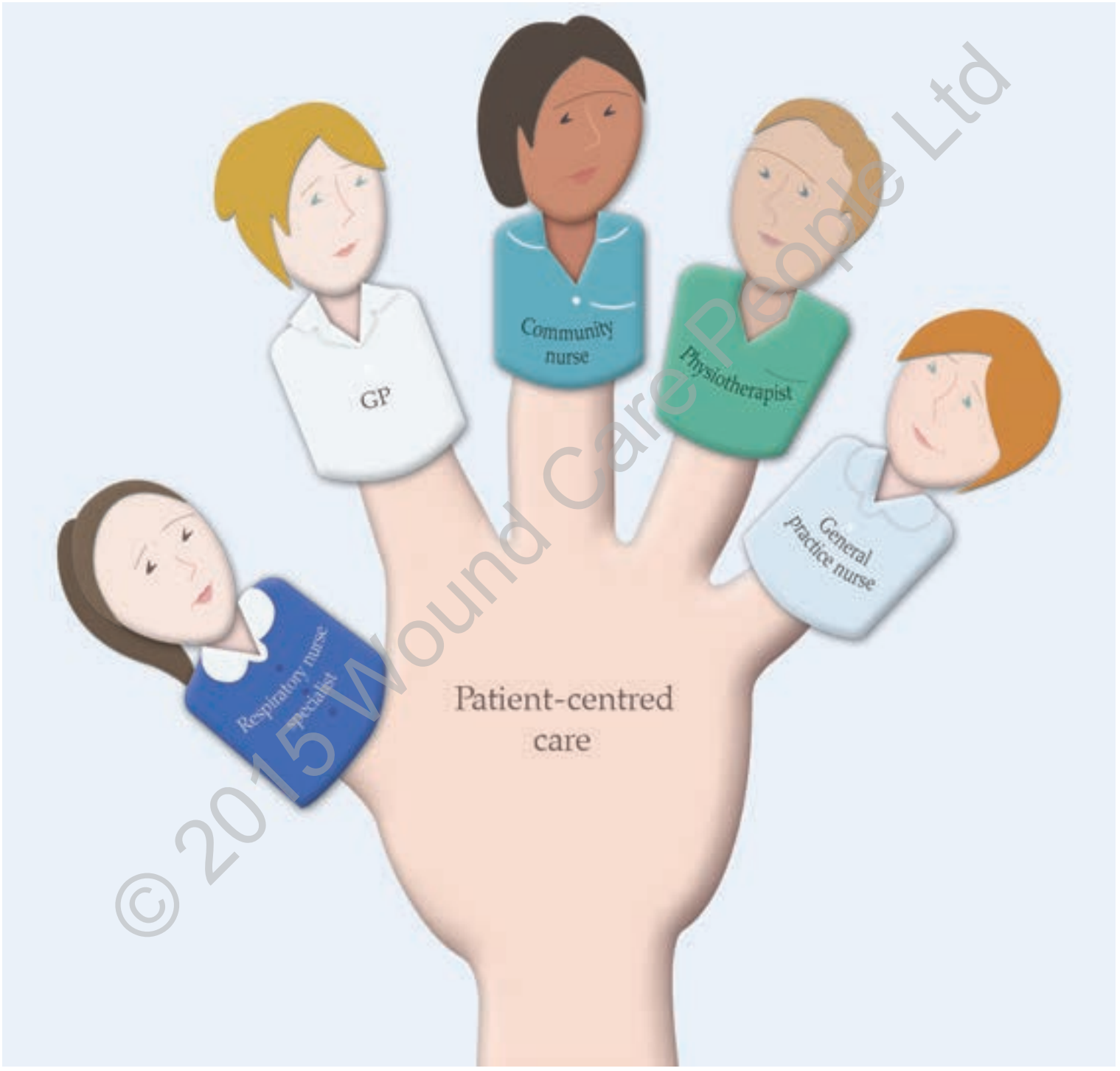
RESPIRATORY CARE TODAY

www.journalofpracticenursing.co.uk

For what matters in practice

Volume 1
Number 1
2015



Can integrating respiratory services work in practice?

ANORO® ELLIPTA®

umeclidinium/vilanterol

breathe...

Anoro® Ellipta® improves lung function (trough FEV_1) compared with tiotropium and has a similar adverse event profile in clinical trials[1-2]

Give your patients the benefits of dual bronchodilation.

Visit Anoro.co.uk to find out more.

A maintenance bronchodilator treatment to relieve symptoms in patients with COPD

Anoro® Ellipta® (umeclidinium bromide/vilanterol [as trifenatate]) Prescribing information
(Please consult the full Summary of Product Characteristics (SmPC) before prescribing)

Anoro® Ellipta® 55/22mcg (umeclidinium bromide/vilanterol [as trifenatate]) inhalation powder. Each single inhalation of umeclidinium bromide (UMEC) 62.5 micrograms (mcg) and vilanterol (VI) 25mcg provides a delivered dose of UMEC 55mcg and VI 22mcg. **Indications:** *COPD:* Maintenance bronchodilator treatment to relieve symptoms in adult patients with COPD. **Dosage and administration:** Inhalation only. *COPD:* One inhalation once daily of Anoro Ellipta. **Contraindications:** Hypersensitivity to the active substances or to any of the excipients (lactose monohydrate and magnesium stearate). **Precautions:** Anoro Ellipta should not be used in patients with asthma. Treatment with Anoro Ellipta should be discontinued in the event of paradoxical bronchospasm and alternative therapy initiated if necessary. Cardiovascular effects may be seen after the administration of muscarinic receptor antagonists and sympathomimetics therefore Anoro Ellipta should be used with caution in patients with severe cardiovascular disease. Anoro Ellipta should be used with caution in patients with urinary retention, narrow angle glaucoma, convulsive disorders, thyrotoxicosis, hypokalaemia, hyperglycaemia and severe hepatic impairment. No dosage adjustment is required in renal or mild to moderate hepatic impairment. **Acute symptoms:** Anoro Ellipta is not indicated for acute episodes of bronchospasm. Warn patients to seek medical advice if short-acting inhaled bronchodilator use increases, a re-evaluation of the patient and of the COPD treatment regimen should be undertaken. **Interactions with other medicinal products:** Interaction studies have only been performed in adults. Avoid β-blockers. Caution is advised when co-administering with strong CYP3A4 inhibitors (e.g. ketoconazole, clarithromycin, itraconazole, ritonavir, telithromycin). Anoro Ellipta should not be used in conjunction with other long-acting β_2-adrenergic agonists or medicinal products containing long-acting muscarinic antagonists. Caution is advised with concomitant use with methylxanthine derivatives, steroids or non-potassium-sparing diuretics as it may potentiate possible hypokalaemic effect of β_2-adrenergic agonists. **Fertility, pregnancy, and breast-feeding:** No available data. Balance risks against benefits. **Side effects:** Common: Urinary tract infection, sinusitis, nasopharyngitis, pharyngitis, upper respiratory tract infection, headache, cough, oropharyngeal pain, constipation and dry mouth. Uncommon: Atrial fibrillation, supraventricular tachycardia, rhythm idioventricular, tachycardia, supraventricular extrasystoles and rash. **Legal category:** POM. **Presentation and Basic NHS cost:** Anoro® Ellipta®. 1 inhaler x 30 doses. Anoro Ellipta 55/22mcg - £32.50. **Marketing authorisation (MA) nos. 55/22mcg 1x30 doses [EU/1/14/898/002]; MA holder:** Glaxo Group Ltd, 980 Great West Road, Brentford, Middlesex TW8 9GS, UK. **Last date of revision:** October 2014. UK/RESP/0077/14c. Anoro® Ellipta® was developed in collaboration with Theravance,Inc.

Adverse events should be reported. Reporting forms and information can be found at www.mhra.gov.uk/yellowcard.
Adverse events should also be reported to GlaxoSmithKline on 0800 221 441.

References
1. Decramer *et al*. Lancet Resp Med 2014 ; Vol 2 No. 6 pp 472-4486.
2. Maleki-Yazdi *et al*. Respir Med. 2014;108(12):1752-1760.

Theravance

UK/UCV/0011/14v February 2015

ANORO ELLIPTA was developed in collaboration with Theravance

Contents

Welcome to *Respiratory Care Today*

It is with great pleasure that I welcome you to the first edition of *Respiratory Care Today*. This new journal is the result of the increased recognition of the important role that nurses play in the provision of good quality care for the millions of people in the UK living with a respiratory condition.

This issue includes articles, written by expert respiratory clinicians working across the many different interfaces of care in the NHS, that cover a wide range of topics relevant to clinical practice, ranging from practical tips when providing care to people with chronic obstructive pulmonary disease (COPD), asthma, as well as long-term oxygen therapy and end-of-life care. Management of the patient at end of life is a sensitive and challenging area, and one that is becoming increasingly relevant to primary care nurses as more people choose to die at home. Symptom control, notably breathlessness for people with a respiratory condition, is paramount to good palliative care — the article focusing on end of life provides an excellent overview of how best to support patients and their carers during this phase. All the articles are patient-centred and cover the basic principles of providing good quality nursing care to respiratory patients.

A number of practical posters are also included with some tops tips, including practical insights on spirometry readings and diagnosing asthma. Moving on from clinical issues, we have a feature on contemporary professional development that explores integrated care (*pp 4–7*). Integrated care is high on the NHS and political agenda, and respiratory care nursing is at the forefront of such developments. I am also especially excited to share with you the discussion piece on the state of respiratory care today (*pp 10–11*), which asks some difficult questions and the responses are both interesting and thought-provoking. I hope you enjoy this first issue of *Respiratory Care Today*.

Janelle Yorke, Professor of Cancer Nursing, University of Manchester and the Christie NHS Foundation

Managing director
Nicola Rusling
nicola@woundcarepeople.com

Publisher
Binkie Mais
binkie@woundcarepeople.com

Editor
Jason Beckford-Ball
jason@jcn.co.uk

Business manager
Alec O'Dare
alec@woundcarepeople.com
07535 282827

Finials House, The Square,
Stow-on-the-Wold, Gloucestershire GL54 1AF

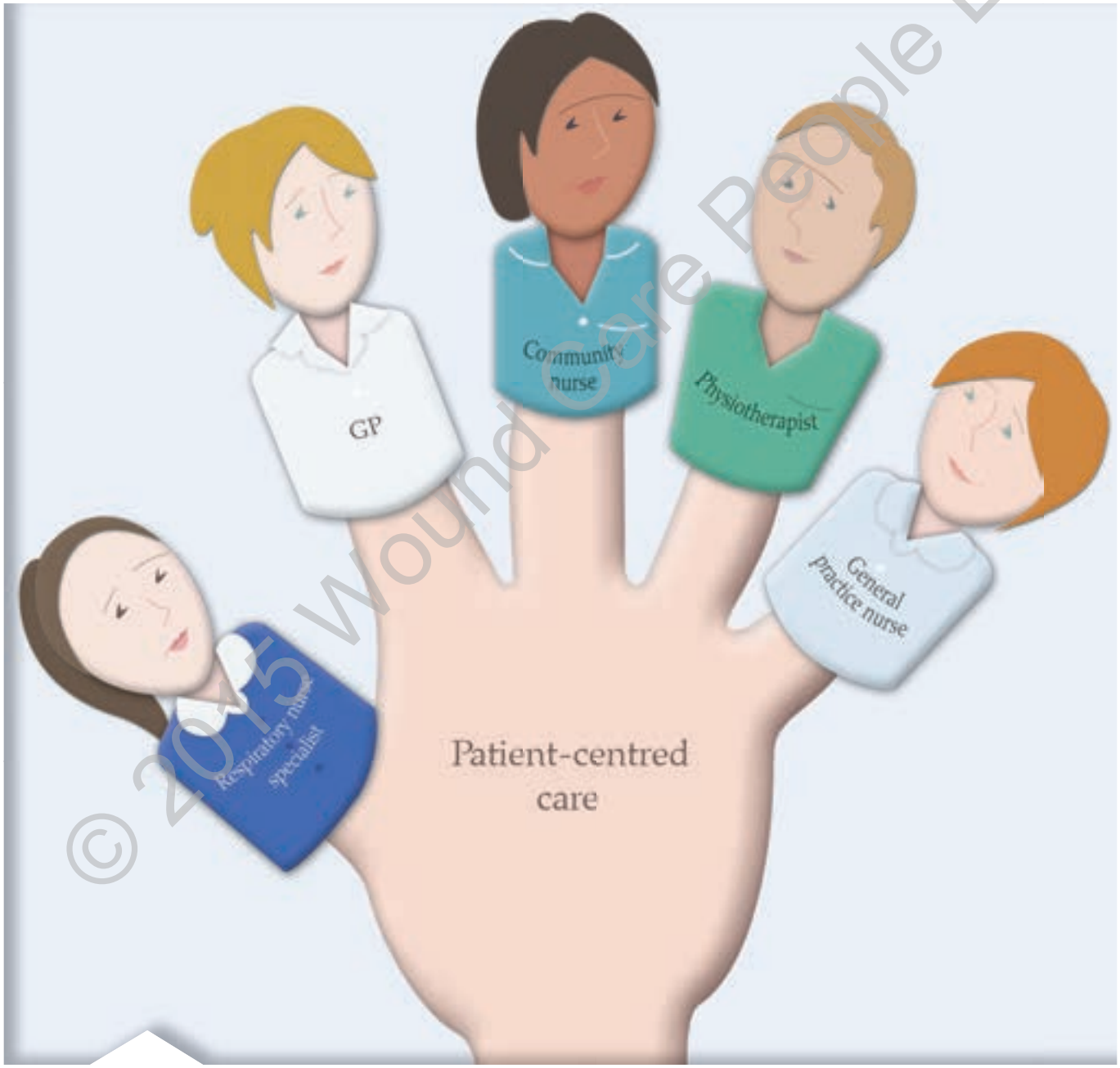
ISSN 2059-2795

t: +44(0) 1451 870310 e: binkie@woundcarepeople.com
http://www.journalofpracticenursing.co.uk

Printed in England by Blackmore Ltd, Shaftesbury

In each issue of *Respiratory Care Today* we investigate a hot topic currently affecting our readers. In this issue, Samantha Prigmore asks...

Is integrated respiratory care the way to go?



We all know that respiratory disease is an all-too common condition resulting in significant personal and economic burden. How do we know this? Partly because of the numbers — approximately one-in-five people in the UK is affected by a respiratory disease, resulting in approximately one million admissions to hospital and accounting for 80,000 deaths a year (All Parliamentary Party Group [APPG], 2014).

Samantha Prigmore, respiratory nurse consultant, St George's University Hospitals NHS Trust

I have been researching how to improve delivery of care for those with respiratory disease for many years, as well as teaching medical and nursing students. The introduction and move towards integrated care has been one of the most significant changes to the NHS over the last few years. This process is being driven along for a variety of reasons. Firstly, to improve efficiency and costs and secondly, and probably more importantly for us, to improve the care that is delivered.

This system-wide change gives us a unique opportunity to realistically embed patient-centred care, with new innovative ways of interacting with patients and their families, using systems such as virtual clinics and care planning conferences. This will help bring care closer to patients and allow them and their families to be more involved in care. From our recent project with the British Thoracic Society (BTS; www.brit-thoracic.org.uk/delivery-of-respiratory-care/integrated-care/) we know that many healthcare professionals are interested in working in this new way to ensure that patients get the right care at the right time in the right place. Our project looked at one way of delivering care, using integrated respiratory consultants and how they work in practice now. This type of role can help bring in expertise from an acute specialist setting to improve services locally (i.e. risk profiling, care bundles), as well as being a bridge between sectors and helping to provide seamless care. As this new way of working rolls out, it is important that as well as considering some of the process and system changes (i.e. budgets, management systems, commissioning and funding), we also consider important issues such as educating staff at all levels, as well as creating new career pathways to entice individuals into this new field. This is a really exciting opportunity for everyone to look at what works in our own practice and see how we can integrate with our colleagues across all sectors.

Dr Nicola Roberts, lecturer, Department of Nursing and Community Health, Glasgow Caledonian University

In order to combat this, the national outcomes strategy for chronic obstructive pulmonary disease (COPD) and asthma (Department of Health [DH], 2011) provided recommendations for quality care, supported by quality standards for both conditions and establishing evidence-based guidelines. Similarly, *The National Review of Asthma Deaths* (Royal College of Physicians, 2014) highlighted issues that may be adversely affecting asthma management, including:

- Forming the correct diagnosis
- Inappropriate prescribing of treatment
- Inadequate asthma reviews
- Failure to recognise the severity of symptoms
- Failure to follow recommended pathways of care.

But despite these efforts, we still have some way to go. Although the results of the national COPD audit programme (Stone et al, 2014) of secondary care demonstrated an overall improvement in care, an admission to hospital was highlighted as a crisis in the long-term management of the patient, and there is a recommendation that new models of care should involve specialist input, covering the whole treatment pathway.

To improve the diagnosis and management of people with respiratory conditions, the question has to be asked — is integrated respiratory care the way forward? If so, what exactly is integrated care? Simply speaking, it is the organisation of patient-centred care that involves both health and social care staff and services, resulting in an improvement in the quality, experience and cost-effectiveness of patient care.

Sounds simple? Not necessarily. There are several types of integration:

- Organisational integration: where the healthcare organisations themselves are formally merged together — the NHS and social services, for example
- Service integration: where separate clinical services are integrated, e.g. nursing, medical and occupational therapy and social work departments working together in a multidisciplinary team
- Functional integration: where non-clinical support and back-

Having worked in respiratory care for many years at a local and regional level, I am aware that there are widespread variations in care, with underlying fragmentations in services, resulting in concomitant adverse effects on morbidity and mortality. Worldwide trends in healthcare reform advocate integrated working as the solution to providing equitable high quality solutions to the problems of disjointed care, poor outcomes, high level demand for services and a growing elderly population — many with chronic conditions and comorbidities. Integrated care appears to be a simple concept focusing on coordinating care for people, especially between health and social care, but there are different approaches to and definitions of the concept. In reality, attempting to improve services through reorganisation can be difficult, often because the fragmented systems in place have encouraged ingrained inflexible practice, with people reluctant to relinquish deep-rooted ways of working. This feature on integrated care is a timely reminder of the issues and challenges ahead.

Jane Scullion, respiratory nurse consultant, regional respiratory clinical lead, East Midlands

office functions are integrated, e.g. integrated electronic patient records. This can reduce expenditure on staff, improve efficiency and communication and reduce duplication
- Clinical integration: the provision of a single coherent process within and/or across health and social care boundaries to provide care through shared guidelines. An example would be joint primary and secondary care prescribing and management guidelines for COPD or asthma.

If we are to provide really integrated care for people with respiratory conditions, then some, if not all of these elements will need to be developed.

So, where to start? There are already moves to provide more integration. The future hospital report (Future Hospital Commission, 2013) recognised the importance of shifting care out of the acute setting to provide a more outward-facing role for hospitals, with specialists working across hospitals and the community setting.

More recently, The *Five Year Forward View* (NHS England, 2014) explains how the NHS needs to change by tackling the root causes of ill-health, e.g. smoking; giving patients more control over their care; providing care that meets the needs of the aging population; and ultimately developing new models that expand and strengthen primary care.

“Knowledge needs to be shared to enable staff to better diagnose and treat patients, with the development and implementation of care pathways, while supporting patients to develop self-management strategies and skills.

It is also important to bear in mind what we are hoping to achieve so that ‘integrated care’ does not simply become the latest health service trend to be forgotten in the next wave of change. The aim of integration is to improve coordination of care, prevent ill-health, and achieve greater value for money.

But, as well as considering the positives, we must acknowledge the potential barriers:
- As it stands, budgets are separate and split into primary, community, secondary and social care
- Services are organisationally distinct, i.e. GP practices are generally businesses run by GPs, while hospital and community services are ‘owned’ by the NHS
- Staff are employed by different organisations with separate health records and a lack of integration of data and information systems.

Integrated respiratory care will not happen overnight. We need to learn from the experiences of the trail blazers described by Robertson et al (2014) if we are to be successful. There needs to be trust and an understanding of each others’ roles and perspectives and a mutual respect in recognising how different healthcare professionals complement each other.

Knowledge needs to be shared to enable staff to better diagnose and treat patients, with the development and implementation of care pathways, while supporting patients to develop self-management strategies and skills.

It is accepted that changes in the provision of care can take time and that strong leadership is required, with communication and negotiation

skills and a real passion to achieve the best possible outcomes for the community. Discussions about the allocation of funding also need to take place between commissioners and providers of care.

A professional cultural shift will be needed. While nurses have always worked across all healthcare settings, for others, i.e. medical consultants, this will be a new experience. For some, working in an integrated way may not be an attractive career option, while for others it will present exciting challenges. Clear clinical governance arrangements and lines of accountability and responsibility need to be drawn up to ensure a safe and robust service for both those receiving and providing care.

