How can bronchoscopy training for respiratory trainees be improved?

All respiratory trainees must become competent at bronchoscopy in order to obtain their Certificate of Completion of Training. This article reports the comments of trainees regarding the quality of bronchoscopy training and whether there may be room for improvement.

Fibreoptic bronchoscopy involves the use of a thin flexible instrument or bronchoscope to examine the airways of the lungs for diagnostic and therapeutic purposes. Being able to perform bronchoscopy is an essential procedural skill for all respiratory physicians.

The core competencies for bronchoscopy in the UK have been defined for the directly observed procedural skills (DOPS) assessment (Joint Royal Colleges of Physicians Training Board, 2007) but there is a paucity of literature about what constitutes good training in bronchoscopy and consequently it is difficult to know how best to develop these competencies. This is in contrast to other closely related technical procedures such as endoscopy (Thuraisingam et al, 2006). Indeed, a nurse bronchoscopy training programme had to look to the endoscopy literature for its basis since no adequate literature on bronchoscopy training could be found (O'Donnell et al, 2004). Yet good training is vitally important as bronchoscopy is a potentially hazardous procedure, particularly during the early part of training (Ouelette, 2006).

Most trainees begin by observing a trainer performing bronchoscopies on patients before undertaking supervised procedures themselves. Trainees then make the transition to unsupervised practice when it is judged that they are competent enough (British Thoracic Society Bronchoscopy Guidelines Committee, 2001). Some believe that trainees should perform a prescribed minimum number of procedures before they are deemed competent (Torrington, 2000) while others (Hudson and Benson, 1988) argue that this would merely 'fulfil some arbitrary quota' given that the manual dexterity and competence of trainees vary. The UK guidelines bridge this divide by recognizing that the optimal number of supervised procedures will vary depending on the individual trainee but that it would 'seem reasonable to undertake a minimum of 50 procedures under direct supervision' (British Thoracic Society Bronchoscopy Guidelines Committee, 2001).

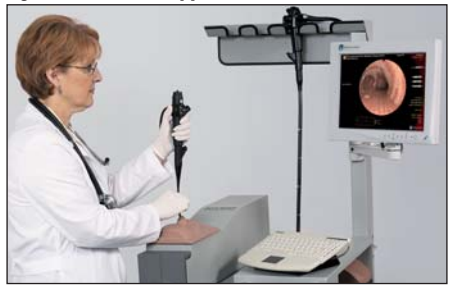
One-to-one training may also be supplemented with other modes of instruction such as lectures, photographic atlas, static lung models, computer simulators (*Figure 1*), computer-assisted learning and the review of video-bronchoscopy footage.

The only published survey to explore respiratory trainees' perspective of bronchoscopy training demonstrated that instruction varies considerably between institutions and that this is associated with perception of both bronchoscopy competence and also training programme quality (Haponik et al, 2000). The study had only a narrow remit and consequently there was no elaboration as to how bronchoscopy curricula might be optimized.

This qualitative study has three principal objectives:

1. To determine the modes of instruction that trainees receive
2. To evaluate whether trainees view their training as being adequate for the purpose of performing unsupervised bronchoscopy
3. To explore how bronchoscopy training might be improved.

Figure 1. Bronchoscopy simulator.



Methods

The survey studied a population of respiratory trainees (registrars) from a London training programme and was conducted in two phases. In the first phase, all the trainees were sent a questionnaire to identify the hospitals where the majority of their bronchoscopy instruction had taken place and to determine the modes of instruction they had received. The questionnaire also encouraged the use of free text to explore how bronchoscopy training was regarded.

The second phase consisted of a tape-recorded semi-structured interview. Five trainees were selected by purposive sampling, a qualitative research technique where participants are chosen to represent a range of experiences that the researcher believes will be relevant to the research question (Kuper et al, 2008a). The rationale for this method was to obtain a selection of trainees who had completed their supervised training in different hospitals and who had experience of different modes of instruction. In addition, a trainer was also sampled purposively from the programme and was selected on the basis of having recently (<5 years) trained under the same programme.

An interview script provided a framework to ensure that all aspects of bronchoscopy training were covered. The script was informed both by literature review and also by the free-text responses from the initial questionnaire. The interview process was iterative in that the script would be adapted for successive interviews in order to explore phenomena uncovered by preceding interviews (Kuper et al, 2008b).

