

## ORIGINAL RESEARCH

## Knowledge and utilisation of occupational asthma guidelines in primary care

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Received 26th March 2010; revised version received 18th May 2010; accepted 29th May 2010; online 2nd August 2010

**Abstract**

**Aims:** To develop an occupational asthma learning module, which could be used both as an educational tool and to evaluate awareness and usage of clinical guidelines in primary care.

**Methods:** Healthcare professionals were invited to undertake an interactive BMJ Learning module, developed from existing national occupational asthma guidelines. Participants were invited to record immediate post-module feedback, and were also sent an e-mail questionnaire six weeks later to assess the impact of the module.

**Results:** In total 1041 healthcare professionals completed the learning module within the first six months, which was associated with significant improvements in knowledge, and predominantly positive feedback. The e-mail follow-up questionnaire demonstrated improved usage and awareness of national occupational asthma guidelines.

**Conclusions:** Significant barriers remain in ensuring that evidence-based occupational medicine guidelines are adopted in primary care. This project has demonstrated that e-learning offers one method of improving postgraduate medical education in this area, particularly where evidence-based guidelines have already been developed.

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C Barber *et al.* *Prim Care Resp J* 2010; 19(3): 274-280

doi:10.4104/pcrj.2010.00047

**Keywords** occupational asthma, e-learning, primary care, postgraduate education

The full version of this paper, with online Appendix, is available at [www.thepcrj.org](http://www.thepcrj.org)

**Introduction**

Occupational asthma is the most frequently reported work-related airway disease in Britain, and it has been estimated that exposures in the workplace may account for between 16-17% of all adult cases of asthma.<sup>1,2</sup> In 2007 this equated to just over 300 new cases of occupational asthma reported by UK respiratory and occupational physicians, although the true incidence is likely to be three- to ten-fold higher.<sup>3</sup> Workers developing this condition may develop chronic ill health<sup>4</sup> and be forced to relocate or leave employment, with subsequent loss of income and benefit requirements.<sup>5-8</sup> These

factors combine to produce a huge financial burden on society,<sup>4</sup> which in the year 2000 was estimated by the UK Health and Safety Executive (HSE) to be in the region of £1.1 billion over a ten-year period.<sup>3</sup>

There is clear evidence that the prognosis for workers developing occupational asthma is improved by rapid accurate diagnosis and removal from further allergen exposure.<sup>9-12</sup> Studies from a range of countries, however, have identified average delays of several years in the patient journey for symptomatic workers, which in part relate to the condition being under-recognised in primary care.<sup>13-16</sup>

National published guidelines for the prevention, identification and management of occupational asthma have been developed by the British Occupational Health Research

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Foundation (BOHRF), and are freely available on the Internet. These provide evidence-based recommendations to inform doctors and nurses working in primary care as to appropriate best practice.<sup>17</sup> The British Thoracic Society (BTS) has produced guidelines for asthma which contain a chapter relating to the diagnosis and management of occupational asthma,<sup>18</sup> and the BTS have also recently approved a national Standard of Care for this condition.<sup>19</sup>

Although these guidelines have been designed to improve all aspects of the management of occupational asthma, their impact and utilisation in primary care has not previously been studied. The aim of this project therefore was to translate existing occupational asthma guidelines into an evidence-based, interactive e-learning module, which could be used both as an educational tool and to evaluate awareness and usage of clinical guidelines for the diagnosis and management of occupational asthma in primary care.

## Methods

### Module development

This model was developed by the Centre for Workplace Health at the Health and Safety Laboratory in Buxton, in collaboration with the Manchester academic General Practice Research Unit. A new e-learning module was developed, comprising key messages taken from the BOHRF occupational asthma guidelines<sup>17</sup> and the occupational asthma Standard of Care.<sup>19</sup> The e-learning module comprised a comprehensive interactive case history relating to the care of patients with occupational asthma. The cases were designed to mirror real-life clinical scenarios, and were developed with multidisciplinary input from the HSE and both primary and secondary care. The module was peer-reviewed by an international expert in occupational asthma, and provided free to users.