The good news is that within the respiratory community itself there appears to be a desire to drive integrated respiratory care forward, e.g. 60% of healthcare communities are reported to have an integrated care pathway for COPD (Stone et al, 2014). This is certainly a step in the right direction. The need to develop and support skilled respiratory practitioners has also been recognised by the British Thoracic Society (BTS; http://bit.ly/1OryAuR), which has researched the role, training and support needed for these integrated posts and is developing resources to support the provision of integrated respiratory care.

We have also seen the establishment of several integrated teams across the country, which have resulted in locally enhanced services, enabling primary and community teams to be supported by respiratory specialists. Due to improved clinical knowledge, a reduction in admissions to hospital and better patient outcomes have been seen (NHS England, 2014).

Despite the enormity of the challenge, integrated respiratory care offers an exciting opportunity for nurses to provide an holistic approach that will be delivered throughout the disease trajectory and across the traditional healthcare settings. Put that way, it seems that working together may be the only option. **RCT**

Most people don't understand the terms 'primary', 'secondary', 'community' and 'social' care — these words are relatively meaningless. People want coordination and care based on best practice. Patients have little interest in organisational or institutional priorities or mergers. They want organisations and professionals not to argue between themselves, or provide differing messages. They expect all professionals to work together as a 'single team', which is based around them, and they want services to work together at the time they are needed — care delivered without delay. Most understand that they may need a variety of professionals and support services, but within this they want a single trusted point/person coordinator.

I agree that if care were fully integrated improvements would be seen in respiratory care. But the author is right, the current health and social care systems in England are not well integrated and so the challenges to achieve integration will require widespread bold professional and organisational changes to reinvent the organisational culture of the NHS.

Rebecca Sherrington, nurse consultant, respiratory medicine, Health and Social Services Department, Guernsey, Channel Islands

REFERENCES

All Parliamentary Party Group (APPG) on Respiratory Health (2014). Available online: www.asthma.org.uk/campaign-appg (accessed 1 May, 2015)

Department of Health (2011) *An outcomes strategy for chronic obstructive pulmonary disease (COPD) and asthma in England*. DH, London. Available online: www.gov.uk/government/publications/an-outcomes-strategy-for-people-with-chronic-obstructive-pulmonary-disease-copd-and-asthma-in-england

Future Hospital Commission (2013) *'Future hospital; caring for medical patients'. A Report from the Future Hospital Commission to the Royal College of Physicians*. Royal College of Physicians, London

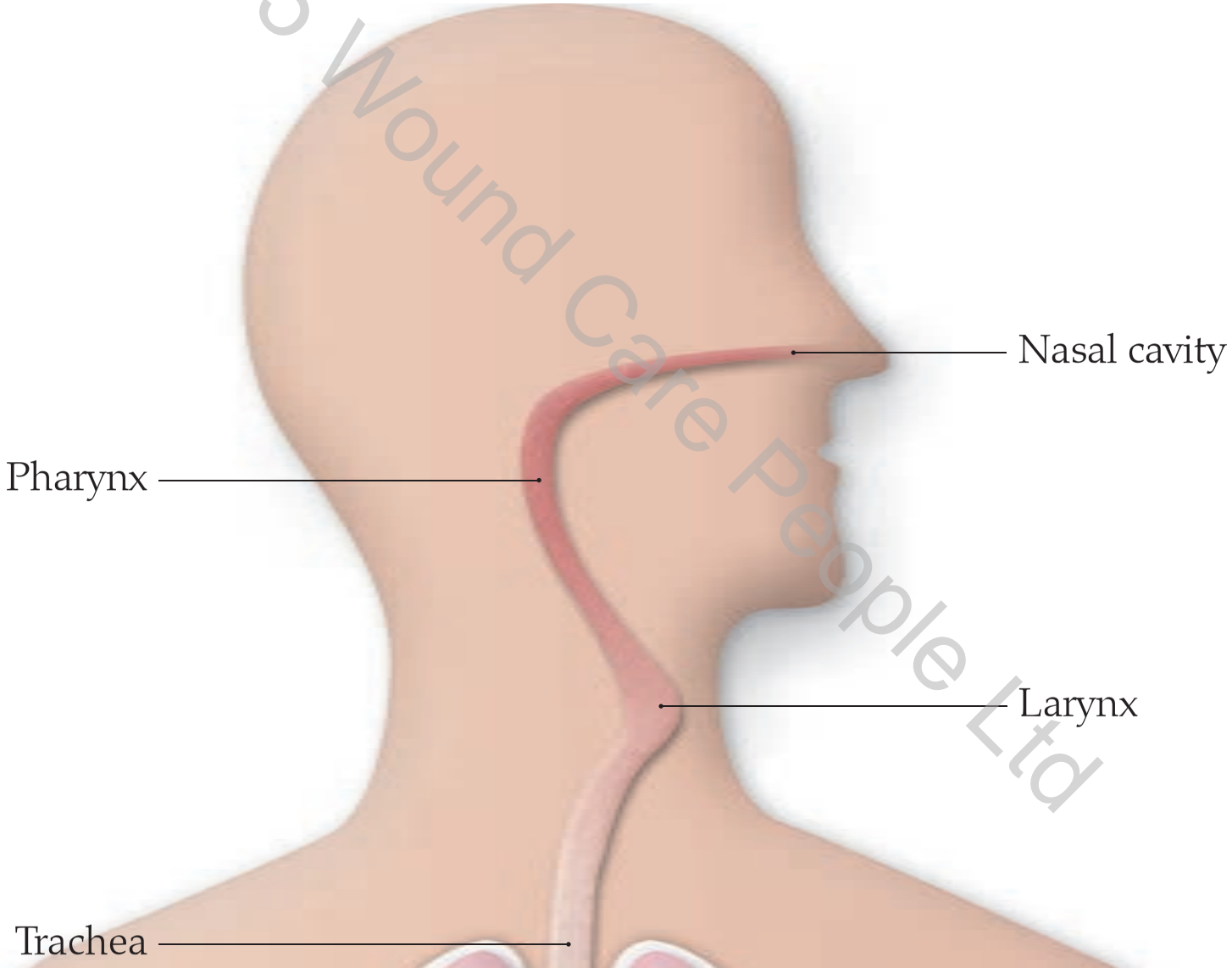
NHS England (2014) *NHS Five Year Forward View*. NHS, England, London. Available online: www.england.nhs.uk/ourwork/futurenhs/ (accessed 1 May, 2015)

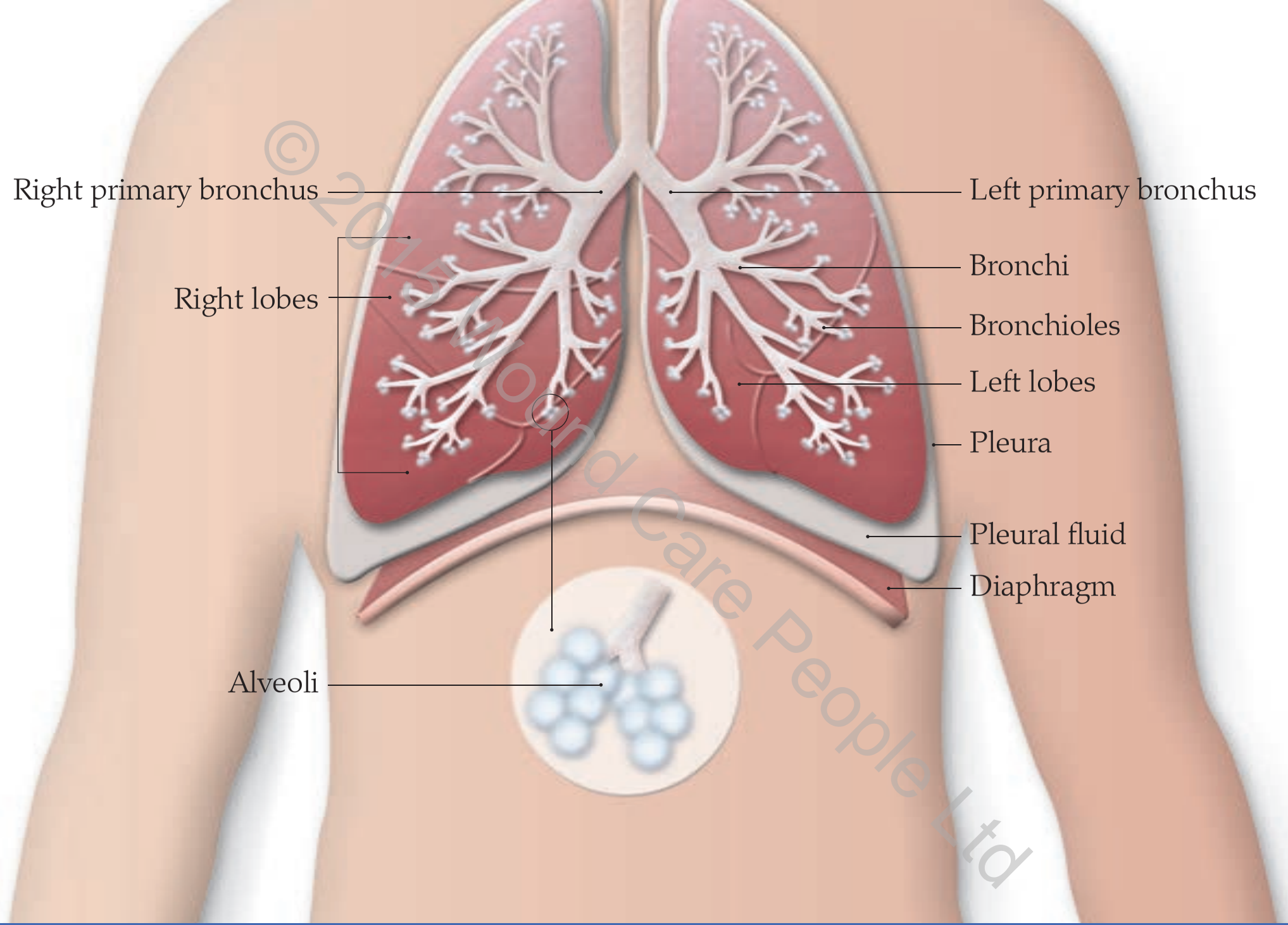
Robertson R, Sonola L, Honeyman M, Brooke B, Kothari S (2014) *Specialists in out-of-hospital settings: findings from six case studies*. King's Fund, London. Available online: www.kingsfund.org.uk/publications/specialists-out-hospital-settings (accessed 1 May, 2015)

Royal College of Physicians (2014) *Why asthma still kills: the National Review of Asthma Deaths (NRAD) Confidential Enquiry report*. Royal College of Physicians, London

Stone RA, Holzhauer-Barrie J, Lowe D, Searle L, Skipper E, Welham S, Roberts CM (2014) *COPD: Who cares? National chronic obstructive pulmonary disease (COPD) Audit Programme: Resources and organisation of care in acute NHS units in England and Wales 2014*. National Organisational Audit report. Royal College of Physicians, London

Respiratory system



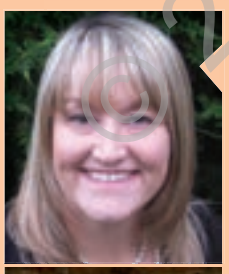


The state of respiratory care today

Health care is changing faster than ever before — at least that's what we are constantly being told from above. The *Five Year Forward View* (NHS England 2014) acknowledges that with an ageing population, who are more and more affected by lifestyle-related disease, demands on healthcare services are going to become unsustainable and so proposes radical solutions that focus on improving people's lifestyle-related behaviour, partnership with people, patients, carers and communities, as well as new models of care. The management of long-term conditions is, of course, central to this, necessitating ongoing relationships between healthcare professionals and patients, rather than just single episodes of care.

It is here that respiratory disease management begins to raise its head, as caring for people with, for example, chronic obstructive pulmonary disease [COPD] or asthma, makes up a large part of primary care caseloads. Indeed, the predicted rise in prevalence of chronic respiratory disease over the next 20–30 years can only add to the burden on healthcare professionals, who are trying to provide the best patient-centred care possible, while also working within tight financial constraints.

In this first *Respiratory Care Today* discussion, we ask two expert respiratory care practitioners, Carol Stonham and Monica Fletcher, for their views on the current state of respiratory care provision, whether clinicians have the right skills and training and, if not, what they need in the future. The results make for interesting reading...



Carol Stonham, *Queen's Nurse, senior nurse, Minchinhampton Surgery and lead nurse, Primary Care Respiratory Society UK (PCRS-UK)*

Monica Fletcher, *OBE, chief executive of Education for Health, the international medical education charity; fellow of the Queen's Nursing Institute*

WHAT DO YOU THINK IS THE CURRENT STATE OF RESPIRATORY CARE PROVISION IN PRIMARY CARE

Care provision in primary care is variable. There are some pockets of excellent care being delivered to patients both locally and regionally — this has been demonstrated by some practices being awarded the Primary Care Respiratory Society Quality Award for the organisation and delivery of their respiratory services, for example. Unfortunately, there is no consistency in the care offered or the standards to which clinicians should aspire. The *National Review of Asthma Deaths* (Royal College of Physicians [RCP], 2014) highlighted issues around organisation of care, training and prescribing that needed to be improved in asthma care, and the same are likely to be found in other respiratory conditions. In many practices much of the care has been delegated to the nursing team which, as long as the nurses are trained, updated regularly, competent and confident is not wrong, although this can lead to the de-skilling of GPs, which may need to be addressed. An unwell patient may need to see a GP in an emergency situation, so all team members should be competent in dealing with respiratory patients. **CS**

Over the past 25 years the amount and complexity of community respiratory care has grown considerably. This has been driven by the production of high-quality clinical guidelines and the expansion of clinical services, which has put nurses at the heart of respiratory care, from diagnosis through to management. Over the years the model of nurse-led care has been incentivised through the General Medical Services (GMS) contract. This has been underpinned by the availability of high-quality accredited education programmes such as that provided by Education for Health and Respiratory Education UK.

However, the quality of care is not universal and like all care provided in general practice, it is dependent on the skills and expertise of individuals within the team. Nurse-led care is an excellent model and one that is revered by many other countries across the world. However, it is important that nurses are supported by well-qualified GPs and have access to ongoing education and training. **MF**

WHAT DRIVERS ARE NEEDED TO ENSURE THAT MISDIAGNOSING ASTHMA AND/OR POOR PRESCRIBING BECOME A THING OF THE PAST? IS THIS ACHIEVABLE?

Education of healthcare professionals in correct diagnosis using current guidelines. Unfortunately, if guidelines are complicated or there are competing guidelines, there may be confusion regarding which ones are correct. The National Institute for Health and Care Excellence (NICE) is currently reviewing asthma diagnosis and its draft guidelines are causing some controversy, but actually they are not that different to the British Thoracic Society/Scottish Intercollegiate Guidelines Network (BTS/SIGN, 2014) guidelines if read in detail. They do, however, recommend the

use of nitric oxide monitoring (FeNO) — something I have used in practice to enhance asthma diagnosis for eight years and find very helpful. Poor prescribing will only be revealed if we routinely interrogate our prescribing data — which can be done with relative ease in general practice — and then act either through education or patient reviews. **CS**

I don't believe any clinician wants to do a 'poor job', but you 'don't know what you don't know', so obviously education and training are key. The way to really raise the bar would be to ensure all those involved in respiratory care meet a standard competency level, but clinical practice changes and we need to encourage individuals to keep up to date. Not all nurses read scientific journals or are interested in evidence-based practice, but we need to find ways of bringing evidence to them in a variety of ways and make sure we spend time implementing guideline-driven care.

Specifically with regard to diagnosis, good history taking is vital, so having the time to undertake a structured consultation is important. However, in many cases objective tests are also necessary for a definitive diagnosis. Spirometry is increasingly performed in primary care, but the results and quality of the tests are variable and unless it is of the correct standard then it will lead to misdiagnosis (Primary Care Commissioning, 2013). The major professional societies and educational organisations all advocate the development of a recognised national register for those who undertake spirometry and interpret the results. The inclusion of FeNO in the BTS/SIGN (2014) guidelines should see the expansion of near-patient testing in general practice, as well as the increased use of blood eosinophils. **MF**

WHAT IS THE VALUE OF SPECIALIST RESPIRATORY NURSING? HOW IS THIS ROLE DEFINED AND HOW DO YOU MEASURE/ASSESS ITS 'VALUE' OR 'QUALITY'

Defining who is a specialist nurse can be controversial as there is a lot of specialism in general practice with some so-called 'general practice nurses' trained to a high level and offering great care. However, the specialist nurse is generally perceived as someone who sees patients with a specific condition, e.g. respiratory disease. What is important is that the majority of care will not involve the specialist team — diagnosis is usually carried out in general practice, as is the majority of ongoing management. It is only a very small proportion of patients with asthma and very severe COPD, or those at end of life, who may ever see a specialist. It is vital that the practice team and the 'usual' nurse is well-trained and clinically up to date, as it is these healthcare professionals who will provide most of the care. **CS**

The majority of 'airway' diseases — mainly asthma and COPD — can and should be managed in primary care by nurses interested in respiratory conditions. However, very few of these would call themselves specialist respiratory nurses. I believe there is a difference between generalist nurses who have additional skills in particular disease areas and those who are true specialists — it's similar to a GP with an interest in respiratory conditions and a respiratory consultant. In a true integrated care model, the specialist nurse should be part of the extended primary care team and be available for nurses and GPs to access for advice on more complex patients.

For many years — and not only in respiratory care — we have struggled to determine the true value of specialist nurses. This is not because they are not respected for their skills — numerous studies have demonstrated high patient satisfaction. However, in the strictly budgeted NHS it is important to demonstrate the economic value of our work, which is defined as 'outcomes relative to costs'. This is a hard task, but one that needs to be addressed, otherwise I fear we could see the gradual decline of specialist nurses. **MF**

IN THE FUTURE, WHAT ONE THING DO YOU THINK SHOULD BE DONE TO ENSURE THAT PATIENTS WITH RESPIRATORY CONDITIONS RECEIVE THE PATIENT-CENTRED CARE THAT THEY NEED?

If there could be a minimum standard of care offered to patients with respiratory conditions, it should be that each practice has a named GP and nurse who are appropriately trained, assessed, competent and feel confident to deal with respiratory conditions commonly seen in primary care, and that the whole practice team has a minimum level of competence. To see a Quality Award in all practices would be fantastic. **CS**

Patient-centred care requires a change in attitudes and we need to challenge our perceptions. The biggest issue is the attitudes of nurses themselves. In 2011, Education for Health undertook a study (Upton et al, 2011) on shared decision making among practice nurses and found that it was often used to support the nurse's agenda rather than as an expression of equality — nurses used it to try and persuade patients to do what they wanted. If this is the common understanding of patient-centred care, then we still have quite a long way to go! **MF**

REFERENCES

British Thoracic Society, Scottish Intercollegiate Guidelines Network (2014) British guideline on the management of asthma. *Thorax* 69(Suppl): 1–192

NHS England (2014) *Five Year Forward View*. NHS England, London. Available online: www.england.nhs.uk/wp-content/uploads/2014/10/5yfv-web.pdf

Primary Care Commissioning (2013) *Guide To Quality Assured Diagnostic Spirometry*. Available online: http://bit.ly/1IN08pD

Royal College of Physicians (2014) *Why asthma still kills: the National Review of Asthma Deaths (NRAD) Confidential Enquiry report*. RCP, London

Upton J, Fletcher M, Madoc-Sutton H, et al (2011) Shared decision making or paternalism in nursing consultations? A qualitative study of primary care asthma nurses' views on sharing decisions with patients regarding inhaler device selection. *Health Expectations* 14(4): 374–82

Myths and facts around the use of long-term oxygen therapy

Long-term oxygen therapy (LTOT) is defined as the provision of supplementary oxygen for at least 15 hours per day, including overnight use (Hardinge et al, 2015).

Current recommendations are based on the results of two landmark randomised controlled trials (RCTs) that were performed in the early 1980s, both of which assessed the use of supplemental oxygen in patients with chronic obstructive pulmonary disease (COPD) and severe resting hypoxaemia (see *box*).

The Nocturnal Oxygen Therapy Trial Group (NOTT, 1980) compared continuous oxygen versus nocturnal oxygen only; while the Medical Research Council (MRC, 1981) study compared oxygen being supplied 15 hours per day (including overnight) versus no supplemental oxygen. Both studies demonstrated a survival benefit to those with COPD and severe resting hypoxaemia receiving oxygen for more than 15 hours per day.

This kind of study has not been replicated in patients with chronic hypoxaemic respiratory failure associated with non-COPD conditions (such as pulmonary fibrosis, kyphoscoliosis [an abnormal curvature of the spine that can cause chronic underventilation of the lungs], or cystic fibrosis), in part because of the wide heterogeneity of these diseases. As a result, the evidence that long-term oxygen therapy (LTOT) has a mortality benefit in other conditions is lacking (Zielinski, 2000; Ringbaek, 2005). However, it is generally accepted in clinical practice that the same arterial blood gas (ABG) criteria should be applied.

The effect of LTOT on health-related quality of life (HRQoL) seems more questionable, with some studies suggesting minor improvements and others no benefit at all (Hardinge et al, 2015). Despite this, home oxygen is widely used in patients with chronic respiratory disease and is associated with significant potential costs both to the individual patient — in terms of quality of life — and to the wider healthcare economy.

