellow, pleural research fellow	• Support lead physician with clinics, lists, referrals and reviews • Liaison between other team members • Advanced pleural intervention • Standard pleural procedures (aspirations, chest drains, etc) • Advanced thoracic ultrasound • Involvement in pleural research or audit • Teaching and training of other team members and junior ward staff
Pleural specialist clinical nurse, pleural specialist research nurse	• Liaison between other team members • Direct patient care • **Maintaining high standards of drain management on wards** • Involvement with advanced pleural intervention • IPC management on wards and in community • Intrapleural drug administration • Involvement in pleural research and audit • Standard pleural procedures and basic thoracic ultrasound
Cancer specialist nurse, palliative care specialist nurse	• Management of IPCs • Liaison between other team members • Direct patient care • Involvement in pleural research and audit • **Continuous point of contact for pleural malignancy patients**, especially during diagnosis and end of life
Oncologist	• **Early management of new pleural malignancy patients** • **Rapid recognition and referral of malignant pleural effusion patients** • Involvement in pleural research or audit
Palliative care physician	• Rapid recognition and referral of malignant pleural effusion patients • **End of life, symptomatic and pain management of pleural patients** • Involvement in pleural research or audit
Thoracic surgeon	• **Video-assisted thoracoscopic surgery (VATS) for definitive diagnostic and therapeutic pleural indications** • **Other thoracic surgical procedures (eg rib resection, open thoracotomy, etc)** • Insertion of indwelling pleural catheters • Involvement in pleural research or audit
Histopathologist, cytopathologist	• **Provide definitive/specialist opinion on pleural diagnostic samples** • Enable rapid reporting of potentially malignant disease • Support use of non-standard pleural tests, eg differential cell count analysis • Involvement in pleural research or audit
Biochemist, immunologist	• Support use of non-standard pleural tests, eg lymphocyte subsets, pleural ADA, etc • Involvement in pleural research or audit
Chest radiologist, interventional radiologist	• **Provide definitive/specialist opinion on all pleural imaging** • Enable rapid reporting on potentially malignant disease • Promote the use of non-standard pleural imaging, eg thoracic MRI and PET-CT • Standard pleural intervention • Indwelling pleural catheter insertion • **CT- and US-guided diagnostic biopsy** • Support the teaching and training of thoracic US • Involvement in pleural research or audit

ADA = adenosine deaminase; CT = computed tomography; IPCs = indwelling pleural catheters; MRI = magnetic resonance imaging; PET = positron emission tomography; US = ultrasound; VATS = video-assisted thoracoscopic surgery.

*Core requirements are highlighted in bold and are not limited to a single team member.

Radiology services

An accessible radiology service is a must for pleural medicine, not least because an interested radiologist or ultrasonographer can help to mentor physician colleagues in achieving the standards described above. In addition to US, CT and positron-emission tomography (PET) can also be pivotal in managing all forms of pleural disease, with more than one imaging modality often being required for any individual patient.

For diagnostic purposes, an early chest CT will often be most useful if performed by radiologists who are accustomed to pleural-specific imaging, which requires adjusted timing of contrast administration to achieve best results.[21] Radiologists are also often able to assist with more complicated real-time pleural assessment. This may take the form of simple marking for aspirations or drains, although 'interventional' radiology colleagues may also use image guidance to perform thoracenteses, to insert standard or difficult drains, or to insert IPCs. Furthermore, with the diagnostic sensitivity of pleural fluid cytology for malignancy being only around 60%,[15] and with evidence suggesting that CT- and US-guided tissue sampling is superior to more traditional methods,[22,23] the role of radiology in pleural diagnostics remains vital.

Pathology services

Rapid and accurate cell, tissue and biochemical analyses are crucial in pleural disease, especially when infection and malignancy can present with superficially similar results. Beyond basic biochemical analytics, there is a constantly expanding arsenal of tests that can be performed to improve diagnosis; these might include adenosine deaminase (ADA), which is useful in the exclusion of tuberculous pleuritis,[24] and assays for mesothelin, one of a number of potential biomarkers for malignant processes that are increasingly finding a role outside of the research laboratory.[25]

The accurate detection of histological or cytological pleural malignancy can be difficult, especially for conditions such as mesothelioma which are relatively rare. Guidelines already suggest that such cases be reviewed on a regional level,[26] which necessitates specialist pathologists with expertise in this area.

