



A lifeline for COPD: prevention strategy

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Educational aims

- ▶ To provide an overview of the medical devices used in support of respiratory diagnosis and management. An outline of the National Clinical Strategy in the UK.
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Summary

This review provides an overview of the new National Clinical Strategy in the UK, which is designed to work proactively in preventing the development of chronic obstructive pulmonary disease (COPD) while defining a clear pathway to healthcare for sufferers. The government initiative will aim to associate the education of target groups with the diagnosis and management of COPD. Easy-to-use tools for healthcare professionals are available from the medical technology industry in support of the initiative, for example pre-screening, smoking cessation, spirometry measurements and body plethysmography.

As COPD continues to climb the World Health Organization's (WHO) burden of disease rankings [1], vying for fourth place with HIV/AIDS in many countries, governments around the world are beginning to define new, coordinated and proactive measures to combat the onset and development of the disease. The headline figures estimate that COPD causes 3 million deaths per year, a sobering number indeed, but it is not necessarily mortality, but rather morbidity, that drains valuable healthcare resources and scars patients' lives.

In 2007, the WHO estimated that 210 million people globally are affected by COPD, both diagnosed and undiagnosed, and these many millions live with the disease as their health and quality of life deteriorate. It is this lifetime of the patient, from the beginning to the end of the disease cycle, that places the heaviest burden on healthcare resources, with estimates suggesting some 50% of healthcare budgets are accounted for by hospital

admissions. COPD patients, especially through exacerbations, will use a high proportion of these resources, through emergency care and critical care. Consequently, many governments are seeking to coordinate previously isolated initiatives to provide a prevention-based lifeline for the COPD epidemic.

Integrating prevention and care

In the UK, 2010 will see the publication and roll-out of the National Clinical Strategy for COPD [2], a government-led initiative that will attempt to connect the diagnosis and management of COPD with the education of target groups and the prevention of COPD. It is designed to reduce the inequalities within the system and provide a patient-focused care pathway that follows the life cycle of the disease. As smokers make up 80% of the COPD

Provenance

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population, the prevention of smoking is an integral component and begins with the education of the "Tweens" – children aged 7–12 yrs – to prevent this important age-group taking up smoking in the first place.

In many countries, smoking cessation has been seen as a separate undertaking by health authorities – an end in itself – but an important development in the National Clinical Strategy for COPD is to provide a link between COPD diagnosis and smoking cessation. Government-sponsored smoking cessation programmes are a fundamental part of the prevention messages, combining education about the dangers of smoking with practical methods for kicking the habit, whether through drug, patch or displacement therapies. This is especially relevant to smokers aged 20–29 yrs and the pre-symptomatic middle aged, those aged 30–40 yrs, who may come to smoking cessation programmes with other motivations, such as financial or social considerations.

The early recognition and diagnosis of COPD is particularly relevant to this latter, pre-symptomatic middle-aged group. The onset of COPD may have already begun in an estimated 20% of smokers by this age, but the sufferers can remain unaware of the condition, especially if there are no obvious symptoms such as a persistent cough or chest tightness. This group may additionally dismiss any minor symptoms, attributing them to the inevitable effects of ageing, but with or without symptoms it is important to identify these pre-symptomatic sufferers and introduce them to the healthcare system. Early diagnosis leads to early treatment, and early treatment is an important step to reducing costs and quality-of-life issues later in the life of the patient.

The next element of the National Clinical Strategy for COPD is providing that patient-focused care pathway from first diagnosis all the way through to end-of-life care for the severest COPD sufferers. This will encompass aspects such as diagnosis and management, medication (including oxygen therapy), rehabilitation services and homecare. Improvement in quality of life through the anticipation of care requirements is fundamental to this strategy in order to provide equal opportunities for all patients to prevent the premature deterioration of the condition to such a degree that it requires emergency admissions and prolonged hospital stays. It remains to be seen how successful this coordinated structure will be in the coming years, but COPD pathways are already in place across the UK which define the different stages of Prevention, Case Finding, Diagnosis and Management, while Key Performance

Indicators will look to monitor such parameters as the percentage of smokers offered smoking cessation courses, the percentage of diagnosed COPD sufferers with a defined healthcare plan and the number of emergency readmissions.