Here, Sandra Olive explores a number of misconceptions that exist regarding LTOT and seeks to explain some of the main 'myths and facts'.

Myth

'OXYGEN CONCENTRATORS REMOVE OXYGEN FROM THE ROOM'

Fact

Long-term oxygen therapy (LTOT) is delivered via an oxygen concentrator — a motor driven machine that plugs into an electrical supply and filters the air in a room through a series of internal chemical filters, venting nitrogen as a 'waste' gas. The concentrated oxygen is stored in a small reservoir and delivered to the patient via standard oxygen delivery devices, usually nasal cannulae. Oxygen in the surrounding room air (21% at sea level) is not depleted, as only a small amount of room air is filtered and the concentrated oxygen is delivered continuously, with a proportion of the concentrated supply being released into the atmosphere.

Sandra Olive, respiratory nurse specialist, Norfolk and Norwich University Hospital

Myth

'ALL PATIENTS WHO ARE BREATHLESS NEED HOME OXYGEN'

Fact

Oxygen therapy treats hypoxaemia, specifically. In the absence of low oxygen levels, breathlessness is not relieved by oxygen therapy. In a randomised controlled trial (RCT) of patients with COPD and moderate hypoxaemia (7.4–8.7kPa), Gorecka et al (1997) found no survival benefit in those receiving LTOT for at least 15 hours per day compared to controls.

Breathlessness in chronic respiratory disease is often exacerbated by progressive inactivity and muscle deconditioning. Pulmonary rehabilitation comprises patient education and targeted exercise to retrain skeletal muscles and, in COPD, has been shown to significantly improve functional capacity and perception of breathlessness (McCarthy et al, 2015).

Severe resting hypoxaemia...

... is defined in the MRC and NOTT trials as arterial oxygen (PaO_2) less than or equal to 7.3kPa or 2.4–7.8kPa, in the presence of signs of *cor pulmonale* (abnormal enlargement of the right side of the heart) or polycythaemia (a rare condition that results in the bone marrow producing too many red blood cells).

Some patients who are not hypoxaemic at rest but become significantly desaturated on exertion, may benefit from ambulatory oxygen therapy (AOT), which is supplied from portable cylinders and used during activity. AOT does not confer a survival benefit but may enable some patients to tolerate more prolonged levels of activity (Hardinge et al, 2015).

Patients should have a formal AOT assessment before the therapy is recommended and should be reviewed regularly to determine benefit, usage and any ongoing requirement for oxygen. Portable cylinders are cumbersome and patients find them difficult to manage; this may outweigh any perceived improvement in symptoms.

Myth

'PATIENTS REQUIRING LTOT NEED TO KEEP IT ON 24 HOURS A DAY'

Fact

The Nocturnal Oxygen Therapy Trial Group (NOTT, 1980) and Medical Research Council (MRC, 1981) trials determined that a minimum of 15 hours' LTOT per day offered a survival benefit in COPD. Continuous oxygen therapy (24 hours per day) may offer further improvements in life expectancy, but for some patients extra caution is needed to monitor the effect on $PaCO_2$ levels which may rise (Hardinge et al, 2015). Furthermore, many patients will find using oxygen for 24 hours per day restrictive, with a negative impact on quality of life.

Most patients on LTOT manage well with some breaks. For those requiring LTOT and who remain very active outside of the home, portable cylinders can help them achieve the therapeutic minimum hours of usage while having time away from home.

Myth

'PATIENTS BECOME ADDICTED TO THEIR OXYGEN'

Fact

It is not possible to become addicted to oxygen. All of us require oxygen 24 hours per day for day-to-day functioning and cell metabolism. When healthy, we are able to derive essential oxygen from atmospheric air. However, if ventilation is impaired to the extent that the lungs cannot transfer enough oxygen into the bloodstream, it is necessary to increase the pressure gradient — so that the concentration of oxygen is higher in the alveolar space than in the surrounding capillary network — to optimise gas transfer through the addition of supplementary oxygen.

Some patients do become very dependent on their oxygen, but this is either because they are extremely hypoxic and symptomatic without it, or because, in some cases, there is a powerful psychological component associated with the use of oxygen therapy and expectations of its benefit (Eaton et al, 2004).

Myth

'LTOT IS CONTRAINDICATED IN SMOKERS'

Fact

There are no studies that have specifically investigated the impact of continued smoking on the potential survival benefits of LTOT (Hardinge et al, 2015). The MRC (1981) study did not exclude smokers and the outcomes were not stratified according to smoking and non-smoking populations.

However, continuing to smoke is associated with an increased risk of accelerated decline in lung function and increased mortality in COPD, and it is possible that the negative effects of smoking offset any benefit from LTOT.

The current British Thoracic Society (BTS) guidelines (Hardinge et al, 2015) recommend that patients started on LTOT who continue to smoke should be advised that it may limit any clinical benefits.

Additionally, fire and injury are significant risks related to home oxygen use and smoking. A number of injuries and even fatalities have been reported in smokers on LTOT; while oxygen is not itself explosive, it is highly flammable. Lighting cigarettes is the commonest cause of injury through oxygen flare fires (Hardinge et al, 2015), with patients sustaining burns to the face, hands, and inhalation injuries. The increasing use of e-cigarettes has introduced the additional risk of fires associated with e-cigarettes themselves and their chargers.

Clinicians prescribing home oxygen and home oxygen suppliers have a responsibility to undertake risk assessments before installation, and it may be necessary to withhold oxygen therapy if safety concerns are significant. All patients and their families should be made aware of the dangers of using home oxygen in the vicinity of naked flames, and smoking cessation should be discussed at each review if patients continue to smoke (Hardinge et al, 2015).

Myth

'PATIENTS WHO BECOME HYPOXAEMIC DURING AN ACUTE EXACERBATION OF COPD SHOULD BE STARTED ON LTOT'

Fact

Many patients with chronic respiratory conditions will have a temporary worsening of hypoxaemia during an episode of acute illness. It can be difficult for clinicians to discharge patients without oxygen if oxygen saturations remain lower than usual when they are ready for discharge home.

However, in patients with COPD there can be substantial improvements during the post-exacerbation recovery period for up to four months following discharge. Reviews of patients started on LTOT at discharge have found that 30–50% no longer meet the criteria (Hardinge et al, 2015).

The BTS guidelines (Hardinge et al, 2015) recommend that a formal LTOT assessment should take place when patients are clinically stable (at least eight weeks after an exacerbation). LTOT should not normally be arranged at the time of acute exacerbation — if it is considered essential after an assessment of blood gases, patients should be advised that they will be reassessed when they have recovered and that home oxygen provision may be temporary.

Myth

'PATIENTS ON OXYGEN DO NOT NEED TO BE SEEN BY SPECIALIST SERVICES'

Fact

Many patients still receive oxygen at home without any formal assessment of their requirements — treatment may be unnecessary or inadequate and oxygen therapy can place a considerable burden on patients and carers who may find themselves with a large amount of medical equipment in the home. This can cause anxiety and additional risks, particularly in a largely elderly population, many of whom have multiple comorbidities.

Patients with resting oxygen saturations of 92% or less when clinically stable should be considered for referral to a respiratory specialist or oxygen assessment service. A full formal assessment will exclude those who are above the threshold for LTOT to be beneficial. Follow-up of those started on LTOT is essential — domiciliary visits from a specialist nurse or other clinician experienced in home oxygen therapy will highlight any potential risks and ensure that treatment remains therapeutic (Hardinge et al, 2015) and any side-effects are monitored and managed.

Myth

'LTOT MAKES GOING ON HOLIDAY DIFFICULT'

Fact

A break away from home can be enjoyable, but for those living with any long-term condition it can take a bit more planning. For those on LTOT there certainly a few more practicalities to consider, but oxygen, in itself, should not prevent anyone from going away.

Within the UK, holiday oxygen is provided by the NHS. Patients can simply contact their usual supplier and inform them of the details of their holiday so that a supply can be arranged at the accommodation. It is wise to allow a few weeks' notice and to ensure the hotel, or other accommodation, is able to accept and store an oxygen supply safely.

It is also important to consider journey times if oxygen is required 24 hours per day. Patients will need to make sure that they have sufficient cylinders both for the outward and return journeys, as they cannot bring back the holiday supply.

Similarly, a holiday abroad can be manageable. An oxygen supply at the destination needs to be arranged privately before travelling — respiratory nursing teams and UK oxygen suppliers can advise. Patients should seek advice from their respiratory teams if they wish to fly. Those requiring oxygen at sea level will certainly become more hypoxic under pressurised aircraft cabin conditions, when the available atmospheric oxygen falls to around 15%. Many patients can manage air travel with supplementary oxygen, but the risks should be weighed up on an individual basis according to severity of respiratory failure, amount of oxygen required at sea level and additional comorbidities.

Others find a different type of holiday, such as a cruise or travel over land, easier to cope with. Again, planning is key to ensure that there is an adequate supply of oxygen for the journey and for any stops along the way. Some patients find hiring a portable oxygen concentrator for their trip works well, but it is best to discuss plans with the respiratory team to ensure that the equipment they plan to take is suitable for their needs.

Equally important, patients and families need to ensure that they have adequate travel insurance and enough medication for their holiday.

CONCLUSION

The management of breathless patients is complex. LTOT is just one aspect of treatment and while it may be appropriate for some following assessment, it can be challenging for patients, carers and clinicians alike.

When provided without appropriate assessment, counselling, education and ongoing support, LTOT is unlikely to be used therapeutically and any potential survival benefit will be compromised. Specialist home oxygen assessment teams can play an important role in ensuring safe and cost-effective care for this group of patients. RCT

Top tip:

Consider referral to a specialist oxygen assessment service if patients, who are clinically stable, consistently record oxygen saturations of 92% or less at rest when breathing room air.

REFERENCES

Eaton T, Lewis C, Young P, et al (2004) Long-term oxygen therapy improves health-related quality of life. *Resp Med* 98: 285–93

Gorecka D, Gorzelak K, Sliwinski P, et al (1997) Effect of long-term oxygen therapy on survival in patients with chronic obstructive pulmonary disease with moderate hypoxaemia. *Thorax* 52: 674–9

Hardinge M, Annandale J, Bourne S, et al (2015) BTS guidelines for Home Oxygen Use in Adults. *Thorax* 70 suppl 1: 1–143

McCarthy B, Casey D, Devane D, Murphy K, Murphy E, Lacasse Y (2015) *Pulmonary rehabilitation for chronic obstructive pulmonary disease*. Cochrane Library. Published online 24 Feb 2015

Medical Research Council Working Party (1981) Long-term domiciliary oxygen therapy in chronic hypoxic *cor pulmonale* complicating chronic bronchitis and emphysema. *Lancet* 1: 681–6

Nocturnal Oxygen Therapy Trial Group (1980) Continuous or nocturnal oxygen therapy in hypoxaemic chronic obstructive lung disease: a clinical trial. *Ann Intern Med* 93: 391

Ringbaek TJ (2005) Continuous oxygen therapy for hypoxic pulmonary disease. *Treat Resp Med* 4(6): 397–408

Zielinski J (2000) Long-term oxygen therapy in conditions other than chronic obstructive pulmonary disease. *Respiratory Care* 45(2): 172–6

ANORO® ELLIPTA®

umeclidinium/vilanterol

breathe...

Anoro® Ellipta® improves lung function (trough FEV_1) compared with tiotropium and has a similar adverse event profile in clinical trials[1-2]

Give your patients the benefits of dual bronchodilation.

Visit Anoro.co.uk to find out more.

A maintenance bronchodilator treatment to relieve symptoms in patients with COPD

Anoro® Ellipta® (umeclidinium bromide/vilanterol [as trifenatate]) Prescribing information
(Please consult the full Summary of Product Characteristics (SmPC) before prescribing)

Anoro® Ellipta® 55/22mcg (umeclidinium bromide/vilanterol [as trifenatate]) inhalation powder. Each single inhalation of umeclidinium bromide (UMEC) 62.5 micrograms (mcg) and vilanterol (VI) 25mcg provides a delivered dose of UMEC 55mcg and VI 22mcg. **Indications:** *COPD:* Maintenance bronchodilator treatment to relieve symptoms in adult patients with COPD. **Dosage and administration:** Inhalation only. *COPD:* One inhalation once daily of Anoro Ellipta. **Contraindications:** Hypersensitivity to the active substances or to any of the excipients (lactose monohydrate and magnesium stearate). **Precautions:** Anoro Ellipta should not be used in patients with asthma. Treatment with Anoro Ellipta should be discontinued in the event of paradoxical bronchospasm and alternative therapy initiated if necessary. Cardiovascular effects may be seen after the administration of muscarinic receptor antagonists and sympathomimetics therefore Anoro Ellipta should be used with caution in patients with severe cardiovascular disease. Anoro Ellipta should be used with caution in patients with urinary retention, narrow angle glaucoma, convulsive disorders, thyrotoxicosis, hypokalaemia, hyperglycaemia and severe hepatic impairment. No dosage adjustment is required in renal or mild to moderate hepatic impairment. **Acute symptoms:** Anoro Ellipta is not indicated for acute episodes of bronchospasm. Warn patients to seek medical advice if short-acting inhaled bronchodilator use increases, a re-evaluation of the patient and of the COPD treatment regimen should be undertaken. **Interactions with other medicinal products:** Interaction studies have only been performed in adults. Avoid β-blockers. Caution is advised when co-administering with strong CYP3A4 inhibitors (e.g. ketoconazole, clarithromycin, itraconazole, ritonavir, telithromycin). Anoro Ellipta should not be used in conjunction with other long-acting β_2-adrenergic agonists or medicinal products containing long-acting muscarinic antagonists. Caution is advised with concomitant use with methylxanthine derivatives, steroids or non-potassium-sparing diuretics as it may potentiate possible hypokalaemic effect of β_2-adrenergic agonists. **Fertility, pregnancy, and breast-feeding:** No available data. Balance risks against benefits. **Side effects:** Common: Urinary tract infection, sinusitis, nasopharyngitis, pharyngitis, upper respiratory tract infection, headache, cough, oropharyngeal pain, constipation and dry mouth. Uncommon: Atrial fibrillation, supraventricular tachycardia, rhythm idioventricular, tachycardia, supraventricular extrasystoles and rash. **Legal category:** POM. **Presentation and Basic NHS cost:** Anoro® Ellipta®. 1 inhaler x 30 doses. Anoro Ellipta 55/22mcg - £32.50. **Marketing authorisation (MA) nos. 55/22mcg 1x30 doses [EU/1/14/898/002]; MA holder:** Glaxo Group Ltd, 980 Great West Road, Brentford, Middlesex TW8 9GS, UK. **Last date of revision:** October 2014. UK/RESP/0077/14c. Anoro® Ellipta® was developed in collaboration with Theravance,Inc.

Adverse events should be reported. Reporting forms and information can be found at www.mhra.gov.uk/yellowcard.
Adverse events should also be reported to GlaxoSmithKline on 0800 221 441.

References
1. Decramer *et al*. Lancet Resp Med 2014 ; Vol 2 No. 6 pp 472-4486.
2. Maleki-Yazdi *et al*. Respir Med. 2014;108(12):1752-1760.

Theravance

UK/UCV/0011/14v February 2015

ANORO ELLIPTA was developed in collaboration with Theravance

RESPIRATORY CARE TODAY

Spirometry explained

What is spirometry?

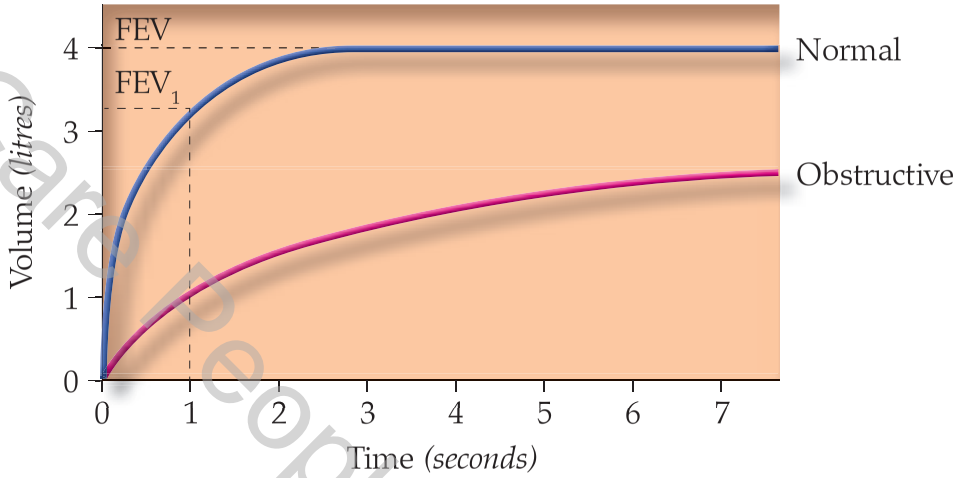
- A spirometer is a simple device used to measure how much air a patient breathes out and how long it takes them to do so, i.e. patterns of airflow (normal, obstructive, restrictive or combined)[1]
- Findings are presented in a spirogram (spirometry tracings), showing volume/time or flow/volume curves.[1]

Why perform spirometry?

- To confirm diagnosis of chronic obstructive pulmonary disease (COPD), even if in mild or moderate stages[2]
- To identify severity of disease and monitor disease progression
- To differentiate between obstructive airway conditions (e.g. COPD, asthma) and restrictive diseases (e.g. cystic fibrosis)
- To guide the patient's care pathway, together with presenting symptoms.

How to interpret spirometry?

- Use the curve patterns and numbers to guide your interpretation
- Most spirometers automatically calculate the percentage of the predicted normal values. This is performed with reference data already programmed into the machine. Enter details of the patient's sex, race, age and height for this to be calculated.



Terminology for interpreting spirometry

FEV_1	FVC	VC	FEV_1/FVC	FEV_1/VC
› Forced expiratory volume in one second, i.e. the volume of air blown out in the first second taken from a forced vital capacity › Percentage predicted is used to grade the severity of lung disease.	› Forced vital capacity, i.e. the total volume of air that the patient can blow out in one breath (e.g. until they cannot blow any more) › Normal FVC is 80% or more of predicted value.	› Vital capacity, i.e. the total volume of air blown out in a relaxed manner from breathing in and blowing out as much as you can.	› Ratio of FEV_1 to FVC, i.e. a percentage of the FVC › 70% or 0.7 is the 'set' figure indicating obstruction.	› Ratio of FEV_1 to VC — used when the volume of air in the VC is larger than that in the FVC.

Note: Values of FEV_1 and FVC are expressed as a percentage of the predicted normal for a person of the same sex, age and height.[1]

Patient advice before the test[3]

- Avoid eating a full meal within two hours of the test
- Avoid alcohol within four hours of the test
- Avoid smoking within 24 hours of the test
- Avoid exercise within 30 minutes of the test
- Wear loose-fitting clothing.

Contraindications to spirometry testing (always adapt to your place of work and local policy)[3]

- Exacerbation in last 4–6 weeks
- Haemoptysis
- Pneumothorax
- Unstable cardiovascular status
- Thoracic, abdominal or cerebral aneurysms
- Recent eye surgery
- Nausea and vomiting
- Recent thoracic/abdominal surgery
- Pain.

How to perform spirometry?

Prepare the patient by fully explaining the test[1, 2] — allowing some practice attempts before taking readings can help. No more than eight attempts (including practice ones) should be taken at any one session.[4]

Two sets of measurements will need to be undertaken — for both, the patient should be seated and comfortable.[1, 2]

- Vital capacity — this can be done first so that the patient becomes familiar with the equipment:
  - Patient needs a nose clip or to hold their nose
  - Patient breathes in deeply and then exhales slowly and steadily until all the air is blown out (encourage the patient to keep blowing)
  - Repeat test at least two more times and record values manually — the best two blows should be within 100mls of each other.[4]

- Forced vital capacity — the FEV_1 is taken from this test:
  - No nose clip is needed
  - Patient breathes in deeply and exhales hard and fast until all the air is blown out
  - Repeat test at least two times and record values manually — the best two blows should be within 100mls of each other.

Remember: always interpret spirometry results alongside a patient's full clinical history[3]

1. Global Initiative for Chronic Obstructive Lung Disease (2015) *Pocket guide to COPD diagnosis, management and prevention*. Available online: http://bit.ly/1V9Xd3I

2. British Thoracic Society COPD Consortium (2005) *A practical guide to using spirometry in primary care*. BTS COPD Consortium, London. Available online: http://bit.ly/1Ojvnxw

3. Loveridge C (2015) *J GPN* 1(2): 28–33

4. Primary Care Commissioning (2013) *A guide to performing quality assured diagnostic spirometry*. Available online: http://bit.ly/1Len4V5

IN BRIEF

- Chronic obstructive pulmonary disease (COPD) is a long-term condition of the lungs, that includes diseases such as chronic bronchitis and emphysema.
- Patients with COPD can have progressively worsening breathlessness, which limits normal activity and increases risk of mortality and, most importantly, reduces quality of life.
- Primary care nurses have a significant role in patient education of the condition and its management.

