Facilities for the diagnosis of respiratory disease in the UK

A survey of 276 thoracic physicians

Report of a working party of the British Thoracic Society's Regional Representatives Committee

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In 1984 the Council of the British Thoracic Society (BTS) asked the Thoracic Regional Representatives Committee to survey the availability of lung function testing equipment throughout the country. The Working Party was constituted and decided to expand this brief and to survey the national provision for the diagnosis and management of respiratory disease in a much more complete fashion.

Against the background of the increasing prominence of respiratory disease in both adult and paediatric practice in hospitals [1,2] and the importance of physicians being able adequately to investigate and manage patients with AIDS, we describe the diagnostic facilities at present available to respiratory physicians and indicate where the nation’s facilities are inadequate.

The full report for the BTS [3] contains a great deal of specialised data and information of local or regional interest only, and the working party felt that a short report containing a summary of their findings related to the diagnosis of respiratory conditions would be of wider interest.

Methods

A detailed questionnaire was sent to 281 consultants in England, Scotland and Wales in the Autumn of 1985. Respondents were those known from local enquiry to be responsible for the respiratory services in the 215 districts and health boards, and to be able to describe authoritatively their own facilities and those of their colleagues.

The data collection period ended on 1 September 1986. The replies were analysed using the SPSS-X21 package on the ICL VML2900 computer at the Department of Epidemiology and Community Medicine, University of Wales College of Medicine, Cardiff.

Results

Replies were received from 276 of the 281 physicians circulated (98.3 per cent), and their replies cover 213 of the 215 districts in the UK (99.1 per cent). The number of physicians exceeds the number of districts because 49 of the latter have more than one district general hospital.

Outpatients

Organisation The 276 physicians see their respiratory cases in 447 clinics, of which 223 (49 per cent) are in hospital outpatients, 104 (23 per cent) in peripheral clinics, and 120 (27 per cent) in designated chest clinics. Five districts in the UK are entirely without thoracic or general medicine/thoracic outpatient clinics.

Radiographs These were not available to 22 doctors in medical outpatients (14 whole districts), five in chest clinics (four whole districts) and 11 in peripheral clinics (seven whole districts). However, only four districts are without an open access GP chest X-ray diagnostic service. Twenty per cent of physicians provide all or part of this service in their district.

Outpatient spirometry (FEV1, FVC) This was available to all but three respondents, and they had facilities elsewhere in their districts. Nurses or technicians perform the measurements in 76 per cent of clinics.

Allergy Skin prick testing was available to all but 22 of the physicians (92.4 per cent) and is done by either nurses or technicians in 64 per cent of cases. IgE estimation is available to 82 per cent of doctors but only 26 per cent have it as a district service. Twelve whole districts (6 per cent) do not have these basic facilities for respiratory allergy diagnosis.

Diagnostic imaging

The number of physicians reporting the lack of these imaging techniques in their main hospital is shown in Table 1, together with the corresponding district figures for two of the major deficiencies, perfusion lung scans and bronchograms. As expected, only a low proportion (30 per cent) of hospitals have CT on site. Physicians were asked to rate the available imaging services as: excellent,
Table 1. Availability of diagnostic imaging.

| Technique                  | Physicians without (%) | Districts without (%) |
|----------------------------|-------------------------|-----------------------|
|                            | n = 276                 | n = 213               |
| Thoracic CT                | 192 (70)                |                       |
| Isotope lung scan (V)      | 117 (42)                |                       |
| Isotope lung scan (Q)      | 98 (35)                 | 98 (46)               |
| M-mode ultrasound          | 64 (23)                 |                       |
| Bronchograms               | 38 (14)                 | 34 (16)               |
| Chest tomography           | 33 (13)                 |                       |
| Plain radiology            | 7 (3)                   |                       |

Table 2. Pulmonary function laboratories.