BMJ Learning were chosen to market and host the educational module due to their existing provision of similar online learning modules for postgraduate training, and their email access to over 70,000 doctors and other healthcare professionals. The module comprised:

- An introduction outlining why this topic is important and the learning outcomes from the module
- An initial test (the "pre-test") to assess users' current knowledge
- An interactive series of consultations, following a patient with possible occupational asthma from first presentation, through investigations, to diagnosis and subsequent management. At each consultation, the user was asked a question about how they would manage the patient, their response being compared with the correct response, giving explanations and evidence-based supporting statements

- At the end of this part of the module, the key points were reinforced in a summary
- A final test (the "post-test"). This was a repeat of the pre-test to find out what the user had learnt from the module, and also allowed users to compare their scores with other users
- The text was supported by a video clip of an occupational asthma patient being interviewed, highlighting the personal impact of developing the condition
- A comprehensive list of references and live links to further resources was made available
- Finally the users were encouraged to reflect on the learning experience by writing their thoughts on what they had learnt
- Users were able to print out a certificate of completion stating that they had done this learning module
- Users were also able to record the fact that they had completed the learning module in their professional development plan within the BMJ Learning system, with the completed module providing one hour of online learning linked towards their continuous professional development and eventual successful appraisal and revalidation.

In order to market the module, BMJ Learning placed a prominent link to the module on their homepage and on their learning resources page. E-mails were also sent to relevant groups of existing users to inform them of the new module.

### Module user survey

BMJ Learning also surveyed learners who had completed the module six weeks previously. This survey was sent by e-mail, and comprised a series of seven multiple choice questions which asked them about their knowledge of guidelines in relation to occupational asthma and also whether the module had helped them put the guidelines into practice. The questions and possible responses are shown in Appendix 1 (available online at [www.thepcrj.org](http://www.thepcrj.org)).

### Data analysis

Pre-test and post-test data were entered by BMJ Learning into an SPSS statistical package, and compared using Wilcoxon's test. Qualitative analysis of the post-module feedback comments was assessed by examining for emergent themes. The frequency of key descriptive words was also calculated by searching a Word document containing the feedback.

### Ethics

Due to the nature and design of this study formal Ethics Committee approval was not required.

## Results

After the module had been available on line for six months, a total of 1041 users had completed it – 658 (63%) from

**Table 1. Qualitative feedback – commonly used descriptive words.**

Feedback	Frequency (%)
Good/great/excellent	245 (36)
Useful/helpful	241 (35)
Informative/interesting/educational	166 (24)
Clear/concise	56 (8)

**Table 2. Qualitative feedback – prevalence of occupational asthma.**

“hadn't appreciated how common occupational asthma is”

“an eye opener... 3000 cases a year wow!!”

“I fear I must be missing cases as I don't recall 15% of our asthmatics having an occupational cause”

“didn't know such a high percentage of asthma was occupational”

primary care, 258 other UK healthcare professionals (25%), and 125 (12%) international doctors. Overall, completion of the module significantly improved knowledge of occupational asthma amongst healthcare workers, with a mean pre-test score of 70% rising to a mean post-test score of 92% ( $p < 0.001$ ).

Of the 1041 users, 682 (66%) left qualitative feedback immediately after completing the module in the form of free text. Qualitative analysis demonstrated that the most common emergent theme of the feedback related to short descriptive comments on how the user had found the module. Examples of the most commonly used words and their frequency are shown in Table 1.

Other less common emergent themes related to the prevalence of occupational asthma, which accounted for approximately 4% of all comments. Examples of these are shown in Table 2.

Another feedback theme related to comments suggesting that the module would lead to a change in practice. These were mainly related to either an increased likelihood of considering occupation as a cause of adult-onset asthma, or a change in the diagnostic process. Selections of these comments are shown in Tables 3 and 4, respectively.

There was a small amount of negative feedback; approximately 2% of all comments had some negative element. There were no common themes here, and some examples are shown in Table 5.

### E-mail questionnaire

An e-mail questionnaire was sent to the first 578 users six

**Table 3. Qualitative feedback – consideration of occupation as a cause of asthma.**

“I'll keep a close eye on exploring the history more”

“much needed prompt to ask about occupation”

“ears wide open for symptoms of occupational asthma now!”