KEY WORDS:

- COPD
- Smoking cessation
- Pulmonary rehabilitation
- Inhaler technique
- Patient education
- Self-management
- Spirometry

Management of chronic obstructive pulmonary disease in primary care

Matthew Hodson, Rebecca Sherrington

Chronic obstructive pulmonary disease (COPD) is a common long-term condition of the lungs, an umbrella disease including emphysema and chronic bronchitis. It is predicted to be the third leading cause of death worldwide by 2020 (World Health Organization [WHO], 2013), and second leading reason for emergency admission in the UK (National Institute for Health and Care Excellence [NICE], 2011a).

Disease symptoms are breathlessness, cough and sputum, all of which can have a debilitating affect on a patient's quality of life (*Figure 1*). The main cause of COPD is tobacco smoking, with occupational, genetic and environmental factors contributing to its development in non-smokers (Decramer et al, 2012).

Many patients are first diagnosed in primary care, and primary care nurses have an important and unique role in the detection, diagnosis and management of COPD.

Matthew Hodson, respiratory nurse consultant, acute COPD early response service, Homerton University Hospital NHS Foundation Trust, London; Rebecca Sherrington, respiratory nurse consultant, Health and Social Services Department, Guernsey, Channel Islands

SYMPTOMS AND DIAGNOSIS

A diagnosis of COPD should be considered in all patients in primary care who are over 35 years who have a risk factor (usually smoking), and are becoming more breathless upon exertion (walking uphill or stairs, for example), have a chronic, productive cough or wheezing. A good target population are those that have frequent 'bronchitis', especially in winter months (NICE, 2010). On examination, signs of a hyper-inflated chest, use of respiratory accessory muscles, and wheezing or quiet breath sounds may also be found.

Diagnosis of COPD is made on the symptom profile, clinical signs, and airflow limitation that is not fully reversible (NICE, 2010). Spirometry is essential to confirm a diagnosis. COPD may display symptoms and characteristics of other diseases, such as congestive heart failure and lung cancer, and most especially asthma, making the distinction between asthma and COPD important and fundamental to long-term management (*Table 1*).

All primary care nurses caring for patients with COPD should have access to maintained and calibrated spirometry equipment, know how to use the spirometer and be able to interpret the data (NICE, 2010). Primary care nurses are encouraged to undertake accredited training in these areas to ensure quality assured spirometry.

Remember:

Spirometry is performed in primary care to confirm a diagnosis of COPD (after taking a full patient history), or during routine follow-up appointments of those diagnosed with COPD.

Spirometry measures the volume and flow of exhaled air. A diagnosis of COPD is based on the finding of an abnormal FEV_1/FVC ratio (the forced vital capacity [FVC] to forced expired volume in one second [FEV_1] ratio) (Loveridge, 2015). An FEV_1/FVC ratio of less than 0.7 recorded after using a bronchodilator, and appropriate clinical history, are considered diagnostic of COPD.

ASSESSING DISEASE SEVERITY

Degree of airflow limitation

Not only is spirometry essential to confirm COPD, but degree of airflow limitation is important to assessing severity. Four classes of

✔ Questions to ask patients to help with diagnosis

- ✔ Are you currently smoking, or are an ex-smoker?
- ✔ Do you work, or have worked, in a job that exposes you to dust, gas or fumes?
- ✔ Do you have a new, persistent, or cough that has recently changed?
- ✔ Do you cough up mucus, phlegm or blood?
- ✔ Do you get out of breath more easily than others of the same age as you?
- ✔ Do you experience chest tightness or wheezing?
- ✔ Have you had, or are having frequent chest infections?
- ✔ Do you experience chest pain, fatigue, or have suddenly lost weight?

(Source: NICE guidelines, available online: http://bit.ly/1DLxDam)

severity are recognised, based upon the predicted post-bronchodilator FEV_1% (*Table 2*).

Symptoms

Disease severity is based on the degree of airflow obstruction, and FEV_1 is used to guide recommendations for pharmacological intervention as outlined by the NICE (2010) guidelines (*Figure 4*). The Global Initiative for Chronic Obstructive Lung Disease (GOLD, 2014) recommends that assessment of COPD is expanded to include symptoms, in addition to the severity of the spirometric abnormality.

Dyspnoea is the most reported symptom that affects patients' daily lives. The modified Medical Research Council (MRC) dyspnoea scale is a simple-to-administer assessment (Hsu et al, 2013), which, in the authors' clinical experience, can easily be used in primary care and included in the COPD annual review. This measurement enables primary care nurses to grade the effect of dyspnoea on daily activities (*Table 3*), and make appropriate adjustments or referrals.

PLANNING PATIENT CARE

The East Midlands Respiratory Network's 'Top Ten Tips' for COPD management reminds us that the purpose is optimisation, as opposed to asthma that has normalisation as the primary objective (East Midlands Respiratory Network, 2013). Beyond medication management, the COPD care plan within primary care should focus on:

- Vaccination
- Smoking cessation
- Physical activity
- Nutrition
- Psychosocial wellbeing
- End-of-life care (NICE, 2010; Primary Care Respiratory Society UK [PCRS-UK], 2010).

STEPWISE MANAGEMENT OF COPD

Annual COPD review

Primary care nurses should be familiar with the Quality and Outcomes Framework (QoF; http://bit.ly/1M6d0h7), an incentive scheme which details general practice performance against a national set level of criteria. The QoF has seven indicators set within three themes called the annual 'COPD Review'.

Firstly, each primary care practice should establish and maintain a list of patients with a confirmed diagnosis of COPD. The second theme is 'initial diagnosis', which outlines how new patients should

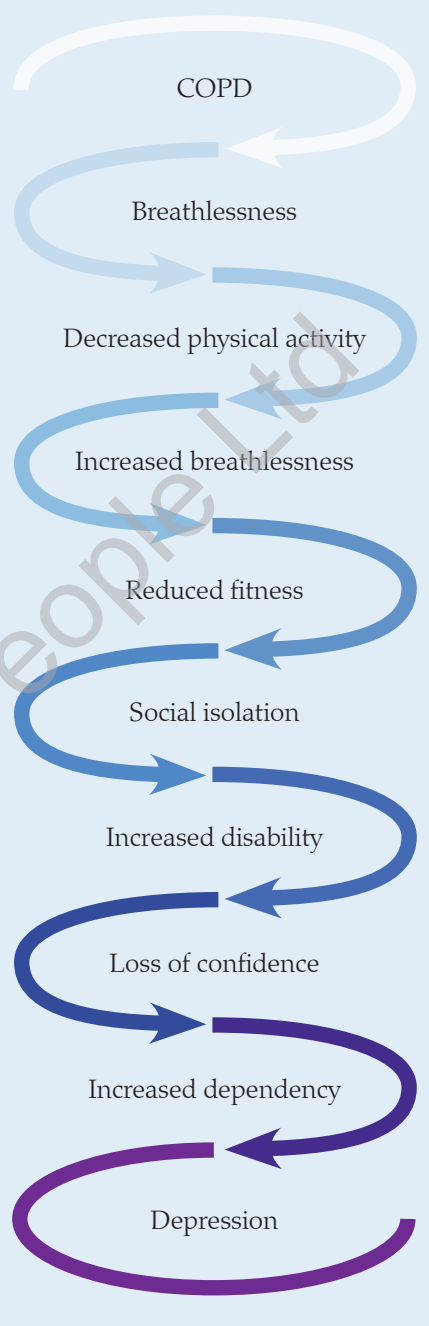


Figure 1. *Spiral of disability with COPD (adapted from Barnett, 2006).*

Table 1: Clinical indicators differentiating COPD from asthma (NICE, 2010; PCRS-UK, 2010)

Clinical indicator	COPD	Asthma
Past or present smoker	Almost all patients	Possible
Symptoms before 35 years	Rare	Common
Chronic productive cough	Common	Uncommon
Breathlessness	Progressive and persistent	Variable
Night waking with breathlessness/wheezing	Uncommon	Common
Variability in symptoms over time	Uncommon	Common

Performing spirometry — key principles

- Measure patient's height and weight, and enter his or her gender, ethnicity and date of birth into the spirometry software
- Attach a new mouthpiece to the spirometer
- Block the nose with a clip, or ask the patient to pinch the nose closed
- Instruct the patient to breathe normally, then to inhale deeply through the mouth until the lungs feel totally full, and then to hold the breath and seal the lips tightly around the mouthpiece
- Instruct the patient immediately to blow air through the mouthpiece hard and fast until no more air can be blown out and the spirometer tracing plateaus smoothly
- Repeat — the two largest FEV_1 and FVC values should be within 150ml of each other

(Source: GOLD, 2010)

be diagnosed and how spirometry readings should be undertaken and confirmed by post-bronchodilator spirometry. The final theme outlines five indicators related to the ongoing management of patients with COPD, namely the percentage of:

- Patients with COPD who have had a review undertaken by a healthcare professional, including an assessment of breathlessness using the MRC dyspnoea scale in the preceding 12 months
- Patients with COPD with a record of FEV_1 in the preceding 12 months
- Patients with COPD and MRC dyspnoea grade greater than or equal to 3 at any time in the preceding 12 months, with a record of oxygen saturation value within the preceding 12 months
- Patients with COPD and MRC dyspnoea grade greater than or equal to 3 at any time in the preceding 12 months, with a subsequent record of an offer of referral to a pulmonary rehabilitation programme within the preceding 12 months
- Patients with COPD who have had influenza immunisation in the preceding period, 1 September to 31 March.

NICE (2010) recommends that patients with mild–severe COPD are followed up at least yearly, and patients with very severe COPD are followed up every six months. Some patients will need more frequent reviews due to the ongoing monitoring of symptoms, frequency of exacerbations, further adjustments in treatments, or smoking cessation support and education.

The annual review is an ideal opportunity to recognise deterioration in symptoms, record and support frequency of acute exacerbations, and the optimisation of inhaler technique and drug delivery, alongside promoting public health messages such as diet, yearly flu vaccinations and maintenance of regular exercise.

The following sections outline the primary care nurse's role in COPD management.

SUPPORTIVE INTERVENTION AND MEDICATION APPROACHES

Smoking cessation support, pneumococcal and annual influenza vaccinations, assessment of inhaler technique and adherence of medications, as well as suitable referrals to pulmonary rehabilitation, should be offered to all patients with COPD across all stages of the disease (NICE, 2010).

Smoking cessation

Encouraging patients to stop smoking is the most essential component of COPD management at all stages of disease (NICE, 2010). No other intervention has such a considerable effect on COPD, as it slows disease progression and improves health-related quality of life (HRQoL) (Morgan and Britton,

Practice point

Dyspnoea is a subjective awareness of breathing discomfort and can vary in intensity.

Table 2: Stages of airflow obstruction severity (NICE, 2010)

Stage of severity	FEV_1/FVC	Post-bronchodilator FEV_1% predicted
I — mild	<0.70	≥80%*
II — moderate	<0.70	50–79%
III — severe	<0.70	30–49%
IV — very severe	<0.70	<30%**

* in the presence of symptoms only; ** or ≤50% in cases of respiratory failure (NICE, 2010)

Table 3: MRC dyspnoea scale (Mahler and Wells, 1988)

Grade	Scale of dyspnoea related to activities
1	Patient untroubled by breathlessness, except during strenuous exercise
2	Patient breathless when walking up a slight hill or when hurrying
3	Breathlessness causes patient to walk slower than contemporaries on level ground, or to stop when walking normally
4	Patient stops for breath after a few minutes or 100 metres on level ground
5	Patient breathless when dressing/undressing, or too breathless to leave house

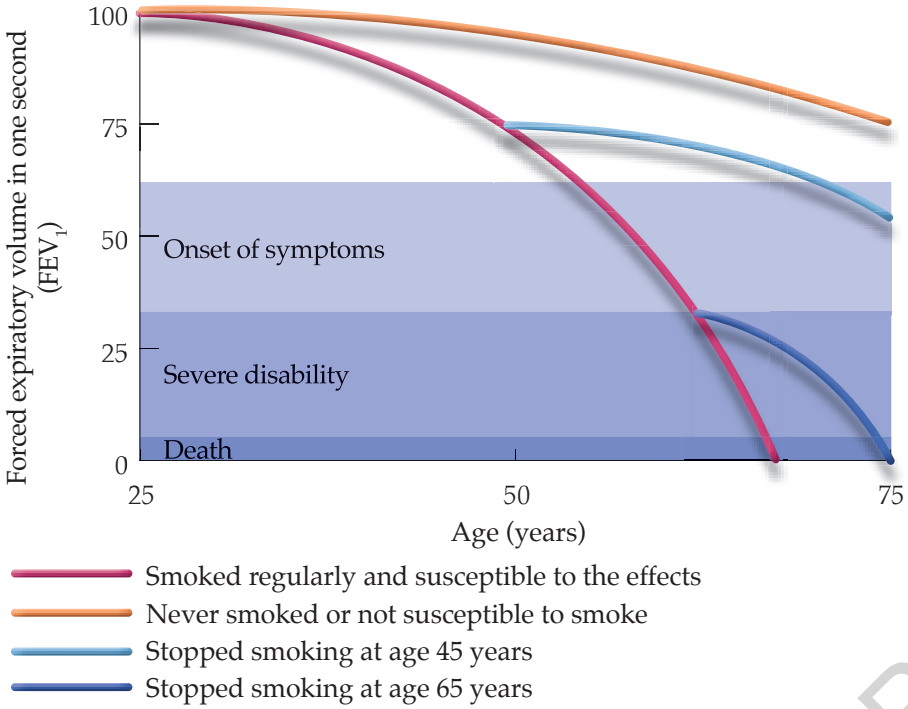


Figure 2. *Fletcher-Peto graph showing the impact of tobacco smoking on lung function and life expectancy. Adapted from Fletcher and Peto, 1977.*

2003; Almagro and Castro, 2013). In the authors' clinical experience, using the Fletcher-Peto graph is helpful when counselling smokers (*Figure 2*). This shows the potential to reduce further lung damage and extend life expectancy.

For those patients who continue to smoke, smoking cessation programmes with pharmacotherapy are recommended. The 'value pyramid' shows that efforts to persuade cessation are very cost-effective (*Figure 3*; London Respiratory Team, 2013). Consistent, even short periods of counselling a smoker to stop can be effective and should be given at every clinic visit. However, counselling together with pharmacotherapy is more successful (Tashkin and Murray, 2009).

Pulmonary rehabilitation

Remaining physically active is an important goal for COPD. Pulmonary rehabilitation consists of physical training, disease education, smoking cessation, breathing retraining, and nutritional and psychological interventions (NICE, 2010). It is recommended by NICE for 'all appropriate people with COPD, including those who have had a recent hospitalisation for an exacerbation and those who consider themselves functionally disabled by COPD (usually regarded as MRC grade 3 and above)' (NICE, 2011b). Important exceptions include people who cannot walk, and those who have experienced an acute coronary syndrome (ACS).

Inhaled medication

The ability to 'open' the airways to relieve breathlessness is one of the cornerstones of treatment for COPD.

For patients with mild disease who are breathless and can only perform limited exercise, an inhaled short-acting beta agonist (SABA), e.g. salbutamol or terbutaline, or a short-acting muscarinic antagonist (SAMA), e.g. ipratropium, can be prescribed and used as required. Salbutamol has a faster onset of action than ipratropium (~5 minutes versus 30 to 60 minutes), and has a lower acquisition cost, with evidence to show little difference in benefits between the two treatments (Appleton et al, 2006). A SABA can be continued with additional treatment if prescribed later, but a SAMA must be stopped if a long-acting muscarinic antagonist (LAMA) is prescribed later.

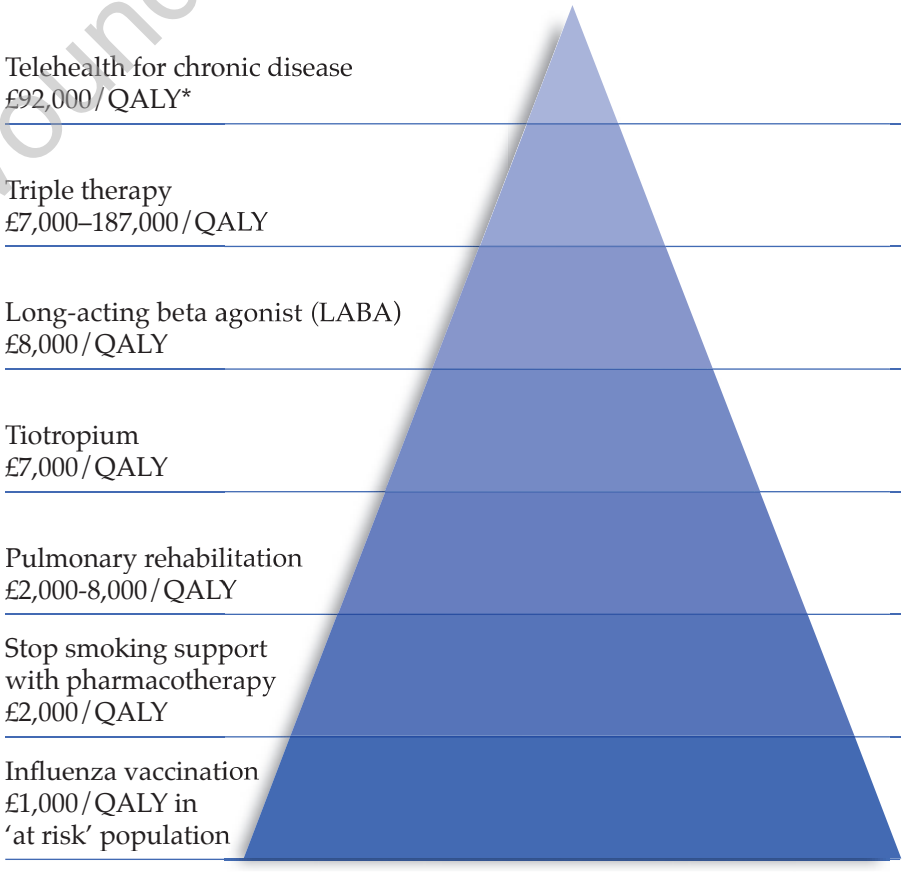


Figure 3. *COPD 'value' pyramid developed by the London Respiratory Team (2013). * Not specific to COPD. QALY = quality-adjusted life year*

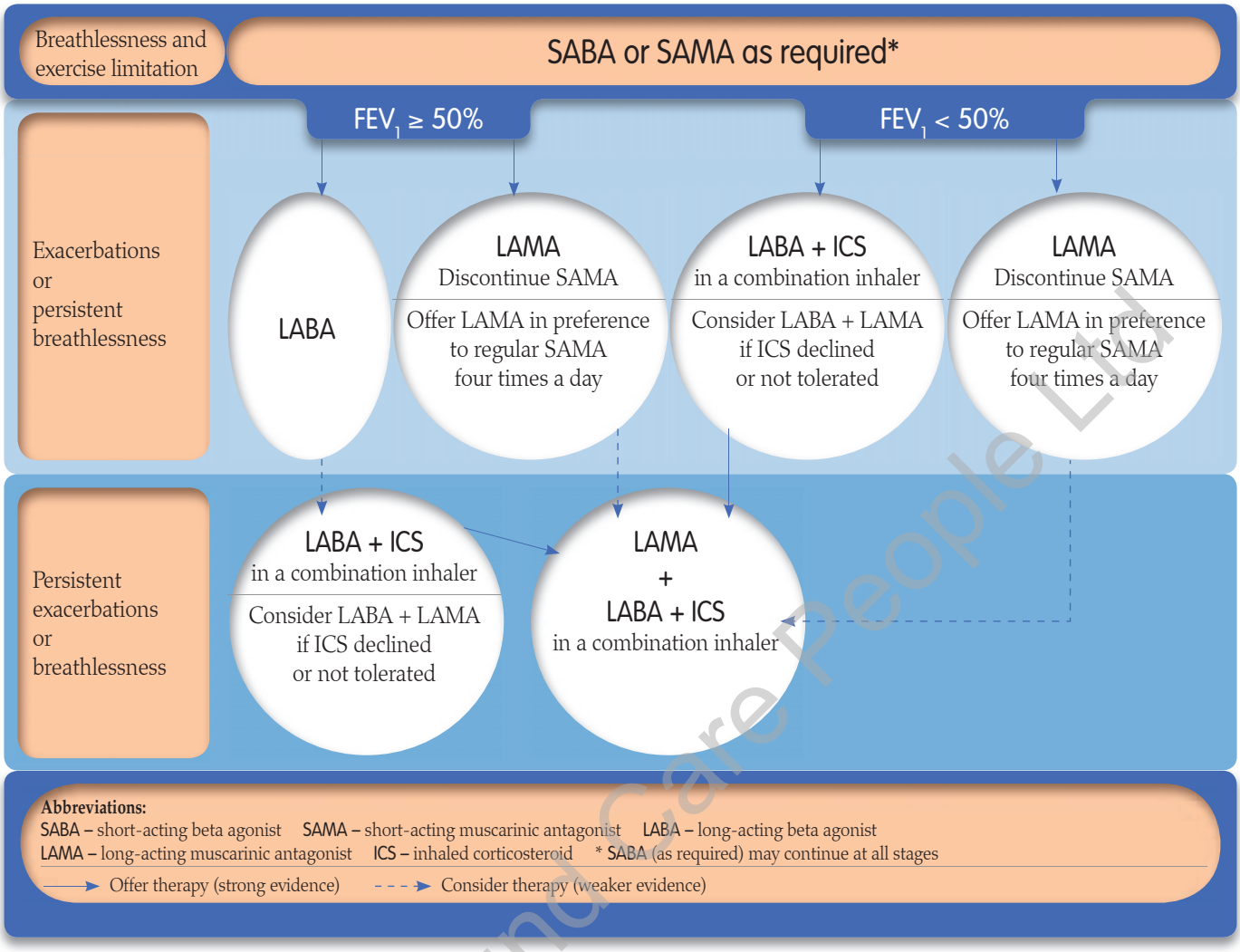


Figure 4. *COPD guidelines (adapted from NICE, 2010).*

In patients with mild-to-moderate COPD (FEV_1 greater than or equal to 50% predicted) who remain symptomatic or experience exacerbations, a long-acting beta agonist (LABA), or a LAMA can be prescribed.