(a) Physicians without basic pulmonary laboratories

|                  | Physicians without (%) | Districts without (%) |
|------------------|-------------------------|-----------------------|
|                  | n = 276                 | n = 213               |
| Pulmonary Function Labs | 68 (25)               | 40 (19)               |
| Lung volumes      | 78 (18)                 | 46 (22)               |
| CO Transfer factor| 73 (16)                 | 40 (19)               |
| Flow Vol. Loop    | 116 (42)                | 73 (34)               |

(b) Physicians with access to specialised equipment

|                        | Physicians (%) | Districts (%) |
|------------------------|----------------|---------------|
| Body plethysmography   | 49 (18)        | 41 (19)       |
| Exercise tests with gas exchange | 65 (24)   | 58 (27)       |
| Ear lobe oximetry      | 57 (21)        | 54 (25)       |

Pulmonary function laboratories

All physicians and all districts have equipment for inpatient spirometry and arterial blood gas analysis. The number of physicians who work without basic pulmonary laboratories or other tests are shown in Table 2a. Nineteen per cent of districts have no designated pulmonary function laboratory and therefore a similar percentage have no equipment for helium dilution measurement of lung volumes (22 per cent) or carbon monoxide transfer factor (19 per cent). The flow volume loop, used increasingly to diagnose airflow limitation and its site, is not available in 34 per cent of districts.

Approximately one fifth of chest physicians in the country have access to more sophisticated measurements (Table 2b). The three techniques listed are helpful for the diagnosis of such conditions as poor gas mixing and gas trapping, psychogenic hyperventilation and sleep apnoea syndromes.

Bronchoscopy and tissue biopsy

Table 3 shows the availability of bronchoscopy in the UK. The great majority of chest physicians now perform fibreoptic bronchoscopy within their district general hospitals, but there are still 26 districts (12 per cent) where none is done. By contrast, rigid bronchoscopy, done in 97 per cent of cases with a general anaesthetic, is available to only 56 per cent of physicians and is unavailable in more than half of the health districts in the UK. Of the respondents, 102 (37 per cent) perform, or have available, fibreoptic bronchoscopy within their hospitals without a locally available rigid bronchoscopy service. There are 21 districts (10 per cent) with no bronchoscopy service at all. In only 36 per cent of instances is fibreoptic bronchoscopy undertaken in dedicated endoscopy theatres with 21 per cent of examinations being done in general operating theatres, 17 per cent in X-ray departments and 15 per cent in adapted ward side rooms.

Fig. 1. The proportions of physicians satisfied and dissatisfied with their CT body scanning service, related to the distance from their hospital to the scanner.
Table 3. The availability of bronchoscopy within the UK.

| Bronchoscopy facility            | Physicians with (%) | Distincts Whole & Part without (%) |
|----------------------------------|---------------------|--------------------------------------|
| Fibreoptic bronchoscopy (FOB)    | 250 (91)            | 26 (12)                              |
| Rigid bronchoscopy (RB)          | 154 (56)            | 112 (53)                             |
| FOB and RB                       | 148 (54)            | 98 (46)                              |
| Neither FOB nor RB               | 21 (8)              | 21 (10)                              |

Table 4. Additional bronchoscopic facilities available to physicians within the UK.

| Bronchoscopy facility                      | Physicians with (%) |
|-------------------------------------------|---------------------|
| Transbronchial biopsy (TBBx)              | 228 (83)            |
| X-ray screening at FOB                    | 182 (66)            |
| TBBx with screening                       | 176 (64)            |
| FOB with bronchograms                     | 196 (71)            |
| Bronchial lavage                          | 168 (61)            |

Of physician bronchoscopists 83 per cent also do transbrachial lung biopsies by this method (Table 4). However, simultaneous X-ray screening is available to only 66 per cent of them and consequently 52 (23 per cent) routinely perform transbrachial biopsies without it.

Selective or bilateral bronchograms can be carried out during fibroptic bronchoscopy in an X-ray department, and 71 per cent of bronchoscopists do this. A similar number undertake bronchial lavage, usually for diagnostic purposes (samples for TB culture or differential cell counts). Only 14 physicians to date use their bronchoscopes with laser equipment for the treatment of stenosing large airway tumours [6].

Whereas 86 per cent of fibroptic bronchoscopies in the UK are done by thoracic physicians, the picture for rigid bronchoscopy is quite different. In the 109 districts (47 per cent) where it is available, it is performed by thoracic physicians in only 36 per cent of instances, being done otherwise by cardiothoracic surgeons (39 per cent), ENT surgeons (13 per cent) and general surgeons and anaesthetists (11 per cent).

Non-bronchoscopic tissue diagnosis
The techniques available for non-bronchoscopic pulmonary tissue sampling are open lung biopsy and fine or cutting percutaneous needle biopsy for either cytology or histology [7].