“occupational asthma is now on my radar”

**Table 4. Qualitative feedback – change of diagnostic process.**

“better position to advise them to seek specialist advice”

“not aware of the importance of referral to secondary care”

“I have recently considered the diagnosis of occupational asthma in a patient with breathing problems, and I now have a much clearer idea of what to do with them”

“very useful to clear up recent problem with patient and her employer”

**Table 5. Qualitative feedback – negative comments.**

“a useful reminder but very basic.”

“more information on treatment options”

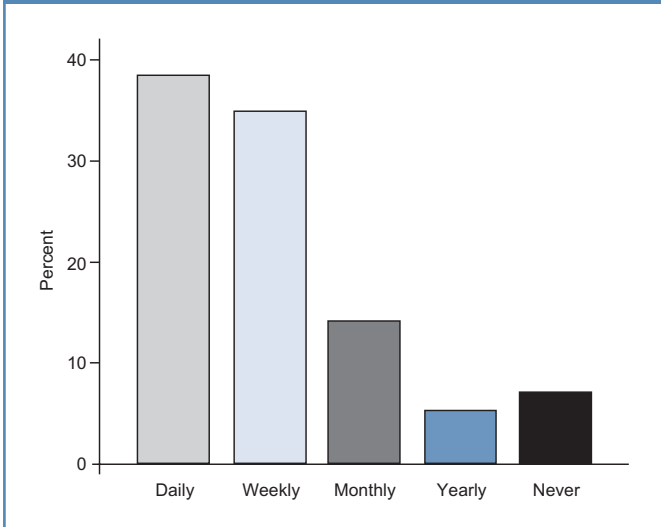
“not so sure a respiratory physician's opinion is really needed”

“referral to occupational health advisor in workplace should be considered”

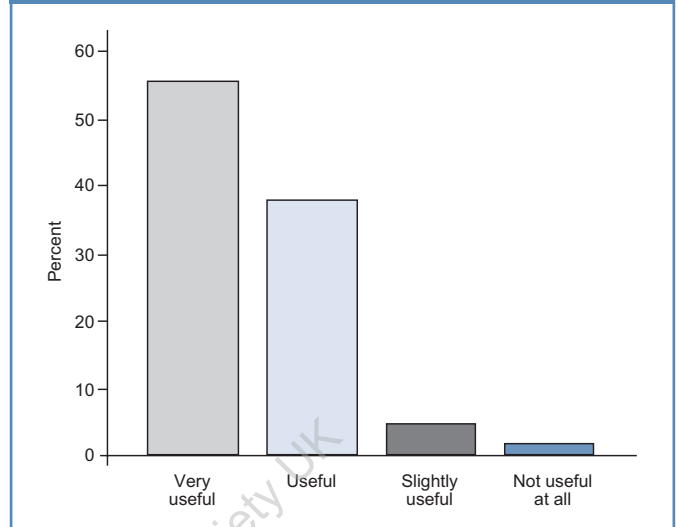
weeks after the module had been completed. The effective response rate based on successful delivery was 30.7%. The majority of the respondents were healthcare workers who were regularly seeing adult patients with asthma, either on a daily, weekly, or monthly basis (see Figure 1). In addition, 42% of them stated that they had seen a patient with possible occupational asthma in the six weeks since completing the module. Almost all (94%) of the respondents stated that they had found the module useful or very useful in raising their awareness of occupational asthma (Figure 2).

Prior to completing the module, awareness of the BOHRF occupational asthma guidelines was relatively poor, with the majority (72%) of respondents stating either that they had never heard of them or had heard of them but had never seen them (Figure 3). The majority of respondents (73%), however, stated that since doing the module they would use evidence-based guidelines for all or most of their patients with possible occupational asthma (Figure 4). Over 90% of respondents also felt that the e-learning module had already, or would in the future, help put evidence-based occupational asthma guidelines in to use.