If a treatment fails to relieve breathlessness, reduce or prevent exacerbations, fixed-dose combinations of a LABA plus an inhaled corticosteroid (ICS) are recommended by NICE (2010; *Figure 4*), with the option of a LABA plus LAMA combination treatment if ICS is declined or not tolerated. For those with severe or very severe COPD (FEV_1 less than 50% of predicted normal), LABA plus ICS, or LAMA alone is recommended (NICE, 2010). For those with persistent exacerbations or breathlessness, a LAMA plus LABA/ICS is recommended. Again, LABA plus LAMA combination treatment is an option if ICS is declined or not tolerated.

Inhaler devices: technique and adherence to treatment

There are three main types of inhalers:

- Pressurised metered-dose inhalers (pMDIs)
- Dry powder inhalers (DPIs)
- Soft mist inhalers (SMIs).

Good adherence to treatment is vitally important. Patients who take more than 80% of their prescribed medication over three years have significantly lower rates of mortality, exacerbations and hospitalisation compared with patients who are non-adherent (Vestbo et al, 2009). Many primary care as well as specialist doctors and nurses lack the awareness, knowledge, and training required to instruct patients in proper inhaler use (Yawn et al, 2008). In one survey among healthcare professionals, only 50% could perform all of the critical steps required for proper inhaler use (Fink, 2005) — a knowledge gap that should be filled. Healthcare professionals must be capable of using multiple educational techniques (e.g. verbal, visual, demonstration) to instruct patients, families, and caregivers on why, when, and how inhalers are to be used.

Practice point

For guidance, advice and resources on inhaler technique, the Asthma UK website has an animated video to help patients review and improve their technique. This covers all the available devices, and is simple to use.

Patient training is important (NICE, 2010) and primary care nurses are in a key position to check if inhalers are being used correctly — this should be checked at every contact and at least yearly. Improved adherence can be fostered by ensuring that each patient understands not only the importance of treatment, but also how to use and maintain their prescribed device, and that they should tell the prescribing healthcare professional when experiencing difficulties with, or dislike of, a particular inhaler.

Other supportive interventions

Patients' body mass index (BMI) should also be calculated and if found to be abnormal (high or low), or changing over time, referral to a dietitian is appropriate. If patients have excessive sputum, consider referring to the local physiotherapist; most patients can be taught to use positive expiratory pressure (PEP) masks and breathing techniques for sputum clearance.

Anxiety and depression are common in patients with COPD, and this is an important component of care because depression adversely affects outcomes through reduction in activity and exercise capacity, and is associated with hospital admissions and reduced quality of life (Baraniak and Sheffield, 2011). It has been demonstrated that psychological and/or lifestyle interventions that include exercise significantly improve symptoms of depression and anxiety by around 25% in COPD patients (Coventry et al, 2013).

To ensure that patients who require oxygen therapy are identified, pulse oximetry should be available in all healthcare settings (NICE, 2010), with primary care nurses having their own one to use in clinical practice. Nurses should closely monitor patients' oxygen saturations at every contact and refer to the local home oxygen and assessment centre for an oxygen assessment if saturations are equal to, or below 92% on room air.

Preventing deterioration and managing COPD exacerbations

Exacerbations ('sustained worsening of the patient's symptoms', Burge and Wedzicha, 2003) are associated with higher mortality, reduction in lung function, and worsening HRQoL (Almagro and Castro, 2013). Exacerbations are described as 'distressing and disruptive, and account for a significant proportion of the total costs of caring for patients with COPD' (NICE, 2010).

NICE (2010) recommends hospital-at-home and assisted-discharge schemes as an alternative way of caring for patients with exacerbations, who would otherwise need to be admitted or stay in hospital.

The primary care nurse's role is to identify patients at risk of exacerbation and to give self-management advice that encourages them to respond promptly to symptoms, e.g. when to start oral corticosteroid and/or antibiotic therapy and when to adjust their bronchodilator therapy. Primary care nurses are also in a position to provide self-management education through the annual COPD review. Patients and carers should also have access to COPD self-management plans.

Planning for the future and end-of-life care

Working alongside colleagues in the community (e.g. dieticians, specialist nurses, physiotherapists), primary care nurses have a role to play in ensuring that advance care is part of every suitable patient's care plan. The need for possible supportive and palliative care should be assessed regularly for all patients with COPD, particularly after hospital admissions due to exacerbations (Pinnock et al, 2011).

The process of advance care planning allows patients to have a say in their current and future treatment (Detering et al, 2010). It is supported by the Department of Health's *End of Life Care Strategy* (DH, 2008) and the NICE quality standard (QS) for end of life care for adults (NICE, 2011c). Advance care planning improves end of life care and patient and family satisfaction, and reduces the anxiety, depression and stress of relatives/carers (Detering et al, 2010; Janssen et al 2012).

Practice point

Primary care nurses have the opportunity during routine reviews to make lifelong improvements for patients living with COPD, helping to maximise their quality of life.

CONCLUSION

COPD is one of the most prevalent and debilitating diseases (Almagro and Castro, 2013). There are no treatments that can repair the lung and airway damage that causes the disease, but addressing the symptoms of COPD improves quality of life.

A thorough clinical history and objective assessment of lung function are vital components in diagnosing COPD, and distinguishing it from other conditions such as asthma. Symptom control and minimising hospital admissions are the primary goals of patient care. For those patients who continue to smoke, intensive smoking cessation programmes with pharmacotherapy are warranted. The 'value pyramid' (*Figure 3*) shows that even with the costs of pharmacotherapy, intense efforts to persuade cessation are cost-effective and offer value to the health economy.

Bronchodilation is the basis of pharmacological treatment of COPD, helping to relieve lung hyperinflation with associated improvements in dyspnoea.

For those with continuing symptoms, pulmonary rehabilitation should be strongly considered, as it is a valuable and cost-effective intervention beyond bronchodilation alone. Through the COPD annual review, primary care nurses have the opportunity to see many patients with COPD who specialist teams do not. Therefore, the recommendations in this paper are critical to ensuring that every person living with COPD is offered the correct treatments and support. RCT

REFERENCES

Almagro P, Castro A (2013) Helping COPD patients change health behavior in order to improve their quality of life. *Int J Chron Obstruct Pulmon Dis* 8: 335–45

Appleton S, Jones T, Poole P, et al (2006) Ipratropium bromide versus long-acting beta-2 agonists for stable chronic obstructive pulmonary disease. Cochrane Database Syst Rev. 3, CD006101

Baraniak A, Sheffield D (2011) The efficacy of psychologically based interventions to improve anxiety, depression and quality of life in COPD: a systematic review and meta-analysis. *Patient Educ Couns* 83(1): 29–36

Barnett M (2006) *Chronic Obstructive Pulmonary Disease in Primary Care*. John Wiley and Sons: 76

Burge S, Widzicha JA (2003) COPD exacerbations: definitions and classifications. *CRS* 21(41 suppl): 46s–53s

Coventry PA, Bower P, Keyworth C, et al (2013) The effect of complex interventions on depression and anxiety in chronic obstructive pulmonary disease: systematic review and meta-analysis. *PLoS One* 8(4): e60532

Decramer M, Janssens W, Miravitlles M (2012) Chronic obstructive pulmonary disease. *Lancet* 379(9823): 1341–51

Department of Health (2008) *End of Life Care Strategy: promoting high quality care for adults at the end of their life*. DH, London

Detering KM, Hancock AD, Reade MC, Silvester W (2010) The impact of advance care planning on end of life care in elderly patients: randomised controlled trial. *Br Med J* 340: c1345.

East Midlands Respiratory Network (2013) *Top Ten Tips*. Available online: www.em-respiratorynetwork.co.uk/#/top-ten-tips/4570387594 (last accessed 7 July, 2014)

Fink JB, Rubin BK (2005) Problems with inhaler use: a call for improved clinician and patient education. *Respir Care* 50(10): 1360–74

Fletcher C, Peto R (1997) The natural history of chronic airflow obstruction. *Br Med J* 1: 1645–8

Global Initiative for Chronic Obstructive Lung Disease (2010) *Spirometry for health care providers*. GOLD. Available online www.goldcopd.org/uploads/users/files/GOLD_Spirometry_2010.pdf (last accessed 10 February, 2014)

Global Initiative for Chronic Obstructive Lung Disease (2014) *Global Strategy for the Diagnosis, Management and Prevention of COPD, Global Initiative for Chronic Obstructive Lung Disease* (GOLD). Updated 2014. Available online: www.goldcopd.org/ (last accessed 10 February, 2014)

Hsu KY, Lin JR, Lin MS, Chen W, Chen YJ, Yan YH (2013) The modified Medical Research Council dyspnoea scale is a good indicator of health-related quality of life in patients with chronic obstructive pulmonary disease. *Singapore Med J* 54(6): 321–7

Janssen DJ, Engelberg RA, Wouters EF, Curtis JR (2012) Advance care planning for patients with COPD: past, present and future. *Patient Educ Couns* 86(1): 19–24

London Respiratory Team (2013) *Final report from the London Respiratory Team three-year programme July 2010 to June 2013*. LRT, London. Available online: www.networks.nhs.uk/nhs-networks/london-respiratory-network/key-documents (last accessed 23 October, 2013)

Loveridge C (2015) Use of spirometry in the diagnosis of chronic obstructive pulmonary disease. *J GPN* 1(2): 28–33

Lung Foundation Australia (2015) *Stepwise management of COPD*. Available online: http://lungfoundation.com.au/wp-content/uploads/2014/02/LFA-Stepwise-Management-of-COPD_0215.pdf (last accessed 23 July, 2015)

Mahler DA, Wells K (1988) Evaluation of clinical methods for rating dyspnea. *Chest* 93(3): 580–6

Morgan MD, Britton JR (2003) Chronic obstructive pulmonary disease 8: non-pharmacological management of COPD. *Thorax* 58(5): 453–7

National Institute for Health and Care Excellence (2010) *Clinical Guideline 101. Chronic obstructive pulmonary disease. Management of chronic obstructive pulmonary disease in adults in primary and secondary care* (partial update issued June 2010). NICE, London. Available online: www.nice.org.uk/nicemedia/live/13029/49397/49397.pdf (last accessed 13 July, 2015)

National Institute for Health and Care Excellence (2011a) *Chronic obstructive pulmonary disease*. Quality standard (QS10). NICE, London. Available online: www.nice.org.uk/guidance/qs10 (last accessed 13 July, 2015)

National Institute for Health and Care Excellence (2011b) *Chronic obstructive pulmonary disease Costing report (February 2011)*. Clinical guideline 101. NICE, London. Available online: www.nice.org.uk/guidance/cg101/resources/cg101-chronic-obstructive-pulmonary-disease-update-costing-report2 (last assessed 13 July, 2015)

National Institute for Health and Care Excellence (2011c) *End of life care for adults*. Quality standard (QS13). NICE, London. Available online: www.nice.org.uk/guidance/qs13

Primary Care Respiratory Society-UK (2010) *Diagnosis and management of COPD in primary care*. PCRS-UK. Available online: www.pcrs-uk.org/system/files/Resources/Guidelines-and-guidance/COPDQuickGuide2015Final.pdf (last accessed 13 July, 2015)

Pinnock H, Kendall M, Murray SA, et al. (2011) Living and dying with severe chronic obstructive pulmonary disease: multi-perspective longitudinal qualitative study. *Br Med J* 342: d142

Tashkin DP, Murray RP (2009) Smoking cessation in chronic obstructive pulmonary disease. *Respir Med* 103(7): 963–74

Vestbo J, Anderson JA, Calverley PM, et al (2009) Adherence to inhaled therapy, mortality and hospital admission in COPD. *Thorax* 64(11): 939–43

World Health Organization (2013) *Chronic obstructive pulmonary disease (COPD)*. WHO, Geneva. Available online: www.who.int/respiratory/copd/en/index.html (last accessed 13 July, 2015)

Yawn BP, Wollan PC (2008) Knowledge and attitudes of family physicians coming to COPD continuing medical education. *Int J Chron Obstruct Pulmon Dis* 3(2): 311–17

Yawn BP, Colice GL, Hodder R (2012) Practical aspects of inhaler use in the management of chronic obstructive pulmonary disease in the primary care setting. *Int J Chron Obstruct Pulmon Dis* 7: 495–502

GPN:
Journal of General Practice Nursing

NEW Journal of General Practice Nursing

Promoting practice to improve patient health and quality of life

Published in association with Education for Health, this **free** journal (both online and in print) helps challenge and develop practice within primary care.

Regular features include; debate and discussion on the latest hot topics, an educational learning zone (linked to the online GPN learning zone units), a double-page poster offering practical clinical guidance, as well as clinical articles on long-term conditions, health promotion and prescribing, to name but a few.

To receive your free copy and access to online resources, register at:

www.journalofpracticenursing.co.uk

IN BRIEF

- Asthma is a common long-term condition that affects both children and adults.
- Patients should be assessed regularly and given education on how to manage the condition.
- There is no cure for asthma, so the goal of treatment is to control symptoms and maintain quality of life.
- Severity of asthma can change over time.
- Treatment involves long-term control and fast-acting medicines.

KEY WORDS:

- Asthma
- Diagnosis
- Assessment
- Asthma control
- Emergency care
- National guidelines

Routine management of asthma in primary care

Andrew Booth

Asthma is a respiratory condition that has a collection of symptoms which include breathlessness, cough (usually unproductive), chest tightness and wheeze. Usually, two or more of these symptoms occur in the presence of known triggers such as pollen, long-haired animals (pets), house dust mites, exercise, respiratory virus, and noxious fumes/chemical smells, among others (Cross and Burns, 2005).

Contraction of the bronchial smooth muscles (bronchospasm) and inflammation of the walls of the airways, cause a narrowing or constriction, which is known as 'airways obstruction'. This reduces the speed and volume of air passing in and out of the lungs, making it difficult to breathe or causing wheeze or noisy breathing. Narrow, obstructed airways mean that it is difficult for somebody with asthma to exhale forcibly and the speed of air coming out of their lungs is reduced. This speed or velocity can be measured by a peak flow meter or spirometer.

Andrew Booth, advanced nurse specialist, York Teaching Hospital

A key characteristic of asthma, which differs from chronic obstructive pulmonary disease (COPD), is that asthma symptoms can 'come and go'. This variability can occur over a short period of time and can be corrected spontaneously or with treatment — referred to as 'reversibility' (Bourke and Burns, 2011; Global Initiative for Asthma [GINA], 2012).

Approximately 5.4 million people in the UK receive treatment for asthma (Asthma UK, 2013). Asthma affects a high proportion of children, with 1.1 million diagnosed in the UK (Asthma UK, 2009). It can have a significant impact on their lives — nearly 90% miss a day of school and for 40% their asthma 'stops them having fun' (Asthma UK, 2009).

Twice as many women die from asthma as men (Office of National Statistics [ONS], 2014) and about 1,200 people die from asthma every year in the UK; amounting to three people every day (Department of Health [DH], 2011; Royal College of Physicians [RCP], 2014). This figure has remained the same for several years, despite training and education for healthcare professionals and publication of evidenced-based national and international guidelines (e.g. British Thoracic Society [BTS]/Scottish Intercollegiate Guidelines Network [SIGN], 2014).

Did you know:

An analogy frequently used to describe airways obstruction is to imagine standing on a hosepipe of flowing water. The pressure caused by standing on the hosepipe narrows the diameter of the pipe and the flow of water is reduced. Another analogy is to imagine breathing through a straw. The narrow diameter of the straw makes it difficult both to breathe air in and to blow air out.

DIAGNOSIS

National guidelines suggest performing a full assessment, which should include understanding the patient's symptoms and the triggers that might be causing them. With a good working knowledge of the guidelines, patients can be classified as having either a high, intermediate, or low probability of asthma (BTS/SIGN, 2014).

Reversibility

Symptoms can vary from day-to-day or month-to-month, making diagnosis and monitoring tricky. There is no real gold standard test for asthma, but much emphasis has been placed on objective lung function testing based on reversibility. Reversibility is measured as an improvement in either peak flow or by a spirometry test following a trial of treatment. Typically, the peak expiratory flow rate (PEFR) is measured with a peak flow meter, or the forced expired volume in one second (FEV_1) is measured with a spirometer. A dose of inhaled salbutamol is then given. Guidelines suggest 400mcg inhaled salbutamol, for example, four separate puffs through a metred dose inhaler and large volume spacer. After 15–20 minutes, the lung function is measured again. If the PEFR increases by 20% or 60 litres per minute, or the FEV_1 increases by 400ml, the airway can be said to have 'reversed', or improved, and the patient may be diagnosed with asthma.

Because asthma is a variable disease, not all people with asthma will have reversibility all of the time. If lung function tests are performed during a good spell, or if the person's asthma is well-controlled, his or her lung function and reversibility tests may appear completely normal. Taking a series of readings over a period of two weeks using a peak flow meter can provide a further diagnostic aid. Patients can be asked to perform peak flow readings morning and night, and record the results on a chart. If performed correctly, it can be possible to diagnose asthma if two or more readings on the same day differ by 20% or more. The difficulty with this method is that not all patients comply correctly (Dekker et al, 1992).

Careful education and discussion are needed to ensure that patients fully understand why they have been asked to perform time-consuming readings. If patients do not appear to have agreed or understood the request, whatever readings are obtained may be spurious. There is some debate about the effectiveness of home PEFR readings, which may be more beneficial in ongoing management rather than diagnosis.

A confounding factor is that peak flow results measured on the traditional 'Mini-Wright' peak flow meter are expressed in litres per minute, whereas peak flow results expressed from some spirometers (e.g. MicroLab 3500) are in litres per second.

PEFR and spirometry

PEFR is the simplest way of measuring basic lung function and can be initiated by a nurse with basic training. The patient is asked to take a maximum breath in, place the peak flow meter mouthpiece inside his/her mouth, obtaining a good seal with the lips, and then to blow as hard as he/she can. The blow can be a short, sharp effort, and does not need to be sustained. Where possible, the patient should be asked to repeat this three times, in order to ensure reproducibility, and the best of the three blows should be recorded.

Performing spirometry is generally easy to do, and very easy to get wrong. It requires an advanced level of knowledge both to perform and interpret the results. Quality must be assured by performing standards set by the Association for Respiratory Technology and Physiology (ARTP) and British Thoracic Society (BTS).

Table 1: Severity of asthma attacks in adults (adapted from BTS/SIGN, 2014)

Level	Signs and symptoms	
Moderate	› Increasing symptoms › PEF >50–75% best or predicted › No features of acute severe asthma	
Acute/severe	Any one of the following: › PEF 33–50% best or predicted › Respiratory rate ≥25/min › Heart rate ≥110/min › Inability to complete sentences in one breath	
Life-threatening	Any one of the following:	
	Clinical signs: › Altered conscious levels › Exhaustion › Arrhythmia › Hypotension › Cyanosis › Silent chest › Poor respiratory effort	Measurements: › PEF <33% best or predicted › SpO_2 <92% › Partial arterial pressure of oxygen (PaO_2) <8 kiloPascals (kPa) › 'normal' partial arterial pressure of carbon dioxide ($PaCO_2$) (4.6–6.0 $kPaO_2$)
Near-fatal	› Raised $PaCO_2$ and/or requiring mechanical ventilation with raised inflation pressures	

ROUTINE ASSESSMENT

People with asthma should be assessed at least once a year by a healthcare professional who has a good working knowledge of national asthma guidelines and who has received up-to-date training in the care and management of asthma (BTS/SIGN, 2014).

Yearly asthma reviews have been shown to improve asthma control and reduce the number of people who have asthma attacks. While definition of an asthma attack is subjective,

Practice point

Checking the patient's inhaler technique is essential. No matter what drugs are prescribed and how good a patient's concordance is, if he or she is not using their inhaler correctly, a reduced amount of drug may be delivered to the lungs.