Since open lung biopsy is essentially a minor thoracic surgical procedure, it is, as expected, available as a district service to only 32 per cent of physicians. More surprisingly, no percutaneous biopsy service at all is reported by 63 physicians (23 per cent) working in 50 whole districts (23 per cent), and 13 part districts. Analysis of pathology reporting times revealed a median delay of three days between sampling and reporting, with only 2 per cent of physicians having to wait more than seven days. Thirteen physicians (4.7 per cent) were without a district histology service and 17 (6.2 per cent) had no district cytology service at the time of the survey.

Perceived ratings of diagnostic facilities

The 276 respondents were asked to rate their district services on a 5-point scale. The diagnostic facilities perceived as being poor or very poor are listed in rank order (Table 5). The lack of a locally based thoracic CT service is seen as being easily the least satisfactory feature. However, it is clear that the more surprising lack of nuclear medicine facilities is also worrying many physicians and the lack of isotope scans may have implications in thoracic medicine beyond the diagnosis of pulmonary embol (see below).

Discussion

This report presents the results of a large postal survey of respiratory physicians in 1985-6. We were able to analyse responses from 98 per cent of physicians contacted, and have information for all but two of the health districts in the UK. We used local expertise to identify physicians who could reply authoritatively about their own and their colleagues’ work, and therefore, although we (deliberately) did not approach every thoracic physician, we can be sure that the information gathered is representative. Although figures about manpower can change quickly, it is far less likely that the equipment and staffing issues described here have changed substantially in the last 18 months. The deficiencies we have highlighted will still be the main problems in 1988.

It is the considered recommendation of the BTS that there should be one respiratory physician with a major interest in respiratory medicine per 150,000 of the population, and the Society’s recommendations about facilities for such physicians imply that everyone in the UK should have access to adequate diagnostic facilities within their own health districts [8].

Our survey has shown that eight districts have no such physician, and many others, as well as having fewer physicians per unit population than recommended, have major defects in their diagnostic facilities. Although there are definite correlations, as expected, between the ab-

Table 5. Ratings of diagnostic facilities for respiratory medicine perceived as poor or very poor.

| Facility                  | Physicians with poor facility (%) |
|---------------------------|----------------------------------|
| Thoracic CT               | 96 (35)                          |
| Nuclear medicine          | 57 (21)                          |
| Pulmonary function labs   | 42 (15)                          |
| Cytology                  | 30 (11)                          |
| Special pathology         | 27 (10)                          |
| Special radiology         | 24 (8)                           |
| Bronchoscopy              | 11 (4)                           |
sence of a physician and the absence of facilities, nevertheless, many physicians now in post are clearly working without some of the specialty’s standard diagnostic techniques.

There has been considerable interest in recent years about regional variations in health care provision in the UK [9]. We found evidence that this applies to respiratory medicine. In our full report [3] we analysed in detail the regional provisions for bronchoscopy/tissue biopsy and pulmonary function laboratories. For the former, there was a three-fold difference between the average number of district deficiencies in the best and worst regions, the worst being the North West, West Midlands, Yorkshire and Wessex. Similarly, every district in the North West and in East Anglia has a pulmonary function laboratory, but only 68 per cent of those in the West Midlands do so.

Although 80 per cent of respiratory physicians in the UK now practice general internal medicine as well, it is notable that 27 per cent of diagnostic clinics are in dedicated chest clinics. This probably reflects the advantages for many districts in having a separate organisation for what are often very large workloads, as well as a central location for an open-access GP X-ray service, and a tuberculosis service including contact tracing.

The outpatient survey revealed a picture of isolated defects rather than general under-provision, but this is quite different from the inpatient facilities. The practice of modern respiratory medicine has changed markedly within the last 10 years with the advent of CT scanning for mediastinal and pleural disease, the introduction of fiberoptic bronchoscopy, and the expansion of isotope and ultrasound scanning. We have already alluded to the perceived deficiency in CT body scanning as the single most clearly felt lack by Britain’s respiratory physicians, and it is likely that all the medical specialties apart from oncology, respiratory physicians can make the most use of this technique because of their large practice with lung cancer. The same point arises again in relation to isotope scanning: 46 per cent of districts have none and these Districts may also be without bone or liver isotope scans, which are often useful in lung cancer management.