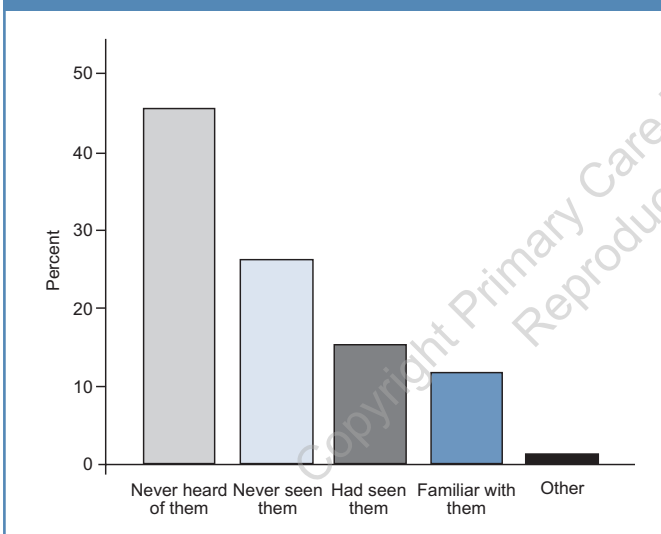
**Figure 1. How frequently do you look after adults with any form of asthma?**



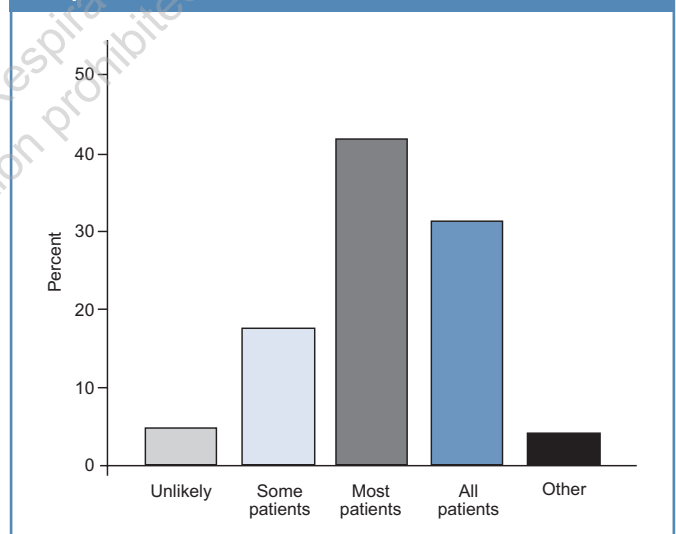
**Figure 2. How useful has this module been in raising your awareness of occupational asthma?**



**Figure 3 Before doing this module how much did you know about the BOHRF guidelines on occupational asthma?**



**Figure 4 Since doing the module, how likely are you to use evidence-based guidelines for patients with occupational asthma?**



**Discussion**

We developed a new interactive e-learning tool, based on key messages from the BOHRF guidelines<sup>17</sup> and occupational asthma Standard of Care.<sup>19</sup> This was hosted and marketed by BMJ Learning, with over 1000 healthcare professionals completing it within the first six months of the module going live. Almost all of the feedback that was left immediately after completing the module was positive, and completing it significantly improved participants' knowledge in this area. A questionnaire following module completion (returned by approximately 30%) demonstrated limited pre-module usage of the BOHRF occupational asthma guidelines.<sup>17</sup> Following the module, however, the majority of participants stated that they would use

the guidelines for all or most of their patients with suspected occupational asthma.

This project utilised an existing online e-learning system, regularly used by general practitioners (GPs) for continuing professional development. It has previously been established that this form of training for healthcare workers offers knowledge transfer equivalent to other forms of teaching,<sup>20,21</sup> and has the advantage that users can determine the time, duration, and place of learning.<sup>21</sup> Internet-based and CD-ROM interactive learning tools such as this are already successfully being used in a variety of European countries to provide distance learning for occupational physicians.<sup>21-23</sup>