Did you know:

Comorbid asthma and COPD is becoming known as Asthma COPD Overlap Syndrome (ACOS) (Gibson and Simpson, 2009; Papaiwannou et al, 2014). A study from the USA suggested that approximately 15–25% of people attending respiratory clinics may have ACOS (Louie et al, 2013).

national guidelines suggest they can be defined as an increase in symptoms and/or a reduction in peak flow (*Table 1*). Reviews are usually conducted in primary care and most often by general practice nurses (GPNs). Increasingly, community pharmacists are becoming involved with asthma care, often through medicines usage reviews.

The BTS/SIGN asthma guidelines (2014) provide an excellent, evidence-based approach as to what should be included within an asthma review.

Taking a patient's history

A good asthma review should start with a recap of the patient's history, which should include confirmation of the diagnosis. Sometimes asthma diagnoses are made without the appropriate tests and often asthma can be confused for COPD and vice versa. While patients can have both asthma and COPD, further tests and examinations — such as chest X-rays, advanced lung function testing, e.g. flow-volume loops, transfer factor for carbon monoxide (TLCO), computer tomography (CT) scan of the chest, or Alpha-1 antitrypsin screening — may be necessary to distinguish between asthma and COPD, if there is any doubt about the diagnosis.

Patients should be asked about trigger factors and what causes their asthma symptoms. Smoking does not necessarily cause asthma, although it can cause COPD and trigger asthma symptoms in some people. Asking about smoking and passive smoking and providing appropriate smoking cessation advice is essential to promote lung health. Smoking can also reduce the effectiveness of inhaled steroids.

About 10% of asthma can be caused by a person's occupation (Fishwick et al, 2008). A decrease in asthma symptoms or improvement in PEFR during the patient's day off or when on holiday is sometimes a good indication that something at work may be causing the condition. Allergies and family history should also be recorded.

Past 6–12 months

To understand the full impact of asthma, patients should be asked how many days off work or school they have had due to their asthma, along with the number of courses of oral steroids and any emergency visits they have needed. Looking at prescription history and the number of reliever inhalers they have had over the past six months helps to understand their level of control. Frequent use of reliever inhaler (for example, 12 or more reliever inhalers in the past six months) signifies an increased risk of asthma attack.

Current lung function

At the review, patients should have their lung function checked. This can be done by measuring either their PEFR using a peak flow meter, or their FEV_1 through spirometry. This should be compared with what their best recent readings have been, or what their predicted values should be. Predicted values depend on the patient's age, gender, ethnicity and height, which should all be measured and recorded (British Thoracic Society/Association of Respiratory Technicians and Physiologists, 1994).

Failure to take medication, especially preventive medication, is a major cause of asthma attacks. Asking questions about how often patients use their inhalers and — just as importantly — how often they forget or choose not to take their inhalers, is an important step in understanding concordance to prescribed therapy. Many people with asthma stop taking their medication when they feel well. While this may be a legitimate thing to do, it can sometimes be problematic as airway inflammation and asthma symptoms can return quickly. For example, in seasonal asthma where known trigger factors such as pollen only occur at certain times of the year, the patient may wish to start preventer inhaler just before the pollen season starts, and discontinue a month or two afterwards. Such a strategy requires careful monitoring of asthma control during the period in which the patient is not taking their preventer.

Practice point

In asthma, as small airways become inflamed, the diameter reduces and consequently the speed of air coming out of the lung lessens.

Asthma control

Assessing asthma control is perhaps the most important element of the asthma review. While control is measured in diabetes through blood sugar and HbA_{1C} and control of blood pressure is measured through readings of systolic and diastolic pressures, in asthma there is no clinical or laboratory test that can measure asthma control. Lung function tests are helpful in measuring the diameter of the small airways.

Poor asthma control is associated with reduced quality of life and increased visits to A&E (Guilbert et al, 2010). As asthma is a symptom-driven disease, the only way to measure asthma control is through an assessment of symptoms. This is best done using directive questions, as broad non-specific questions tend to underestimate symptoms (Juniper et al, 2004). Two excellent measurements of asthma control include the Asthma Control Test (ACT) and the Royal College of Physicians (RCP) 'three questions' (Thomas et al, 2009a, b).

The ACT has a version for adults with five questions and one for children with seven questions. Each question

Practice point

It is important to differentiate control from asthma severity, as the two are sometimes confused. A person with asthma can have severe symptoms but be well controlled. Conversely, another person with asthma can display poor control but have mild symptoms.

Asthma control

Asking the question: 'How is your asthma today?' often leads to the response: 'Oh, it's ok, thanks.' Well-validated tools elicit more information about the frequency of symptoms, as well as reliever usage. Reliever usage is also a good surrogate marker of asthma control, in that the more reliever used, the greater the likelihood of poor control (Sims et al, 2011).

returns a score and when all the scores are added, a total score out of 25 can be recorded. A score below 20 indicates poor control. The RCP 'three questions' is similar to the ACT and is required for the Quality Outcomes Framework (National Institute for Health and Care Excellence [NICE], 2011), but has not been validated for children under 16.

From this assessment, the patient's asthma can be classified as being either controlled or uncontrolled.

UNCONTROLLED ASTHMA

Poorly controlled asthma places patients at increased risk of asthma attacks and hospital admission. The potential risks should never be underestimated, and in extreme cases can lead to death. Poor asthma control can often be caused by natural disease variability and exposure to triggers. It can also be the result of drugs not reaching lung tissue, due to poor inhaler technique and/or poor concordance to therapy. This can sometimes be addressed through education, for example, explaining that it is important to take preventer therapy every day even when feeling well. Demonstrating good practice can correct poor inhaler technique, as can changing to a device that the patient feels more comfortable with and finds easier to use.

HOW TO CONTROL ASTHMA

Although understanding asthma triggers is important, avoiding them can sometimes be difficult. For example, dust is all around us, avoiding cold air is hard during the winter, and staying clear of pollen can be problematic in the spring. However, complete control of asthma can enable a person with asthma to be exposed to a known trigger without experiencing symptoms.

Poor control is an indication that therapy should be increased or that there should be a step-up in treatment according to the BTS/SIGN guidelines (2014), while good control is an indication to consider stepping down therapy. At every interaction with a person with asthma, control should be measured. Inhaled therapy can then be either stepped up or down as needed.

Usually, therapy is increased one step at a time. However, if clinically needed, a step may be missed out when stepping up. For example, if a patient has severe asthma symptoms that require a large increase in therapy. Stepping down is usually best done slowly, and one step at a time (Juniper et al, 2004).

Step 1

Start short-acting beta$_2$ agonist (SABA) as required. SABAs work very quickly to relax the smooth muscle of the bronchial wall. Relief of symptoms occurs after about three minutes, and effects can last up to four hours. Due to instant symptom relief, many patients rely heavily on their SABA, also known as 'reliever' or 'the blue inhaler'. However, SABA therapy does not treat the underlying inflammation. If left untreated, this inflammation can lead to uncontrolled asthma and attacks.

Step 2

Continue with SABA as required and start inhaled glucocorticosteroid (ICS) once or twice daily.

Inhaled steroids can often take several days before any symptom relief is felt. Therefore, it is important to warn patients about this and to encourage them to persist with their therapy. The anti-inflammatory effect of ICS therapy is key to maintaining asthma control and is often known as 'preventer' therapy. An absence of appropriate ICS therapy is a major cause of asthma death (RCP, 2014).

Red Flag

During an acute attack of asthma, increasing the dose of inhaled steroid is unlikely to be effective. For example, if a patient has severe chest tightness, is constantly coughing and is having difficulty speaking in complete sentences, emergency treatment with bronchodilators and oral steroids is needed.

Between 200mcg and 800mcg is the suggested starting dose, with 400mcg being common. This is the total daily dose, which is usually given twice a day. Beclometasone is the most commonly prescribed ICS, and is the reference against which other ICSs are measured. Budesonide and fluticasone are also commonly prescribed.

At step 2, it is possible to titrate ICS up to 800mcg a day if the patient displays signs of poor control. For example, if the patient is experiencing a mild night cough with chest tightness during the day two or three times a week, it is acceptable to increase the ICS from 400mcg to 800mcg a day.

Step 3

Continue SABA as required; continue ICS and start long-acting beta$_2$ agonist (LABA).

LABAs can be added to treatment regimens in combination with ICS in inhalers. Combination inhalers are generally safer than using separate ones, as they reduce the risk of the patient taking LABA without ICS (BTS/SIGN, 2014). Most patients prefer simple treatment regimens with as few inhalers as possible (Haughney et al, 2007). Adding a LABA is usually more effective than doubling the dose of inhaled steroids (Pauwels et al, 1997).

At step 3, there is also a choice of using the maintenance and reliever therapy approach, sometimes known as SMART (Symbicort Maintenance and Reliever Therapy), or single inhaler therapy (SIT). Combination inhalers, such as Symbicort® (Astra Zeneca), Fostair® (Chiesi) and DuoResp® (Teva), are now licensed for this relatively new approach to asthma management.

This is prescribed once in the morning, once in the evening and then once as needed, combining both the patient's reliever and preventer inhaler in one. The LABA component of these inhalers — formoterol — works as fast as salbutamol, providing instant symptom relief. Formoterol is also dose-responsive; the more doses that are given, the more bronchodilation is achieved. Simultaneously, a timely dose of inhaled steroid is delivered, thus treating inflammation immediately. This approach has been shown to improve asthma control, reduce exacerbations, and also to lower the total amount of ICS needed (Karner and Cates, 2011).

There is now also a once-a-day ICS/LABA combination that is licensed for asthma. Relvar® Ellipta® (GSK) is a combination of fluticasone furoate and vilanterol, which is taken once a day. Once-daily therapy may be preferred by some people, and may help to improve adherence.

If there is no improvement with the addition of LABA therapy, LABA should not be continued. However, if there is no apparent benefit, re-confirming the diagnosis may be important. ICS can be increased up to 800mcg a day, or a leukotriene receptor antagonist (LTRA) may be added. LTRAs are tablets given either once or twice a day, and have an anti-inflammatory effect in asthma.

Steps 4 and 5

Therapy at this stage involves increasing ICS dose up to 2000mcg a day of beclometasone or equivalent. Other drugs such as anti-leukotriene tablets may be added. At this stage, referral to specialist teams in secondary care must be considered. The long-acting muscarinic antagonist (LAMA), tiotropium, has recently been granted a license for use in asthma. It is expected that guidelines will advise its use at step 4 and above (Kerstjens et al, 2012).

PERSONAL ASTHMA ACTION PLANS

National and international guidelines have for many years suggested that every person who has asthma should have a personalised, written asthma action plan (PAAP). This should be compiled jointly between the patient and a healthcare professional with a high level of knowledge and education about asthma, and in conjunction with regular review. Most recently, one of the many recommendations to have come from the *National Review of Asthma Deaths*, is that a PAAP should be essential for every person with asthma (RCP, 2014).

PAAPs are available from a variety of sources including Asthma UK. Education with regular practitioner review and written plans have been shown to improve asthma control, reduce asthma attacks and reduce hospital admissions for asthma (Gibson et al, 2003). The PAAP should provide advice about when to increase medication during times of increased symptoms or poor control, and should support the patient in stepping down their therapy when they are well (Stonham, 2015).

STEPPING DOWN

National guidelines suggest that stepping down therapy should be considered after a patient's asthma has been well-controlled for three months (BTS/SIGN, 2014). Reducing the dose of preventer medication by 25–50% is suggested while reviewing asthma control. In practice, this is not always easy as many patients who have previously had severe symptoms and frightening attacks have little motivation to reduce the dose of the inhaler that has been keeping them well.

Stepping down is important to reduce the risk of side-effects, particularly of inhaled steroids. Talking to the patient about stepping down could happen at the time they are being stepped-up, for example, by advising that an increase in treatment might only need to be temporary.

EMERGENCY CARE

Finally, it is essential that patients know what to do in the event of an emergency. Use of a short-acting bronchodilator with a large volume spacer can help to increase lung deposition of the drug and can be as effective as nebuliser therapy. Patients need to understand how to recognise an asthma attack and be aware that an increase in their usual symptoms may require an increase in therapy. Warning signs, such as being unable to speak in full sentences, indicate an emergency that requires immediate medical attention. Patients can continue to assess their own control at home using effective tools such as ACT. There are several paper versions of the ACT available, and even mobile phone apps, which provide relevant prompts, questions and interpretation of results.

FOLLOW-UP

Any change in treatment should be followed by a further assessment.

Top tip:

PAAPs detail a person's personal triggers and current treatments, explain how to prevent relapses and identify when and how to seek help in case of an emergency.

Practice point

The *British guideline on the management of asthma* (BTS/SIGN, 2014) suggests that the aim of asthma management is control of the disease. Control of asthma is defined as:

- No daytime symptoms
- No nighttime awakening due to asthma
- No need for rescue medication
- No exacerbations
- No limitations on activity including exercise
- Normal lung function (FEV_1 and/or PEF >80% predicted or best) with minimal side-effects.

Red Flag

Oxygen saturations less than SpO_2 92% may be a sign of life-threatening asthma and require immediate transfer to hospital (*Table 1*). Oxygen therapy may be necessary to keep saturations between 94 and 98%.

People with poorly controlled asthma should be seen within days or weeks. People attending A&E with an asthma attack should have an urgent review within 48 hours to reduce risk of readmission (RCP, 2014). Telephone assessments can be useful for people with busy lives. Re-checking asthma control will help to assess the effectiveness of any change in medication. Reinforcing key messages, such as daily preventer inhaler use, is also important.

CONCLUSION

Asthma is a variable disease, characterised by symptoms of cough, wheeze, chest tightness or dyspnoea, usually in the presence of known triggers. Regular review by healthcare professionals with a high level of knowledge and education should include assessment of asthma control, lung function, and inhaler technique. Inhaled steroids and long-acting B2 agonists remain the mainstay of asthma treatment, and are safe and effective when prescribed within the framework of the BTS/SIGN (2014) asthma guidelines.

There are more and more drugs, devices and combinations available, making it a challenge for healthcare professionals to keep up to date. However, with three people still dying of asthma every day in the UK, it is vital that the care provided to people with asthma is improved (RCP, 2014). RCT

REFERENCES

Asthma UK (2009) *Missing Out*. Available online: www.asthma.org.uk/scotland-publications

Asthma UK (2013) *Number of people treated for asthma in the United Kingdom*. Asthma UK, London. Available online: www.asthma.org.uk/asthma-facts-andstatistics

Bourke S, Burns GP (2011) *Respiratory Medicine, Lecture Notes*. Wiley-Blackwell

British Thoracic Society/ Association of Respiratory Technicians and Physiologists (1994) Guidelines for the measurement of respiratory function. *Respir Med* 88(3): 165–94

British Thoracic Society/Scottish Intercollegiate Guidelines Network (2014) British guideline on the management of asthma. *Thorax* 69(Suppl 1). Available online: www.brit-thoracic.org.uk/guidelines-and-quality-standards/asthma-guideline/

Cross S, Burns D (2005) *Vital Asthma*. Class Publishing, London

Dekker FW, Schrier AC, Sterk PJ, Dijkman JH (1992) Validity of peak expiratory flow measurements in assessing reversibility of airflow obstruction. *Thorax* 47: 162–6

Department of Health (2011) *An Outcomes Strategy for Chronic Obstructive Pulmonary Disease (COPD) and Asthma in England*. DH, London. Available online: www.gov.uk/government/uploads/system/uploads/attachment_data/file/216139/dh_128428.pdf

Fishwick D, Barber CM, Bradshaw LM, et al (2008) Standards of care for occupational asthma. *Thorax* 63(3): 240–50

Gibson PG, Powell H, Wilson A, et al (2003) Self-management education and regular practitioner review for adults with asthma. *Cochrane Database Syst Rev* 2003;(1):CD001117

Gibson P G, Simpson J L (2009) The overlap syndrome of asthma and COPD: what are its features and how important is it? *Thorax* 64(8): 728–35

Global Initiative for Asthma (2012) *Global Strategy for Asthma Management and Prevention* (updated 2012). Available online: www.ginasthma.org/

Guilbert TW, Garris C, Jhingran P, et al (2010) Asthma that is not well-controlled is associated with increased healthcare utilization and decreased quality of life. *J Asthma* 48(2):126–32.

Haughney J, Fletcher M, Wolfe S, et al (2007) Features of asthma management: quantifying the patient perspective. *BMC Pulmonary Med* 7(1): 16

Juniper EF, Chauhan A, Neville E, et al (2004) Clinicians tend to overestimate improvements in asthma control: an unexpected observation. *Prim Care Respir J* 13(4): 181–4

Karner C, Cates CJ (2011) The effect of adding inhaled corticosteroids to tiotropium and long-acting beta2-agonists for managing chronic obstructive pulmonary disease. *Cochrane Database Syst Rev*. 2011 Sep 7(9): CD009039

Kerstjens HAM, Engel M, Dahl R, et al (2012) Tiotropium in asthma poorly controlled with standard combination therapy. *N Engl J Med* 367(13): 1198–1207

Louie S, Zeki A, Schivo M, et al (2013) The asthma–chronic obstructive pulmonary disease overlap syndrome. *Expert Rev Clin Pharmacol* 6(2): 197–219

National Institute for Health and Care Excellence (2011) *Quality Outcomes Framework. Asthma*. NM 23. QOF identity code: AST003. NICE, London

Office of National Statistics (2014) *Number of deaths from Asthma by sex and month of registration in England and Wales, registered 2012–2013*. ONS, London

Papaiwannou A, Zarogoulidis P, Porpodis K, et al (2014) Asthma-chronic obstructive pulmonary disease overlap syndrome (ACOS): current literature review. *J Thorac Dis* 6(S1): S146–S151

Pauwels RA, Löfdahl CG, Postma DS, et al (1997) Effect of inhaled formoterol and budesonide on exacerbations of asthma. *N Engl J Med* 337(20): 1405–11

Royal College of Physicians (2014) *Why asthma still kills: the National Review of Asthma Deaths (NRAD) Confidential Enquiry report*. RCP, London

Sims EJ, Price D, Haughney J, Ryan D, Thomas M (2011) Current control and future risk in asthma management. *Allergy Asthma Immunol Res* 3(4): 217–25

Stonham C (2015) Personalised asthma action plans for patient education and self-management. *J GPN* 1(1): 60–4

Thomas M, Kay S, Pike J, et al (2009a) The Asthma Control Test (ACT) as a predictor of GINA guideline-defined asthma control: analysis of a multinational cross-sectional survey. *Prim Care Respir J* 18(1): 41–9

Thomas M, Gruffydd-Jones K, Stonham C, et al (2009b) Assessing asthma control in routine clinical practice: use of the Royal College of Physicians'3 Questions'. *Prim Care Respir J* 18(2): 83–8

RESPIRATORY CARE TODAY

Asthma diagnosis

Patient assessment

› Patient history [1]

Is there any family history of asthma or allergies (atopic disorders)? If yes, what triggers make symptoms worse — colds, exercise, allergens (from dust, animal fur, mould, pollen from plants, etc), smoke, air pollution, etc?

Does the patient smoke?

Does the patient work in an environment that might affect the lungs? Are his/her symptoms the same/worse on work days; do they resolve when on holiday?

Remember: document all findings and patient responses, as asthma is different for everyone — not only can it be seasonal but, in some, symptoms can come and go.

› Signs and symptoms

Physically examine patient to check if he/she has any, or all of the following:

- Wheeze
- Cough
- Breathlessness
- Chest tightness.

Does occurrence vary throughout the day/night, or during certain seasons?

Remember: patient may still have asthma even if none of these signs are present on examination.

Symptoms and history tell me that this person has asthma, but I should now do reversibility testing to try and confirm the diagnosis.