Each interview was transcribed in full. Thematic analysis was performed by deriving categories from the substantive statements from the first interviewee. Substantive statements from each successive interviewee were then either placed into a pre-existing category or put into a new category. This analysis uses two validated approaches

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to analysing qualitative data: the framework approach where themes are already pre-determined from both the project objectives and from free-text answers to the initial questionnaire and the grounded theory approach where each new quote is compared with the emerging summary of all the previous quotes (Pope et al, 2000).

Results

Modes of instruction

There was a 77% response rate to the initial questionnaire (27 respondents, eight non-respondents). The 27 respondents had performed their training bronchoscopies in 13 different hospitals within the training programme.

In addition to one-to-one training, the trainees used, on average, one other training medium: 15 (56%) used a photographic atlas, five (19%) used a CD-ROM bronchial anatomy tutor, four (15%) used a static lung model and one (4%) used a computer simulator.

Adequacy of training for the purposes of performing unsupervised bronchoscopy

Trainees were asked which of the following competencies (Joint Royal Colleges of Physicians Training Board, 2007) they had reached at the time of their first unsupervised bronchoscopy.

Competency in bronchial anatomy

Only one trainee could name all of the main segmental bronchi perhaps because 'some trainers seem to feel that anatomy is important, others don't'.

Competency in performing sampling techniques

Three out of the five were confident that they had attained competency in bronchial brushings and endobronchial biopsies with two feeling that they had not performed enough of either. Only one trainee felt competent to perform transbronchial biopsy. Another had 'managed to get to year 5 without doing a single transbronchial [biopsy]'. One remarked 'my trainer said he wouldn't be happy dealing with a complication so he doesn't do TBB [transbronchial biopsy]'. Another didn't feel 'competent [at performing transbronchial biopsy] because I haven't done enough close together'. However, the trainer pointed out that as a consultant 'it would be very unusual to be able to find the time to receive the training [in transbronchial biopsy] or to be able to call on somebody else to help' and if 'you're planning to get a job where you're investigating people' then you need to be able to do it.

Competency in managing complications

Most felt that they had not 'had any training in managing complications' although it was acknowledged that the topic could be self taught. A senior trainee said that she would 'be guessing what to do' in the event of a complication. With specific reference to haemorrhage, again trainees felt that there had been very little training although one 'had talked through it' with his trainer. No-one had come across a serious haemorrhage and if they did, one trainee 'wouldn't know particularly what to do' while another would 'have been terrified'. Another pointed out that she is 'doing potentially dangerous procedures as trainees often without trainers in the building' and that she did not 'think that there should be a list without a trainer on the premises, regardless [of whether] you are doing bronchoscopies independently'.

How bronchoscopy training might be improved

An introductory course for new trainees

The general feeling among the trainees was that they were not well prepared for their very first bronchoscopy. Examples include the trainee who was given 'no instructions about how to use the bronchoscope [apart from] just go through the nose' and another trainee who 'was kind of moving the bronchoscope aimlessly around the bronchial tree without knowing where [they were]'. All of the trainees would have preferred to start their bronchoscopy training with an introductory course.

Failing this, one trainee suggested that as a minimum 'it's important to sit down before the first bronchoscopy and talk about what to expect [and] what are your objectives'. The following were highlighted as important topics to be covered in an introductory programme: handling and care of the instrument, indications for bronchoscopy, conscious sedation, bronchial anatomy and pathology, and management of haemoptysis. Several trainees also felt that it would also be advantageous to gain hands-on experience using a static lung model or computer simulator at this point.

Optimizing the frequency of training bronchoscopies

All of the interviewees remarked that the frequency of supervised bronchoscopies was diminished by on-call commitments and/or cancelled lists as illustrated by one trainee: 'because of nights and post-nights and the consultant being away, there were a lot of weeks with no consistency. The breaks were detrimental to learning the skill. If you're not doing them regularly it takes much longer [to learn]'.

The trainer thought that regularity of training might improve if there was 'an emergency/elective split so that [the trainee] spends 3 months of the year doing general medicine and on-calls and 9 months doing [respiratory medicine]'. Other specific reasons for missed training opportunities mentioned by the trainees were that 'the consultant wants to do all the biopsies on his own patients' and the 'consultant felt that it was more important [for the trainee] to look after the ward patients'.

Optimizing supervision

None of the trainees expressed a desire to have more supervision than they had been given, although there was a feeling that the quality of supervision could have been better. For instance, one trainee thought that 'if you're not doing it right, I'm not sure that [the trainer will] always know as if you missed something they would too as they are often doing other things such as filling in forms'.