Technological backing

The medical technology industry provides many of the tools to be used in support of this initiative, bearing the responsibility of providing healthcare practitioners with easy-to-use devices for, for example pre-screening, smoking cessation, spirometry measurements and body plethysmography. Understanding how the different elements of the comprehensive strategy flow into one another is an important consideration for manufacturers today. They need to interpret new guidelines in order to design products for the future that meet the needs of this patient continuum and provide comprehensive, connected coverage. Few manufacturers, however, are positioned to provide this coordinated combination of diagnostic and preventative devices for both primary- and secondary-care settings, and thus understand the requirements of the holistic approach that forms the basis of these future strategies.

The standards for spirometry, spirometry being the practice for diagnosing and managing COPD, are set by the American Thoracic Society/European Respiratory Society 2005 standards for spirometry [3]. These standards govern not only the performance of spirometry from the perspective of the healthcare professional, but also the requirements of a spirometer for the manufacturer. From the definition of what constitutes an acceptable manoeuvre, through the scaling of flow-volume loops to the size of the display, the standards are in place to foster reliability and thus ensure high-quality interpretation and diagnosis every time. To ensure accuracy and reproducibility, the standards set guidelines for the performance of regular calibration checks, which must be possible with a 3-L syringe. To ensure the safety of patients and caregivers, the standards offer guidance on the use of bacterial filters to prevent cross contamination. All practitioners should receive training in spirometry accredited by a recognised body, such as the Royal College of Nursing in the UK. Such courses are available from national respiratory bodies and quality-driven spirometry manufacturers/suppliers.

At the forefront of these future strategies are the new generation of low-cost early screening devices (figure 1), which measure simple

respiratory parameters such as forced expiratory volume in 1 s (FEV₁) and convert them into terminology the patient can relate to, such as lung age. Why try to convince a 35-year-old that an FEV₁ of 3.80 L is indicative of the early signs of the disease and a prompt to stop smoking, when a lung age of 60 yrs can bring the message home more relevantly and effectively? Such devices are designed to act as part of a normal health check for adults, especially those aged 30–50 yrs, and increasingly in community based pharmacies, to identify the 20% of smokers who make up 80% of COPD sufferers in later life before the symptoms become noticeable to the future sufferer. Identifying potential sufferers earlier and raising their awareness provides an informed platform for those patients, from which healthcare professionals can lead them towards preventative paths such as smoking cessation courses.

Carbon monoxide (CO) monitors have become an integral part of smoking cessation programmes, used to monitor the compliance of subjects enrolled on the courses, providing an objective measure of CO levels on the breath. Smoking cessation programmes are additionally important for pregnant mothers, due to the many health risks that maternal smoking poses to the unborn child (poor birth weight, sudden infant death syndrome, attention deficit hyperactivity disorder, *etc.*). These programmes are designed to educate smokers about the long-term dangers of smoking under the principle that the prevention of smoking in early life is the only cure when it comes to those 80% of COPD cases, and that COPD is just one of the consequences of smoking. Smoking cessation programmes have regular therapy-led motivational structures, are usually subsidised with preventative medication (*e.g.* patches, nicotine gum) and offer smokers a way out of the cycle of COPD. The CO monitor provides proof that the subject is no longer smoking as part of the requirement to stay on the subsidised courses.

The portable and PC-based range of spirometers have become as important to the primary care general practitioner as the blood pressure monitor, the pulse oximeter and the peak flow meter. Spirometry devices today are lightweight, handheld and easy to use, possessing large detailed memories, high-definition touch screens and accessible databases that can be connected *via* USB to standalone PCs, on either a live link or download basis, and to general practitioner journal systems on a similar basis. Indeed, the recent generation of direct-to-PC USB spirometers now effectively transforms laptops and computers into



Figure 1
Portable screening in practice.

professional spirometers, while the flexibility of portable devices to upload information means measurements can be made whenever and wherever required. The National Clinical Strategy for COPD recommends spirometry as part of a general medical health check, while a full spirometry test should be performed every 3 yrs to monitor and track the development of the disease in those already diagnosed. Additionally, it recommends a spirometry test to be performed after all exacerbations and emergency admissions, making spirometry the fundamental basis of professional healthcare respiratory diagnosis.