The absence of bronchography in 34 districts also requires comment. This remains the definitive examination for the diagnosis of bronchiectasis, especially if surgery is contemplated, or if physiotherapists are to have detailed advice, and it may reveal unsuspected disease when it is used to investigate haemoptysis in a patient with a normal bronchoscopy [5].

Spirometry and blood gases analysis are the most important tests needed by a chest physician in the day-to-day management of his patients, and are effectively available everywhere. However, many patients need more detailed physiological measurements for accurate diagnosis or for assessing the severity of their disease or monitoring its progress and response to treatment. For these purposes, a fully equipped pulmonary function laboratory is needed, but 19 per cent of districts and 25 per cent of physicians have none; this explains why 15 per cent of physicians rate their facilities as poor or very poor in this respect.

Analysis and management of difficult problems is recognised to be a justification for major thoracic centres [10, 11].

There is clearly a need for larger laboratories (usually on a regional basis), to undertake more complex investigations such as plethysmography or exercise with gas exchange. However, many district hospitals would benefit from the provision of flow volume loop measurements, and possibly also of ear lobe oximetry.

Fiberoptic bronchoscopy is available to 90 per cent of chest physicians compared with only 56 per cent with access to rigid bronchoscopy. It has been held by some that it is necessary for rigid bronchoscopy to be available in the cases of complications arising from fiberoptic bronchoscopy. However, this is clearly not now general policy, since 99 physicians perform routine fiberoptic examinations without it. The impact of this practice on the management of complications during fiberoptic bronchoscopy is not known, and in fact would be difficult to assess because the survey of bronchoscopic practice in a very similar group of physicians [12] reported a mortality rate of only 0.04 per cent and a major complication rate of 0.12 per cent during routine examinations. However, the death and major complication rate was significantly higher (2.8 per cent) when transbronchial biopsies were performed, and is recognised to be potentially higher still when patients are immunocompromised, or have renal failure. A cross correlation of centres using transbronchial biopsy and rigid bronchoscopic services shows that the pattern of practice is similar to that of routine bronchoscopy and 90 respondents perform these biopsies without having a local rigid bronchoscopy service. It seems, therefore that a very large number of physicians are now prepared to undertake both simple bronchoscopy and transbronchial biopsy without the availability of rigid bronchoscopy.

Although most physicians have the basic accessories for fiberoptic bronchoscopy, 34 per cent have no access to simultaneous X-ray screening. We calculate that there are at least 52 physicians (23 per cent of all doing transbronchial biopsy) who perform this without screening, although there is evidence that pneumothorax is then significantly more common (2.9 per cent vs 1.8 per cent; p < 0.05) [12]. The absence of screening also precludes bronchoscopic bronograms which only 71 per cent of physicians offer.

Rigid bronchoscopy is performed by only 31 per cent of physicians and they perform only 39 per cent of examinations. Correspondingly, fewer thoracic physicians in training may be competent at rigid bronchoscopy. In future, the availability of rigid bronchoscopy may be reduced in districts where there is no cardiothoracic surgical service (the majority), unless it remains part of the training of ENT surgeons or general surgeons.

Open lung biopsy, which is not available in a district basis to 69 per cent of thoracic physicians, must mirror the availability of cardiothoracic surgery in its distribution. Whether the extra difficulty of obtaining an open biopsy in many districts affects the management of patients with diffuse lung disease is not known. Similarly, 63 have no percutaneous needle biopsy service, which
suggests that the management of solitary pulmonary lesions between centres with and without this facility needs to be studied.

It is known that a high percentage of AIDS sufferers develop respiratory disease at sometime in their illness. A tissue diagnosis is usually required and an efficient pathology service is needed. Quite clearly, not all physicians in the UK who may expect to have to care for increasingly large numbers of these patients in the fairly near future, have adequate equipment to do so.

Conclusions

This detailed survey of the provision for a major medical specialty in the UK has revealed striking and illogical variations between regions and districts, and has shown notable deficiencies in the national facilities for the diagnosis and management of both common respiratory diseases such as asthma, chronic airflow limitation, lung cancer and pneumonia, as well as less common but important conditions such as sarcoidosis, alveolitis and tuberculosis.

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