There was a varying of opinion as to how close the supervision should be with one trainee preferring his trainer to 'stand next to [him] and talk [him] through it rather than sitting at the back' and another feeling that 'you need people to stand back and let you get on with it'.

Most trainees expressed the desire to be talked through difficult manoeuvres while retaining overall control of the bronchoscope as often their trainer would 'take over too quickly'. For example, one trainee's experience was that he 'wouldn't necessarily be told how to go about moving the bronchoscope [and] it would be a case of let you get on with it and when you struggle just take over'.

Some of the trainees felt that despite being supervised they were given little feedback as to what to do or how they were doing during the procedure unless they specifically asked, although one trainee felt that feedback with regards to how he was doing was not really necessary as a successful procedure was self-evident.

The trainer 'thought that most people are not really comfortable with knowing what to ask for [and] how much to ask for' and so felt that supervision should be proactive as 'most people… need fairly good direction'. The difficulties in providing optimal supervision were perceived by the trainer to be 'related to service provision, so if somebody is taking a long time to do a procedure and you've got "x" number of patients to do that day then the [bronchoscopy staff] get angry'.

Specific training in writing bronchoscopy reports

This skill seemed to be acquired by either watching what the trainer wrote or being told what to write. Two trainees felt that it would be useful for there to be a consensus of what information should be included as a minimum in the report, particularly where there was no computerized template. The trainer thought that as a quality control measure 'the first 20 or so bronchoscopies that someone does should be completely done hand in hand with the supervisor' and perhaps countersigned.

Specific training for bronchoscopy on the intensive care unit

All of the trainees reported that they had had no specific training for performing bronchoscopies on the intensive care unit (ICU). However, most trainees managed to arrange some supervision either from their trainer or from another, more senior trainee and most felt that specific training did not hamper their ability to perform a successful bronchoscopy considering that the typical procedures performed on patients in the ICU setting were relatively simple. The trainer's perspective was that 'only somebody who is completely competent to do them in the controlled environment of the bronchoscopy suite should be going out to ICU' and that 'trainees should be accompanied at least once by their trainer'.

Biopsy audit

All of the trainees felt that it was important to assess the quality of their biopsy material and all would seek this information from the relevant histology reports. One trainee felt that this information was so important that it should be mandatory to include it in the yearly trainee assessment. The trainer also felt that biopsy audit was important for both trainees and trainers themselves and encouraged all of his trainees to do this.

Interventional bronchoscopy training

There was some concern among the trainees that there was very little possibility to train in interventional bronchoscopy which allows the physician to perform therapeutic manoeuvres in addition to the standard diagnostic procedures. The trainer also recognized that such opportunities were limited and thought that more of the simpler interventional procedures like diathermy or transbronchial needle aspiration could be performed outside of the specialist centres thus allowing trainees to extend their skills. However, the trainer also noted that a lack of training in interventional bronchoscopy was self-perpetuating as there were few consultants around who could teach those skills.

Trainer assessment

Some of the trainees felt that trainers should have some form of assessment with one trainee mentioning that trainee feedback might be the most appropriate way to do this. None of the trainees felt that bronchoscopy trainers should have specific training in teaching bronchoscopy. The trainer felt that 'having bronchoscopists who are skilled educational experts who can teach at a high degree of excellence is devaluing the skill of the trainee who will pick up what's required even from a bad teacher as long as [the teacher is] a good bronchoscopist' and so 'it's more important to have [trainers] who audit themselves and produce good results and whose techniques are sound rather than somebody who is a good educationalist'.

Access to additional training aids

Photographic atlases were felt to be of only very limited value mainly because they show pictures taken using a different bronchoscopic orientation to that used by trainees. A CD-ROM bronchial anatomy tutor was used by two of the interviewees but was felt to be too basic for their learning needs.

Trainees remarked that it was difficult to access a static lung model on the programme and that no computer simulator was available on the programme. The notion of training on a simulator drew a lot of positive comments. One trainee, in fact, 'was desperate for something like this' while another thought that 'during the first few bronchoscopies where you're not really sure of yourself and you're struggling a bit it would be nice to get over that with a simulator so that when you're doing one on your first patient you've got a good idea of what you're doing'. Several trainees had come across a simulator at national conferences and had found them to be 'very useful'. The trainer felt that 'ideally [simulators] should be available somewhere for everyone' and that if he 'had a registrar… who had never bronchoscoped then [he] would prefer that he/she went off and practised before doing it on [patients]'.