Surgical services

Many of the advances in pleural medicine over recent years have involved physicians acquiring skills that have typically been in the domain of thoracic surgeons. Although the use of medical thoracoscopy and intra-pleural fibrinolytics can, in some cases, remove the need for surgical input altogether, there will always be an important role for surgery in the management of chronic or complex pleural infection, the treatment of persistent or recurrent pneumothoraces, and in obtaining difficult pleural biopsies for malignancy. The ready availability of an interested thoracic surgeon as part of a pleural service ensures that patients can receive rapid and definitive intervention even if medical approaches fail or are inappropriate.

Cancer and palliative care services

Specialist chest oncologists are core members of any thoracic multi-disciplinary team, and it is increasingly common to find those that have an interest in pleural malignancy. An accessible and flexible pleural service can be a great resource for patients who are afflicted with recurrent malignant effusions, and who may require frequent admissions for cancer treatments, some of which cannot be administered with significant breathlessness. A similarly accessible oncology or palliative team can ensure that those patients who emerge from a pleural service with a diagnosis of cancer can be seen with minimum delay. Oncologists and palliative care physicians are also usually well-placed to highlight those who might benefit from certain pleural clinical trials, or from procedures such as IPC insertion or talc poudrage.

Nursing services

Ideally, all nursing staff in a respiratory ward should be competent in chest-drain management, and familiar with intra-pleural drug administration, suction and IPC care. Beyond this, however, some centres are turning to dedicated pleural nurses who can more easily co-ordinate the outpatient and inpatient management of pleural patients, and who can usually offer longer-term stability than a medical trainee. Although less common, nurses can easily become proficient in thoracic ultrasound and most forms of pleural intervention, which potentially relieves pressure in other parts of the system. Most pleural nurses have a respiratory background, but acute medical, oncology or palliative nurses are often just as well placed to acquire the skills needed to become valuable team members. Some centres' oncology nurses maintain a pleural interest, working closely with oncologists to manage IPCs in outpatient cancer patients and acting as a link from cancer diagnosis through treatment and recurrence.

Pleural team practicalities

A pleural service can be run from a number of different settings, including a medical admissions unit (MAU), a day-case ward or a respiratory out-patient clinic. For some smaller centres, a weekly pleural clinic or procedure list on the MAU might be all that can be staffed initially. With time, data showing reduced lengths of stay, admission avoidance or high levels of patient satisfaction might justify the expansion of the service. Extra resources are rarely required to start a service, but there must always be a willingness to challenge traditional ways of working.

In addition to having appropriate staff, a pleural team and service should aim to have in place an infrastructure that allows them to operate efficiently. Maintaining a prospective database of patients will allow a local audit to be performed and will maximise opportunities for engaging in observational research.

Dedicated pleural clinics, or clinic slots, are extremely useful in ensuring that patients can be seen in good time following referral from the community.[27] Lengthier appointments for

new patients should be considered as many will require fluid aspiration during a consultation, although separate pleural intervention lists are becoming increasingly common. Such lists provide the opportunity to perform all manner of procedures, including standard chest drains, in a more controlled environment such as an endoscopy suite and, if timed well with clinics, can reduce referral to diagnosis delays to a few days or less.

Pleural teams can also maximise learning opportunities for trainees and allow skills that have already been gained to be consolidated. Ready access to bedside thoracic US has become essentially mandatory for dedicated pleural clinics and lists. Although a machine is often a major financial investment, the ability to make instant decisions without referral to radiology can be of great benefit and can be the catalyst for establishing a pleural service.

Conclusion

As pleural medicine continues to expand, so too does the number of dedicated teams and services across the country. Recent data suggest that the perceived benefits of this way of working are now being backed up with demonstrable improvements in waiting times, patient safety, admission durations and overall costs,[28] even at the level of small district general hospitals. By utilising and adapting locally available services, or by promoting the development of new ones, we believe that a successful pleural service is achievable in all UK hospitals.

A pleural team has the potential not only to streamline patient pathways but also to improve patient care and to provide opportunities for practical skills training to trainees.

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