Approximately half of all practising UK GPs are registered

with BMJ Learning, and will have received e-mail invitations to access the occupational asthma learning module. Around 2% of these completed the module over a 6-month period, representing somewhere in the region of 1% of all UK GPs.<sup>24</sup> Therefore, the selection of those completing the module is not random, could be biased in favour of healthcare professionals with a pre-existing interest in occupational asthma, and may not be representative of all practising GPs. It should also be noted that although originally intended for primary care, a wide range of other healthcare workers also completed the module. It seems reasonable to assume that having chosen to complete it, the management of occupational asthma was relevant to their practice (an assumption confirmed to some extent by the responses to the e-mail follow-up questionnaire shown in Figure 1); we therefore analysed the qualitative and questionnaire responses for all participants together. A further limitation to interpreting the data relates to the low response rate (30.7%) for the follow-up e-mail questionnaire. This was sent out several weeks after the module, and a reply was only received by around a third of users. However, this level of feedback response is typical for this type of e-learning module in the experience of the editor of BMJ Learning.

The aim of this project was primarily to design and evaluate an educational tool for GPs, and the data collected were very much limited by the pre-determined format of the selected learning tool. We were therefore unable to record the demographics of users, unable to compare responses by type of healthcare worker, and were only able to ask a limited number of questions in the follow-up questionnaire.

Bearing in mind these limitations, a large number of individual pieces of qualitative feedback were posted by a range of healthcare workers. Almost all of the feedback was supportive, and many of the comments consisted of short positive words such as "good" or "great".

Within the remaining data, two main themes emerged. The first of these related to the prevalence of occupational asthma, with all comments essentially stating surprise at how common the condition was. The other main theme was a group of comments suggesting that, following the module, healthcare workers would change their practice in some way. Many of these related to being more aware of considering the occupational history of adult asthmatics, whilst others dealt with improving elements of the diagnostic pathway. Approximately 2% of the feedback was in some way negative, although there were no clearly emergent themes within this data to suggest major problems with the module design.

The BOHRF occupational asthma guidelines were published in 2004,<sup>17</sup> and contain a short summary document developed specifically for GPs and Practice Nurses which was disseminated throughout primary care at the time. Accompanying articles in *Thorax*,<sup>25</sup> *Occupational Environmental Medicine*,<sup>26</sup> the *British Journal of General Practice*,<sup>27</sup> and the *Primary Care Respiratory*

*Journal*<sup>28</sup> were also published to raise awareness of the guidelines. The guidelines are also freely available on line (with the recently updated version found at [http://www.bohrf.org.uk/downloads/Occupational\\_AsthmaEvidenceReview-Mar2010.pdf](http://www.bohrf.org.uk/downloads/Occupational_AsthmaEvidenceReview-Mar2010.pdf)), and easily found using the search term "occupational asthma guidelines" in search engines such as Google and PubMed. It is interesting, therefore, that despite these measures, approximately three-quarters of the healthcare workers (most of whom are regularly seeing adult patients with asthma) were either not aware of the BOHRF asthma guidelines or had never seen a copy of them.

Of the healthcare workers completing the post-module user questionnaire in our study, the majority reported that they would use the BOHRF guidelines for all or most of their future patients with occupational asthma, and that the module would help them to use the evidence-based guidelines. However, whether this results in a long-term change of practice could not be assessed during the study. Previous research has highlighted the difficult area of translating clinical guidelines in to routine practice, which in part relates to the large range and number of evidence-based guidelines that GPs are provided with on a regular basis. Significant barriers exist to the adoption of clinical guidelines, including factors relating to the guideline, the patient, the individual physician, and the healthcare system itself.<sup>29</sup> Although this area is complex, guideline characteristics relevant to this include: the type of health problem (e.g. whether of interest or relevance to an individual GP); the quality of the evidence base; compatibility with existing values; simplicity; and ease of changing practice.<sup>30</sup> When German GPs were asked about implementing guidelines, the most commonly cited barrier was lack of time; other reasons listed included technical difficulties in accessing computerised guidelines, finding guidelines too complex to follow, and feeling that using guidelines restricted therapeutic decisions.<sup>31</sup> Qualitative data from interviews with GPs in New Zealand found that they felt that behavioural changes needed to be incremental, requiring reinforcement of knowledge from a range of different sources. They also felt that single events were more likely to effect change if they were of high impact, punitive, or incentive-based.<sup>32</sup> E-mail invitations offering GPs relevant and interactive e-learning modules offer one method of reinforcing and highlighting clinical guidelines in an attempt to effect change in primary care practice.