Discussion

As expected, the trainees' bronchoscopy instruction was mainly through one-to-one supervision. Additional training aids were not often used and, with the exception of computer simulation, they were not found to be very useful. Perhaps this is because only a simulator can help teach and improve technical skills whereas the other training aids are mainly concerned with enhancing the cognitive skills necessary for bronchoscopy. Randomized controlled data suggest that simulators are particularly useful at the beginning of training where they have the potential to reduce harm to real patients (Ost et al, 2001). Indeed some would argue that it is neither acceptable nor appropriate for trainees to be practising new skills on patients (Aggarwal and Darzi, 2006). Simulators also allow trainees to learn at their own pace without the necessity of a trainer and their advantage over older static lung models is that they provide trainees with controlled exposure to a wide range of clinical encounters (Ziv et al, 2000).

One recognized problem with one-to-one training is that it does not often proceed along a smooth continuum of complexity when it involves real patient encounters. Ideally a trainee would progress from uncomplicated cases to more complex cases as he/she demonstrated increasing compe-

tence but, in practice, real clinical events are constrained by chance and availability (Kvale and Mehta, 2001). Another problem with one-to-one training is that its quality depends on the adequacy of supervision and feedback (Hesketh and Laidlaw, 2002) and it is common for trainees across all specialties to be dissatisfied with the amount of supervision provided (Grant et al, 2003). The fact that some trainees are not reaching the prescribed competencies may be a result of suboptimal supervision although the introduction of the DOPS assessment, where competency is objectively assessed and documented, may help to improve this situation.

The trainees had many ideas of ways in which bronchoscopy training could be improved. These included:

- An introductory course
- Designing on-call rotas which promote consecutive attendance to bronchoscopy lists
- Encouraging trainers to provide more feedback regarding trainee performance
- Providing specific training for writing bronchoscopy reports
- Providing specific training for intensive care unit bronchoscopy
- Making biopsy audit mandatory
- Eliciting trainees' evaluation of trainers
- Increasing access to training adjuncts, particularly computer simulators.

Most of these ideas would only involve small changes to current training arrangements but might help to ensure that training is more standardized and more trainee focused rather than service delivery focused.

Study limitations

There are some important study limitations which need to be considered. First, the study size was limited by time and resource restraints. However, by the end of the last trainee interview, no new themes were being raised. Second, trainees were selected from only one region and this may make the findings less generalizable to other UK regions. In addition, the author's role as a respiratory trainee may have influenced the interviews and theme analysis, and the validity could have been improved by taking the findings back to the interviewees to ensure that they agreed with the way the interviews had been analysed (Mays and Pope, 2000).

Another possible method of data collection would have been a group interview with a large sample of the trainees as group interaction is acknowledged as being a useful way of researching sensitive issues, such as dissatisfaction with training (Green and Thorogood, 2004). However, group interviews can also be difficult to record with responses often being fragmentary in character (Gillham, 2000). In addition, junior trainees might be inhibited by the higher status senior trainees. Finally, the deliberate sampling method used for the interviews may be a source of criticism but the use of purposive sampling to assess specific groups is well recognized in qualitative research (Giacomini and Cook, 2000).

Conclusions

Bronchoscopy is an important diagnostic and therapeutic procedure that demands high levels of technical and cognitive skill to perform effectively. It has been established that one-to-one supervision is the key element of bronchoscopy training but apart from this surprisingly little is known about how bronchoscopy is taught. Worryingly, there is evidence that current training arrangements may not be adequate for the purposes of enabling trainees to perform independent practice. However, trainees have identified components of their training that could be optimized and applying the findings from this study should lead to improved bronchoscopy tuition. BJHM

Figure 1 *is reproduced by kind permission of Immersion Medical.*

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KEY POINTS

- Bronchoscopy training must be optimal as trainers and trainees have a duty to minimize the complication rate of patients undergoing the procedure.
- Exclusive use of one-to-one training for the acquisition of bronchoscopy skills has limitations which trainees can readily identify.
- Training adjuncts to one-to-one training (e.g. computer simulators) are available but are not often used by trainees, partly because of a lack of access.
- Prescribed competencies may not be being attained before the trainee performs unsupervised bronchoscopy.
- This study has highlighted a number of different ways in which bronchoscopy training might be improved.