Attempt to confirm diagnosis with objective clinical (lung function) tests

Spirometry	Bronchodilator reversibility	Peak flow meter
› Quick, simple first-line investigation for adults and those over 16 years of age	› If spirometry shows an airways obstruction, it is necessary to test	› This test measures how well you exhale (peak expiratory flow, PEF) by breathing

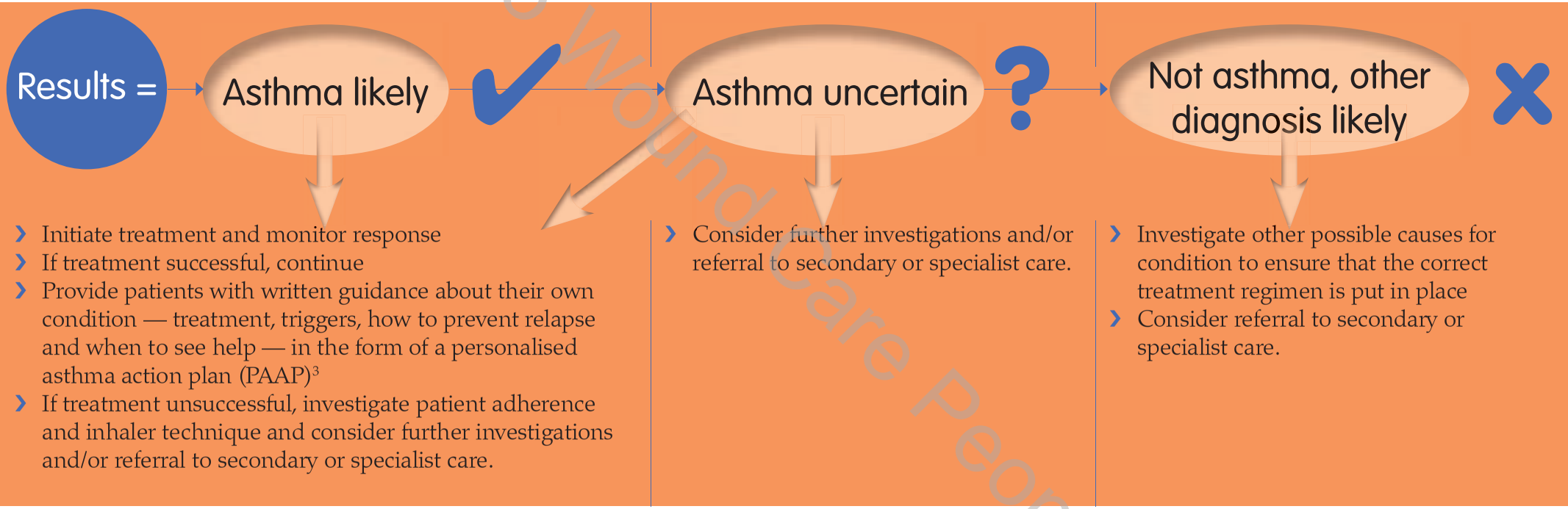
- Blowing into spirometer records how much air you exhale (force vital capacity, FVC) and at what speed (forced expiratory volume, FEV)
- If asthma is present, the score may be lower (i.e. FEV_1/FVC ratio of less than 70%) due to airways being swollen or constricted. Remember: if the patient's asthma is well-controlled, their lung function may be normal
- Tests can also be performed during exercise, and before/after taking medication to see how it is working.

for reversibility with short-acting bronchodilators

- Improvement in FEV_1 of 400ml, or a peak expiratory flow rate (PEFR) increase of 15–20% is highly indicative of asthma[2]
- Remember: if the patient's asthma is well-controlled, they may have no reversibility at all.

into a mouthpiece at the end of a tube

- Although not as accurate as spirometry, this test can easily be done at home by patients to keep track of their asthma, assess how well medication is working, and alert them to a potential medical emergency.



- Initiate treatment and monitor response
- If treatment successful, continue
- Provide patients with written guidance about their own condition — treatment, triggers, how to prevent relapse and when to see help — in the form of a personalised asthma action plan (PAAP)[3]
- If treatment unsuccessful, investigate patient adherence and inhaler technique and consider further investigations and/or referral to secondary or specialist care.

- Consider further investigations and/or referral to secondary or specialist care.

- Investigate other possible causes for condition to ensure that the correct treatment regimen is put in place
- Consider referral to secondary or specialist care.

1. British Thoracic Society, Scottish Intercollegiate Guidelines Network (2014) *British Guidelines on the Management of Asthma*. Quick reference guide. BTS/SIGN, London/ Edinburgh. Available online: http://bit.ly/1HytKt6

2. British Thoracic Society (1997) BTS guidelines for the management of chronic obstructive pulmonary disease. *Thorax* 53(Suppl 5): S1–S28

3. Royal College of Physicians (2014) *Why asthma still kills. The National Review of Asthma Deaths* (NRAD). RCP, London

IN BRIEF

- Recently published guidance on home oxygen use emphasised the appropriate assessment, provision and monitoring of patients requiring oxygen (Hardinge et al, 2015).
- Nurses managing patients in their homes are likely to encounter patients on oxygen, so it is important that they have an understanding of this treatment and its risks.
- Risk assessment and management are important but can be challenging, particularly around areas such as smoking.

KEY WORDS:

- Home oxygen therapy
- Primary care nurses
- Risks
- Guidelines
- Home oxygen assessment

Home oxygen therapy: a clinical update

Joe Annandale

Over the past 10 years the assessment and provision of home oxygen has altered dramatically in the UK. In 2003, the Department of Health (DH) announced changes to the provision of home oxygen resulting in the award of contracts to companies to supply regions across England and Wales (Wedzicha and Calverley, 2006). For the first time, this enabled patients to access a range of oxygen delivery devices, e.g. portable cylinders and liquid oxygen, based on clinical need. These changes were the catalyst for many areas to develop dedicated home oxygen teams. Subsequently, national service specifications (DH, 2012) were written to help ensure standards were equally applied across all regions.

Despite well-established home oxygen services there had never been a comprehensive review of the literature or any evidence-based guidance for UK healthcare professionals. However, in 2013 the British Thoracic Society (BTS) set up a multidisciplinary group to develop evidence-based clinical guidelines (Hardinge et al, 2015). These guidelines not only highlighted the clinical indications and benefits of home oxygen, but also the importance of assessment and monitoring, and the real dangers if it is used inappropriately. This article discusses some of these issues.

Joe Annandale, respiratory nurse specialist, Hywel Dda Health Board, Prince Philip Hospital, Llanelli

CLINICAL APPLICATIONS AND INDICATIONS FOR HOME OXYGEN

Home oxygen can be given for a variety of conditions (e.g. chronic obstructive pulmonary disease [COPD]), a range of indications (e.g. chronic respiratory failure, symptom relief or nocturnal hypoxaemia), and for different lengths of time.

Oxygen is usually delivered by nasal cannulae (*Figure 1*) as opposed to masks, with increased comfort meaning that cannulae are often better tolerated (O'Driscoll et al, 2008). Assessment for home oxygen should take place when the patient is clinically stable, as oxygen levels can fall during acute episodes but recover with time. For example, the oxygen levels of a patient with COPD can take more than eight weeks to stabilise after an acute exacerbation (Timms et al, 1981; Levi-Valensi et al, 1986). For this reason, clinicians should not usually order home oxygen at the point of hospital discharge. Removal of oxygen due to improved hypoxaemia is often traumatic for patients and difficult for healthcare professionals to manage, even when patients have been made aware at the outset that oxygen provision may only be temporary (Eaton et al, 2001).

Figure 1. *Nasal cannula and portable oxygen.*

Long-term oxygen therapy (LTOT)

LTOT is used to treat chronic severe hypoxaemia despite the patient being clinically stable and on optimal treatment (*Table 1*). With LTOT, patients need to use the oxygen for more than 15 hours a day to gain any

Table 1:	Indications for LTOT
pO_2<7.3kPa:	pO_2<8kPa:
› COPD	› Pulmonary hypertension (PH), or any on the left with evidence of PH, peripheral oedema, or polycythaemia
› Interstitial lung disease (ILD)	
› Cystic fibrosis (CF)	
› Heart failure	

clinical benefit (Hardinge et al, 2015). LTOT is usually delivered using a static oxygen concentrator, with ambulatory patients using portable cylinders to help them make up the required hours — this means they are not tied to their houses.

Much of the evidence supporting the general use of LTOT has been extrapolated from studies of patients with COPD (Hardinge et al, 2015). In these patients, LTOT is provided to extend life and reduce secondary complications by reducing pulmonary artery pressure, improving sleep quality, improving neuropsychological function, increasing renal blood flow and reducing secondary polycythaemia (Kvale et al, 1980; Medical Research Council [MRC], 1981).

LTOT has not consistently been proven to improve health-related quality of life (HRQoL) or breathlessness, but it may help to reduce hospital admissions in those with severe hypoxaemia (pO_2 at or below 7.3 kPa), although again this effect is not consistent (MRC, 1981; Ringbaek et al, 2002).

Despite the risks of combustion attached to LTOT and smoking (see below for details on flammable nature of oxygen), there is no evidence that patients who continue to smoke receive any less benefit from LTOT than non-smokers. It is, however, important that patients have an understanding of the benefits of LTOT to ensure realistic expectations and outcomes.

Nocturnal oxygen therapy (NOT)

Patients are only required to use oxygen at night to correct any nocturnal hypoxaemia (Hardinge et al, 2015). This is usually delivered by a static oxygen concentrator.

NOT is rarely used alone when LTOT is not indicated. It can sometimes be given to patients with severe heart failure when other causes of nocturnal desaturation have been excluded, e.g. obstructive sleep apnoea or obesity hypoventilation. It is not usually given to patients with COPD, interstitial lung disease (ILD) or cystic fibrosis (CF). Nocturnal ventilatory support should be considered in those with hypercapnic ventilatory respiratory failure, for example, neuromuscular disease, obesity hypoventilation or chest wall disease.

Ambulatory oxygen therapy (AOT)

This is where oxygen is provided while the patient is active. It can be delivered by portable cylinders, portable concentrators (*Figure 1*), or from flasks of liquid oxygen. Flow rates can be continuous or 'pulsed' — where oxygen is only delivered when the patient breathes in. Pulsed oxygen increases the length of time the cylinder or flask lasts, meaning that the patient can go out for longer. The evidence of benefit is weak, so AOT should not be routinely offered to patients, although some patients who desaturate significantly on mobilising and are very breathless, for example those with ILD, appear to gain from using it (Hardinge et al, 2015) (see *criteria for AOT below*).

Palliative oxygen therapy (POT)

This is where oxygen is given for symptom relief in patients with intractable breathlessness but who do not meet the criteria for LTOT. The frequency and duration of use will determine the best delivery modality.

The strength of evidence indicates that POT would not be effective in end-stage disease where patients have intractable breathlessness and are not significantly hypoxaemic (i.e. do not meet the criteria for LTOT). Instead, a suitably trained healthcare professional should trial the patient on opiates (Jennings et al, 2001), as this will be more effective than POT. The patient should also be considered for non-pharmacological interventions such as fan therapy. If POT is considered, it should be carried out by specialist teams and the clinical benefit regularly assessed.

Short burst oxygen therapy (SBOT)

This is when oxygen is given to non-hypoxaemic patients for short periods of time, typically 10–20 minutes, for symptom relief. It is usually given from a standard non-portable cylinder.

In patients with COPD, SBOT does not improve breathlessness (before or after exercise) or HRQoL, or reduce the burden on healthcare services, and thus should not be provided in this group. However, it has a role in the treatment of acute cluster headaches (severe, one-sided headaches), providing symptom relief when given

Criteria for AOT

- Pulmonary rehabilitation completed (where appropriate)
- Clinically stable and on optimal treatment
- Ambulatory and leaves the house
- Prepared and able to carry oxygen
- More than 4% drop in peripheral oxygen saturation (SpO_2) during walk test, with lowest SpO_2 less than 90%
- Repeated walk test with oxygen demonstrating improvements in symptoms and walking capacity while titrating the O_2 to maintain SpO_2 greater than 90%
- LTOT patients who leave the house to make up their minimum 15 hours/day (irrespective of the above).

Figure 2. *Non-rebreather mask.*

at flows of over 12l/minute via a non-rebreather mask (*Figure 2*).

IDENTIFYING PATIENTS WHO MAY REQUIRE HOME OXYGEN

As the primary indicator for receiving home oxygen is chronic hypoxaemia, an oxygen saturation monitor is a simple and reliable tool for identifying patients who may require referral for a home oxygen assessment, including blood gas measurement (Roberts et al, 1998). Once clinical stability has been established, the peripheral oxygen saturation (SpO_2) should be checked while the patient is at rest. Clinicians should consider referral if a patient has a SpO_2 of less than 92%, or a SpO_2 of less than 94% if he/she has evidence of pulmonary hypertension, peripheral oedema or polycythaemia. An example of a referral form can be found in the clinical guidelines (Hardinge et al, 2015).

ROLE OF HOME OXYGEN TEAMS

Many areas have now commissioned specialist teams to manage home oxygen services (DH, 2012). Their role usually involves patient assessment, arranging installation and removal of oxygen equipment, ongoing patient monitoring and education, managing risks — including risk assessment — as well as healthcare professionals' education. These teams also have an important role in ensuring home oxygen is used cost-effectively as it can be an expensive treatment. Patient education has been found to improve understanding of treatment as well as adherence, and reduces the risks associated with home oxygen (Peckham et al, 1998).

Monitoring

Monitoring is essential for those patients receiving home oxygen therapy who usually have chronic conditions that will decline over time, thereby changing their oxygen needs — unless this is identified, their therapy cannot be adjusted. An example of this is seen in patients who are receiving LTOT but who need to maintain a pO_2 of greater than 8kPa to gain any long-term benefits — a decline in their condition and the development of ankle oedema secondary to *cor pulmonale* may necessitate a medication review, with the possible provision of diuretics and an increase in oxygen supply.

Hypoxaemia improves at different rates following an exacerbation and therefore some patients receiving LTOT may no longer meet the criteria (Guyatt et al, 2005). Thus, without monitoring, they would continue with an unnecessary, non-beneficial and potentially burdensome treatment.

Treatment adherence is vital, both for optimal clinical outcomes and to ensure that vital resources are not wasted, e.g. where patients do not use LTOT for the required minimum of 15 hours a day; or where prescribed ambulatory oxygen is not being used. Oxygen companies supply readings for each patient's usage, so home care teams can address issues of non-adherence to try and optimise clinical outcomes or remove equipment that is not being used.

Patient education may be required to improve treatment adherence and also to manage any risks associated with home oxygen therapy. Non-adherence may be intentional in that the patient may have decided not to use the therapy. Often, further exploration of patients' beliefs and understanding reveals the reasons for their decision, e.g. they think that they will become dependent on oxygen, or using it means death is imminent. Once any issues have been identified, there is an opportunity to discuss any unfounded beliefs and improve adherence and outcomes. Unintentional non-adherence may result from patients simply not understanding that LTOT must be used for a minimum of 15 hours/day; or being unable to physically turn a portable cylinder on or off.

Did you know:

Hypercapnia occurs when there is too much carbon dioxide (CO_2) in the blood; while hypoxia occurs when there is too little oxygen in the tissues. Treatment objectives should aim to keep the patient safe and ensure that he/she has enough oxygen to treat the underlying problem.

Risks associated with home oxygen

To identify any individual risks associated with home oxygen use, the nurse should visit the patient's home within four weeks of starting treatment. Risk assessment tools may help quantify any risks and the actions needed to minimise them (Hardinge et al, 2015). Written information and instructions also help to reinforce key messages and reduce overall risk.

There are two main types of risks:

- Those to the patient as a direct result of the treatment itself
- Those caused by having or using the oxygen equipment.

Risk assessment tools may help quantify individual risk (Hardinge et al 2015).

Hypercapnia

A significant proportion of patients receiving home oxygen will be experiencing ongoing hypercapnia, will have had it in the past, or be at

Red Flag **Warning signs of hypercapnia**

- Morning headache
- Daytime somnolence
- Lethargy
- Poor concentration
- Tremor
- Muscle twitches
- Hypertension
- Flushed skin
- Confusion
- Delirium or unconsciousness (severe hypercapnia)

risk of developing it in the future (O'Driscoll et al, 2008). Oxygen therapy can exacerbate underlying hypercapnia, particularly when the patient becomes unwell. This can have life-threatening consequences such as the blood becoming too acidic (respiratory acidosis). It is therefore important to identify any signs of worsening hypercapnia, as they will require further assessment and, if severe, hospital admission.

There are some important steps that can be taken to minimise the risk of oxygen-induced hypercapnia. At-risk patients should be given an oxygen alert card (*Figure 3*), which will not only highlight any risk to themselves, but also to healthcare professionals who may have to assess them at home. The card will guide clinicians to maintain the patient's oxygen saturations between 88–92%, which will adequately treat any hypoxaemia without overusing the oxygen leading to a worsening hypercapnia and possible acidosis (O'Driscoll et al, 2008). For the same reason, patients should be instructed never to turn up the oxygen flow rate — they may be tempted to do this when their symptoms worsen, when unwell, when they are at greatest risk of worsening hypercapnia. In some instances, oxygen concentrator flows can be fixed so that patients are unable to change them.

Stable patients who when assessed demonstrate a significant rise in carbon dioxide while undergoing treatment (including acidosis), or become symptomatic while on treatment at home (e.g. morning headaches and lethargy), should be considered for specialist assessment of home-based non-invasive ventilation.

Other problems associated with home oxygen use include nasal drying and nose bleeds, particularly when nasal cannulae are used at higher flows. General drying of the respiratory tract can occasionally be a problem, but current 'bubble-through' humidifiers are ineffective and pose a risk of bacterial colonisation if not cleaned regularly and thoroughly. In the author's clinical experience, trying a mask or using a combination of mask and cannulae may help.

Smoking and fire risk

The risks of mixing oxygen with a flame or spark — particularly in the presence of a combustible material — can have potentially fatal consequences (Cooper, 2015). Although the commonest hazard is tobacco smoking, cookers, fires, candles, incense burners, e-cigarettes, and outdoor heating or barbecue equipment can also be dangerous, as can some tools (such as 'grinders' or welding equipment).

While there is some UK data on the risk of fire associated with oxygen therapy, this has been collected for much longer in the United States. A quick internet search highlights a number of catastrophic events related to smoking and home oxygen, resulting in loss of life for users as well as family, friends, neighbours and emergency service personnel.

It is no surprise, then, that much debate surrounds the subject of whether the risks of supplying home oxygen to smokers outweighs any potential benefits. Certainly, this debate is at its most controversial with regards patients receiving LTOT, as the treatment can extend their life span. However, there is much less discussion, if any, about the merits of providing other types of home oxygen for smokers. There is certainly no evidence that other types of oxygen impact on mortality, which might lead some to question if they should be used at all in smokers. Some health services do not supply oxygen to any current smoker and use validated tests such as exhaled carbon monoxide testing to confirm smoking status.

Home oxygen providers in the UK have a contractual obligation to report all serious adverse events including those related to fire. Cooper (2015) highlighted that there are twice as many fires in households where oxygen is being used compared to those not using oxygen, and that these fires are of a greater intensity. From October 2009

Top tip:

Tobacco smoking has many detrimental health consequences and stopping smoking has many health benefits (National Institute for Health and Care Excellence [NICE], 2015). All patients, including those on home oxygen, who continue to smoke, should be encouraged to give up and given access to appropriate specialist smoking cessation services to help them. This issue should be discussed during every contact.

Practice points

Risk factors for hypercapnia:

- COPD
- Cystic fibrosis (CF)
- Neuromuscular diseases, e.g. motor neurone disease
- Morbid obesity, i.e. a body mass index (BMI) of more than 35
- Chest wall disorders, e.g. kyphoscoliosis

Oxygen alert card

Name: _____

I am at risk of type II respiratory failure with a raised CO_2 level.

Please use my _____ % Venturi mask to achieve an

oxygen saturation of _____ % to _____ % during exacerbations

Use compressed air to drive nebulisers (with nasal oxygen at 21/min).
If compressed air not available, limit oxygen-driven nebulisers to six minutes.

Figure 3. *Oxygen alert card.*

Practice points

Safety checks in the home should include:

- Location of oxygen equipment as well as proximity of fire, trip or fall hazard
- Are there any smokers in the house?
- Have fire breaks been put in place?
- Have safety routes been identified?
- Has a visit by a fire safety officer been suggested?
- Is the patient using any flammable petroleum-based creams?
- Are the correct flow rate and delivery device being used?
- Are there any signs of hypercapnia?
- What is the patient's SpO_2 when receiving and not receiving oxygen?

to July 2010, three oxygen providers in the UK reported 51 fire-related incidents, with six deaths, nine hospitalisations and 36 occasions where people required medical attention. The mean mortality rate for oxygen-related fires in the UK is 3.2 per annum (Cooper, 2015).

Oxygen providers will undertake a risk assessment at installation and advise patients on the most suitable positioning and use of their oxygen equipment. There may be added value in a further visit from a member of the home oxygen service who can highlight any ongoing risks or precautions, for instance fire breaks in tubing circuits are designed to cut-off the oxygen supply and reduce the impact of any fire.

Trips and falls are also a potential problem, especially when longer lengths of tubing are being used so that the patient can walk from room to room. Another problem is local friction and irritation of the skin of the nose, often caused by the nasal cannulae used to deliver oxygen. Where this is a problem, patients should use water-based rather than flammable petroleum-based creams on these areas, as well as on the hands.

CONCLUSION

Home oxygen is a common treatment with about 90,000 users in England and Wales (Cooper, 2015). To provide a high standard of health care, appropriate identification, assessment, education and monitoring need to be in place.

Risk assessment and management are important but can be challenging, particularly around areas such as smoking. Healthcare professionals are central to these services and should base their interventions on the best available evidence, or push to develop evidence through research and innovation.