This project was carried out in the UK, and since it began, primary care's key role in the management of occupational disease in this country has further been highlighted by a Government-funded health review.<sup>33</sup> This is particularly true for small and medium-sized enterprises where access to specialist occupational health services is generally poor. Recent research has demonstrated significant delays in the diagnostic pathway for occupational asthma in primary

## SUMMARY BOX

**Difficulties encountered**

The main difficulties with this study related to participation rates, in gaining access to a large number of British primary care healthcare workers, getting them to undertake the module, and gain their views.

**Alternative methodologies**

Although the study findings have been limited by the constraints of the learning module chosen, there were no other viable alternative methodologies available.

**New questions**

Further research is required to investigate the optimal strategy to ensure that GPs and Practice Nurses are adequately equipped to recognise and deal with the occupational health issues they see on a day-to-day basis.

**Lessons for clinical practice**

E-learning offers an acceptable method of post-graduate medical education for occupational health issues in primary care.

care,<sup>13-16</sup> which may in part relate to deficiencies in undergraduate and postgraduate occupational training. This is highly relevant for affected workers, since early and accurate diagnosis linked with exposure modification offers the best prognosis, both for health and socioeconomic outcomes.<sup>4-12</sup> It is clear therefore that adequate primary care training is vital to ensure that adult asthmatics with work-related symptoms are identified as soon as possible in order to facilitate specialist diagnosis and management.<sup>17,19</sup>

The problem of ensuring that occupational asthma guidelines are utilised in primary care is not unique to the UK, and has recently also been acknowledged by American and Canadian occupational respiratory disease specialists. This has led to their developing and publishing similar occupational asthma case studies,<sup>34,35</sup> again with the intent of improving evidence-based practice.

**Conclusion**

This project has demonstrated that e-learning offers an acceptable method of postgraduate medical education for occupational medicine issues in primary care. This model of problem-based learning for GPs may be easily adapted to other important occupational issues, particularly where evidence-based guidelines have already been developed. Further research is required to investigate the optimal strategy to ensure that GPs and Practice Nurses are adequately equipped to recognise and deal with the occupational medical issues they see on a day-to-day basis.

**Acknowledgements**

The authors would like to thank the Health & Safety Executive and the British Occupational Health Research Foundation who funded this work. In addition, the study team would like to acknowledge all those medical practitioners who took part in the study, and BMJ Learning who assisted in making this work possible.

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**Funding**

This project was co-funded by the Health and Safety Executive, and the British Occupational Health Research Foundation.

**Conflict of interest**

No conflicts of interest.

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Available online at <http://www.thepcrj.org>

## Appendix 1. Module user survey.

Please could you tell us how useful this module on occupational asthma was?

1. *How frequently do you look after adults with any form of asthma?*

- Daily
- Weekly
- Monthly
- Yearly
- Never

2. *How useful has this module been in raising your awareness of occupational asthma?*

- Very useful
- Useful
- Slightly useful
- Not useful at all

3. *Before doing this module how much did you know about the BOHFR guidelines on occupational asthma?*

- I had never heard of them
- I had heard of them before but never seen them
- I had seen them before
- I was familiar with them
- Other – open text \_\_\_\_\_

4. *Since doing the module, how likely are you to use evidence based guidelines for patients with possible occupational asthma?*

- I am unlikely to use them
- I may use them for some patients
- I will use them for most patients
- I will use them for all patients
- Other – open text \_\_\_\_\_

5. *Since doing the module, have you suspected that any of the patients you have seen may have occupational asthma?*

If yes then continue to question 5a

If no then jump to question 5b

5a. *Did the BMJ Learning module help you put the guidelines into action?*

- Yes
- No
- Not sure

5b. *Do you think the modules will help you put the guidelines into practice in the future?*

- Yes
- No
- Not sure