The successful management of the symptoms of COPD (*e.g.* ongoing cough, shortness of breath, wheezing, chest tightness) through the use of regular spirometry enables sufferers to remain in touch with their diagnosis. Regular spirometry continues to offer the healthcare practitioner opportunities to reinforce the sufferers'

Figure 2
CO measurement.



knowledge and understanding of the condition through further preventative consultations, which may lead to behavioural changes over time. The National Framework also views medication as just one step on this ladder to behavioural change and not the inevitable conclusion. The message of prevention and rehabilitation must continue to be reinforced. Therapy is designed to be viewed in the wider context of monitoring disease progression and those behavioural changes, incorporating rehabilitation therapy from physical activity and breathing exercises to full lifestyle and nutrition changes.

While primary care spirometry can identify and diagnose overarching conditions such as obstructive and restrictive diseases, it is the secondary care hospital equipment, such as body plethysmography or body box and respiratory muscle devices, that is capable of pinpointing the disease and thus the ideal therapy. Obstructive disease includes conditions such as emphysema, bronchitis and cystic fibrosis, while restrictive conditions such as fibrosis or muscle weakness lead to poor lung compliance through reduced capacity and stiff lungs. It is just as important to diagnose COPD in general terms as it is to diagnose COPD in specific terms, and as such an important part of that care pathway leads inevitably from primary into secondary care.

The efficiency of lung gas exchange can be measured through body plethysmography, performed in a sealed unit. A parameter such as diffusing capacity of lung for carbon monoxide (DL_{CO}), reflects how much oxygen passes from the alveoli into the blood stream. Measurements of total lung capacity and residual volume assess the efficiency of the lungs to ventilate effectively,

while tests such as central and distal airways resistance and measurements of elastic recoil through impulse oscillometry identify poor compliance of the lungs. Additionally, respiratory muscle devices identify muscle weakness, which can be a factor of atrophy, the wasting of the muscles through either poor nutrition or genetic factors.

It is spirometry in primary care that ensures patients are identified early and referred for further analysis within the secondary care environment, rather than burdening the secondary care systems at the point of first contact. Estimates suggest that a huge proportion of COPD sufferers remain undiagnosed (e.g. [4]), and as such their first encounter with a hospital for their condition will be from an emergency visit in response to an event or exacerbation that will normally lead to critical care and hospitalisation. Once again prevention is the key strategy, while it may be too late to prevent the onset of the disease, through accurate diagnosis the patient can be medicated and receive suitable rehabilitation and medication therapy before a critical event occurs. Reducing the number of critical events is not only a measure of the quality of life for the patient, but also reduces the drain on scarce health service resources.

Conclusion

Overall, and in conclusion, the National Clinical Strategy for COPD is a model of how COPD healthcare must work in a coordinated manner in order to avoid an exponentially increasing population affected by the disease and the subsequent healthcare expense. In combination with government policy towards the social policing and messaging surrounding smoking, through public smoking bans, advertising bans, display ban proposals and ever higher taxes, we can see that the connectedness of policy is the way forward. It similarly behaves the medical industry to interpret this bright future by keeping in touch with this sense of connectedness and the needs of future initiatives. The understanding of this patient continuum and the possession of expertise to provide a complete range of professional products from pre-screening, smoking cessation, spirometry and body plethysmography is an important consideration for a medical device provider. Products, now and in the future, should address the full range of government initiatives and provide a connected lifeline for COPD, as we look to improve the quality of life of patients and avoid an ever more expensive future.

Figure 3
Body plethysmography.



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