Although specialist services such as home oxygen or smoking cessation services play a key role, any healthcare professionals who have contact with patients receiving home oxygen can make a significant contribution by working with specialists and undertaking the interventions outlined above. RCT

REFERENCES

Cooper BG (2015) Home oxygen and domestic fires. *Breathe* 1(1): 5–12

Department of Health (2012) *Service specification: home oxygen assessment and review service*. DH, London

Eaton T; Grey C; Garrett JE (2001) An evaluation of short-term oxygen therapy: the prescription of oxygen to patients with chronic lung disease hypoxic at discharge from hospital. *Respir Med* 95: 582–7

Guyatt GH, Nonoyama M; Lacchetti C, et al (2005) A randomized trial of strategies for assessing eligibility for long-term domiciliary oxygen therapy. *Am J Respir Critical Care Med* 172(5): 573–80

Hardinge M, et al on behalf of the BTS Standards of Care Committee (2015) BTS Guidelines for Home Oxygen Use in Adults. *Thorax* 70 supp 1. Available online: www.brit-thoracic.org.uk/document-library/clinical-information/oxygen/home-oxygen-guideline-(adults)/bts-guidelines-for-home-oxygen-use-in-adults/ (last accessed 12 July, 2015)

Jennings AL, Davies AN, Higgins JP, et al (2001) Opioids for the palliation of breathlessness in terminal illness. *Cochrane Database Syst Rev* (4): CD002066

Kvale PA, Conway WA; Coates Jr, EO (1980) Continuous or nocturnal oxygen therapy in hypoxemic chronic obstructive lung disease. A clinical trial. *Ann Internal Med* 93(3): 391–8

Levi-Valensi P, Weitzenblum E, Pedinielli JL, et al (1986) Three-month follow-up of arterial blood gas determinations in candidates for long-term oxygen therapy. A multicentric study. *Am Rev Respir Dis* 133: 547–51

Medical Research Council Working Party (1981) Long-term domiciliary oxygen therapy in chronic hypoxic *cor pulmonale* complicating chronic bronchitis and emphysema. *Lancet* 1: 681–6

National Institute for Health and Care Excellence (2015) *NICE Quality Standard 82: Smoking: reducing tobacco use*. NICE, London. Available online: www.nice.org.uk/guidance/qs82

O'Driscoll BR, Howard LS, Davison AG on behalf of the British Thoracic Society (2008) Emergency Oxygen Guideline Development Group 2008. Guideline for emergency oxygen use in adult patients. *Thorax* 63(supp VI): viI–vi73

Peckham DG, McGibbon K, Tonkinson J, et al (1998) Improvement in patient compliance with long-term oxygen therapy following formal assessment with training. *Respir Med* 92: 1203–6

Ringbaek TJ, Viskum K, Lange P (2002) Does long-term oxygen therapy reduce hospitalisation in hypoxaemic chronic obstructive pulmonary disease? *Eur Respir Journal* 20: 38–42

Roberts CM, Franklin J, O'Neill A, et al (1998) Screening patients in general practice with COPD for long-term domiciliary oxygen requirement using pulse oximetry. *Respir Med* 92:1265–8

Timms RM, Kvale PA, Anthonisen NR, et al (1981) Selection of patients with chronic obstructive pulmonary disease for long-term oxygen therapy. *JAMA* 245: 2514–15

Wedzicha PA, Calverley PM (2006) All change for home oxygen services in England and Wales. *Thorax* 61: 7–9

Don't wait for tomorrow — start caring **today** ....

Do you need an evidenced-based source of practical, 'need-to-know', key information at your fingertips?

The 'Care Today' series of annual journals cover specific areas of care vital for day-to-day practice:

- ✓ Wound Care Today (now in its second volume)
- ✓ Skin Care Today
- ✓ Respiratory Care Today

Their easy-to-read style combines clinical education with practical tips through:

- › Point-specific posters — your clinical companions for everyday practice
- › Clinical features — written by experts in their field
- › Debate and discussion — on what matters most to provide patient-centred care

Available in print and online:

www.journalofpracticenursing.co.uk

IN BRIEF

- Many patients with terminal illness will experience breathlessness in the final stages of illness.
- Along with pharmacological management, primary care nurses can help these patients by providing supportive care.
- Holistic assessment of breathlessness should include reference to the patient's spiritual beliefs.
- Primary care nurses are well positioned to help patients to breathe more easily when they are receiving palliative care.

KEY WORDS:

- Breathlessness
- Primary care nurses
- End-of-life care
- Holistic care
- Spiritual beliefs
- Supportive care

Death and breath: managing breathlessness in patients with terminal illness

Emma Vincent

Palliative care requires an holistic commitment from the nurse to address the physical, social, psychological and spiritual needs of people with terminal illness and their families. Breathlessness is a common symptom in people receiving palliative care. It occurs predominantly in people with severe and chronic respiratory disease and is also associated with other diseases including heart failure, pleural effusions, ascites, dementia and obesity (Ekstrom et al, 2015). Breathlessness may also be experienced by patients diagnosed with cancer and who have had a cerebral vascular accident.

Breathlessness is a subjective experience and can be highly distressing. This paper addresses the core principles of assessment and management and the role of the primary care nurse.

Emma Vincent, interstitial lung disease nurse, Department of Respiratory Medicine, University Hospitals of Leicester NHS Trust

ASSESSMENT OF BREATHLESSNESS

Breathlessness is commonly experienced by people near the end of life. The experience is complex and includes physical and environmental factors. The mechanics of breathing depend upon air flow, respiratory muscles and lung tissue that regulate expansion, while higher neurological functioning is responsible for the metabolic control of breathing.

Breathlessness (dyspnoea) is defined as 'an uncomfortable sensation or awareness of breathing... patients may describe the feeling as shortness of breath, inability to get air or suffocation' (Kamal et al, 2012). It is possible to reverse some of the causes of this sensation with a combination of pharmacology and optimum supportive care. Response to management can vary and it is important to be flexible with a plan of care that incorporates the needs of the patient and carer.

The experience of breathlessness in the palliative care patient has been well documented from a variety of viewpoints. Sampson et al (2015) state how both carers and patients feel that there is a discrepancy between assessment of symptoms and the lived experience. Others (Higginson et al, 2015), promote the early intervention of breathlessness management and recommend the integration of support services to address this. It is also associated with heightened staff anxiety (Steinmetz et al, 1993). Kamal et al (2011) suggested that healthcare professionals must continue to improve their understanding of, and capacity to effectively treat this disabling symptom.

> **Did you know:**
>
> Refractory breathlessness is a sensation of breathlessness at rest or on minimal exertion, which persists despite optimal treatment of the underlying cause (Currow et al, 2014).

Symptoms of breathlessness can often be complicated, for example fear can either exacerbate or shield the patient's response. The initial aims of assessment are to treat the underlying factors that may be aggravating the breathlessness and reduce the extent of the problem. Once the treatable causes have

The challenges

- Limited resources
- Carer burnout
- Lack of clear guidelines
- Patient and carer fear of morphine
- Increased levels of anxiety
- Fear related to deterioration
- Death rattle distress

been addressed and maximal pharmacological therapies are put in place, any breathlessness that is still experienced is considered to be 'refractory'.

CAUSES OF BREATHLESSNESS IN THE PALLIATIVE PATIENT

There are various causes for breathlessness in patients receiving palliative care ranging from anaemia, hypoxia, pleural effusion, pulmonary embolus, advanced chronic lung disease/lung cancer, infection and anxiety. The most common reversible causes are hypoxia, bronchospasm and anaemia (Dudgeon and Lertzman, 1998). The severity of breathlessness may depend upon how advanced the disease has progressed; symptoms becomes less reversible in those patients with end-stage lung disease.

PHARMACOLOGICAL MANAGEMENT OF BREATHLESSNESS

Oral morphine is the first-line pharmacological treatment, starting on a low dose, as required, e.g. 2mg of Oramorph. This can be increased to 2–2.5mg 4–6-hourly, and increased in steps of 30% if tolerated (NHS, 2010). If the breathlessness is only partially relieved by this, the next stage is to consider sustained-release morphine tablets. This can be calculated by adding all the morphine doses given over 24 hours. In addition, Oramorph can be prescribed for breakthrough relief, as required. Subcutaneous morphine can be used where oral medication is not suitable. A dose of 1–2mg can be given 4–6-hourly. A syringe driver may also be considered, depending on frequency of need (NHS, 2010). Benzodiazepines or midazolam can be added into the syringe driver if the patient has anxiety. Nebulised opioids are not recommended for the treatment of breathlessness, as there is little evidence to support the effectiveness of this therapy. If morphine is not tolerated by the patient, oxycodone can be used as an alternative (although it is important to note that it is 1.5–2 times more potent).

Reassurance and education is an important role of the nurse when administering and supporting this therapy, and the patient and carer may naturally have concerns about the use of morphine — its effects and the risk of addiction.

Dosage guidance for palliative care is generally to give half the dose you would for pain control. Anecdotally, nurses and practitioners prescribe morphine for end-stage breathlessness, although a Cochrane review concluded that there was limited evidence to support its use to palliate breathlessness (Jennings et al, 2001). Jennings et al (2001) also found that quality of life measures were inconclusive and there was no evidence to support the use of nebulised opioids. However, the number of patients involved in the studies identified were small and, in the author's clinical experience, both nurses and doctors do consider opiates to have a key role in the pharmacological management of dyspnoea.

Practice points

Possible reasons for refractory breathlessness include:

- Fear
- Anxiety
- Loss of mastery
- Poor understanding/ misunderstanding of disease
- Patient 'feels' the wrong temperature
- Poor positioning
- Lack of autonomy in their care
- Sleep deprivation
- Hunger
- Sputum
- Concern for family members
- Guilt (related to smoking)
- Irrational thoughts
- 'Overthinking'
- Poor rapport with nurse.

NURSING ROLE IN TREATING BREATHLESSNESS

Breathlessness can be a frightening experience for patients, so it is important to ensure that they receive appropriate care. Compassionate reassurance is arguably the main aspect of the nurse's role. Educating patients and their carers in how to master refractory breathlessness is crucial and can be achieved by explaining:

- Why the breathlessness occurs
- How it can be eased
- How to prevent unnecessary levels of respiratory distress.

Supportive care for refractory breathlessness

- Ensure patient and carer understand the cause of breathlessness
- Provide advice and reassurance as necessary
- Encourage an upright posture while maintaining comfort
- Teach some relaxation techniques
- Use a humidifier to help with sputum expectoration
- Teach breathing control techniques while reassuring carers
- Reduce the room temperature if it is too warm
- Encourage ventilation in the room/partially open the window
- Suggest fan therapy to relieve the sensation of breathlessness
- Observe the patient's environment for irritants (allergens, mould or smoke)
- Maintain good communication with other team members
- Produce clear care plans written according to the patient's wishes
- Take into account spiritual and ethnic diversity

Top tip:

Broaching the subject:

- Don't be afraid of 'opening a can of worms'
- Always keep hope integrated into all conversations
- It is important to be honest
- Listen to the patient and carer and talk about their fears
- Address the deterioration of breathlessness in stages, allowing the patient to deal with it in their own time
- Suggest using a notepad for times when the patient feels too breathless to talk
- Try not to rush
- Never assume knowledge or understanding
- Provide written information where appropriate
- Respect the patient's wishes if he or she does not want to talk about death
- It is ok to laugh and be lighthearted.

In the author's clinical experience, relaxation techniques and energy conservation may help patients to stay calm and achieve peace of mind, as guided relaxation can help focus the mind away from the unpleasant sensation of breathlessness. Alternatively, energy conservation encourages patients to re-evaluate their activities of daily living to see if there are any areas where they could conserve energy. Both techniques are considered to work effectively alongside one another. Listening to music can also be a soothing distraction (van Leupoldt et al, 2007). In addition, encouraging any level of independence, if desired, is a way in which nurses can help to promote dignity in a patient's final days.

Good communication is important when providing a continued holistic approach. Nurses are responsible for devising a care plan for any patient in their caseload who is experiencing breathlessness. This should be patient-centred and consider the patient's and carer's safety, comfort, needs, wishes and beliefs. Care plans should identify risks, particularly those associated with oxygen therapy and managing opioid medications. They should also be regularly evaluated and reviewed as breathlessness can progress rapidly. At each visit, nurses can encourage patients to be involved in planning and evaluating their care plan and listening to their opinions, fears and expectations. This can help patients to feel a sense of ownership over their care, as well as reducing the perception of breathlessness. The wording in care plans should also be chosen carefully (see *'Choosing the words' box* for phrases to avoid).

ADDRESSING HOLISTIC NEED

Patients who experience breathlessness when they have advanced terminal disease face a gradual physical decline as well as psychological problems, such as despair and helplessness. Some of these symptoms may be related to spiritual distress.

Spirituality — or how individuals understand the purpose and meaning of their existence (Woof, 1998) — needs to be considered when treating a patient. An holistic assessment must involve gaining an understanding of the patient's and carer's values. By visiting patients in their own homes, nurses are well placed to assess spiritual distress and identify contributing factors. Acknowledging how the patient is feeling is an important part of providing holistic care. Recent findings support the importance of spiritual communication in clinical practice, and the need for clinicians to be trained in communicating spirituality and complex emotions, such as forgiveness (Wittenberg et al, 2015). It has also been suggested that nurses should be able to assess the intricacies of a situation through holistic assessment and facilitate understanding as part of their role in supporting, caring and advocating for patients (Alicea-Plannas, 2015).

In a multicultural society, it is important for nurses to be aware of how religious beliefs may affect care planning. For example, where the patient is distressed because prayer makes them breathless, how could their community help with this and how can the nurse aid the patient to continue to fulfil his or her religious belief? In the author's experience, suggesting that a partner says a prayer can help a patient who is too breathless to speak. Communication and continued spiritual assessment can promote peace of mind and a lowered sensation of breathlessness.

The dependency related to increasing levels of breathlessness may also present other problems for patients and carers. Advanced disease can lead to confined lifestyle, social isolation (for the patient and carer), loneliness and depression (Janssen et al, 2015). This alteration in perception can cause an altered body image and level of sexuality. Although many would not associate sexuality with palliative care, an holistic assessment may prove otherwise. For example, the patient may need to feel close to their carer, but their breathlessness interferes with this. Equally, a carer who is also a partner may miss the physical sense of being held, loved or kissed. Sensitive management can help to tease out and address these concerns. Sexual intercourse during advanced stages of respiratory disease may not be desired or

Choosing the words

- Try not to stress that the patient is dying from his or her lung disease, concentrate on living and coping with the breathlessness
- 'Advancing' breathlessness is less frightening than 'end stage'
- It is important to remain hopeful, but not by providing 'false hope'
- Allow patients to see that you have not given up on them or trying to relieve their breathlessness
- Talking in timescales is frightening

Remember:

Managing the terminally ill breathless patient is complex and challenging.

even possible. However, sexual expression remains an important part of the patient's individual identity (Vincent and Singh, 2007).

The ethos of holistic care requires palliative care professionals to provide opportunities for patients and their partners to discuss any concerns they might have about their relationship and to understand the meanings that symptoms have for them (Taylor, 2014).

FINALLY…

Helping patients to take their final breaths peacefully is a challenging part of a nurse's role.

Nurses need to be flexible and provide evidence-based care, but should also accept when other help is required from experienced professionals, such as specialist palliative care nurses.

Nursing a patient in the advanced stages of their disease can be demanding and nurses will be exposed to dying, grief and loss. This can be exhausting for even the most experienced of nurses. However, with compassion, the right knowledge and clinical supervision, many families can benefit from the involvement of a primary care nurse who can really make a difference to their loved one's care. Every patient deserves a death with a last, peaceful breath. Nurses have the insight, understanding and skills to provide this care. RCT

Reflect:

When a patient takes their final breath the room can become a very different place. As a nurse the comfort of the patient is paramount, but so are the needs of the carer. Observing the final moment can have many different effects upon people, and it is the nurse's role to ensure the reaction is recognised and addressed appropriately. The stillness can trigger anything from shock, immense loss, to sense of relief. A nurse hopes to help the carer start their journey of acceptance of this loss — the final breath can present an opportunity for reflection that may be a complete contrast to the turmoil of the symptom of breathlessness.

REFERENCES

Alicea–Plannas J (2015) Listening to the narratives of our patients as part of holistic nursing care. *J Holist Nurs*. Jun 18 (Epub ahead of print)

Currow DC, Abernethy AP, Ko DN (2014) The active identification and management of chronic refractory breathlessness is a human right. *Thorax* 69: 393–4

Dudgeon D, Lertzman M (1998) Dyspnea in the advanced cancer patient. *J Pain Symptom Management* 16: 212–9

Ekstrom MP, Abernethy AP, Currow DC (2015) The management of chronic breathlessness with advanced and terminal illness. *Br Med J* 349: g7617

Higginson IJ, Bausewein C, Reilly C, et al (2015) An integrated palliative and respiratory care service for patients with advanced disease and refractory breathlessness: a randomised controlled trial. *Lancet* 2: 979–87

Janssen DJ, Wouters EF, Spruit MA (2015) Psychosocial consequences of living with breathlessness due to advanced disease. *Curr Opin Support Palliat Care* Jun 26 (Epub ahead of print)

Jennings AL, Davies AN, Higgins JP, Broadley K (2001) Opioids for the palliation of breathlessness in terminal illness. *Cochrane Database Syst Rev* (4): CD002066]

Kamal AH, Maguire JM, Wheeler JL, Currow DC, Abernethy AP (2011) Dyspnea review for the palliative care professional: assessment, burdens, and etiologies. *Palliat Med* 14(10): 1167–72

Kamal AH, Maguire JM, Wheeler JL, et al (2012) Dyspnea review for the palliative professional: treatment goals and therapeutic options. *J Palliat Med* 15(1): 106–14

Monod SM, Rochat E, Bula CJ, Jobin G, Martin E, Spencer B (2010) The spiritual distress assessment tool: an instrument to assess spiritual distress in hospitalised elderly persons. *BMC Geriatr* 10: 88

National Health Service (NHS) Lothian (2010) *Breathlessness in palliative care*. NHS, UK. Available online: www.palliativecareguidelines.scot.nhs.uk/guidelines/symptom-control/breathlessness.aspx

Nightingale F (1860) *Notes on Nursing. What it is and what it is not*. Appleton & Company: 12

Sampson C, Hope-Gill B, Harrison N, et al (2015) Canopy: care needs of patients with idiopathic pulmonary fibrosis (IPF) and their carers. *BMJ Support Palliat Care* 5(1): 113

Selman L, Beynon T, Higginson IJ, Harding R (2007) Psychological, social and spiritual distress at the end of life in heart failure patients. *Curr Opin Support Palliat Care* 1(4): 260–6

Steinmetz D, Walsh M, Gable LL, et al (1993) Family physicians' involvement with dying patients and their families. Attitudes, difficulties ,and strategies. *Arch Fam Med* 12: 753–60

Taylor B (2014) Experiences of sexuality and intimacy in terminal illness: A phenomenological study. *Palliat Med* 28(5): 438–47

van Leupoldt A, Taube K, Schubert-Heukeshoven S, Magnussen H, Dahme B (2007) Distractive auditory stimuli reduce the unpleasantness of dyspnea during exercise in patients with COPD. *Chest* 132(5): 1506–12

Vincent EE, Singh SJ (2007) Addressing the sexual health of patients with COPD: the needs of the patient and implications for health care professionals. *Chronic Respiratory Dis* 4: 111–15

Wittenberg E, Ferrell B, Goldsmith J, Buller H (2015) Provider difficulties with spiritual and forgiveness communication at the end of life. *Am J Hosp Palliat Care*. Jul 2 (Epub ahead of print)

Woof R, Nyatanga B (1998) Adapting to death, dying and bereavement. In: Faull C, Carter Y, Woof R (eds) *Handbook of Palliative Care* Blackwell Science, Oxford: 74–87

Using an inhaler

Inhalers are a common method of medication delivery for people with asthma and chronic obstructive pulmonary disease (COPD), however there are many different techniques and devices available. Here, Andrew Booth, advanced nurse specialist at York Teaching Hospital, looks at the benefits of the various devices and provides some top tips for best practice.

Inhaled therapy remains the mainstay of evidenced-based therapy for asthma and chronic obstructive pulmonary disease (COPD) (National Institute for Health and Care Excellence [NICE], 2010; Scottish Intercollegiate Guidelines Network [SIGN], 2014). Inhalers allow drugs to be delivered directly to the appropriate area, i.e. the lungs. Because of this, lower doses can be used and there are fewer side-effects than when medicines are administered orally.

For a drug to be clinically effective it needs to reach the lungs, which in turn requires correct use of the inhaler (Global Initiative for Asthma [GINA], 2014). If an inhaler is used incorrectly, there is an increased risk of poor asthma control and potential visits to accident and emergency (Melani et al, 2011).

Healthcare professionals who prescribe inhaled therapy — and others who are involved in that care or are recommending inhaled therapy — must have sufficient knowledge of any inhaler device before they recommend its use. They should also be able to safely and competently demonstrate how to use the inhaler device and be able to periodically check the patient's technique (NICE, 2010; NICE, 2013; SIGN, 2014).

Prescription of the drug and the device are synonymous and both should be prescribed at the same time. For instance, the nasal spray drug beclometasone dipropionate can be used in at least seven different devices, therefore it would be bad practice to write a prescription for the drug without also prescribing the relevant device. For clarity, it is usually recommended that brand names for both drug and device should be used (BMJ Group and the Royal Pharmaceutical Society, 2015).

Sometimes the choice of device is determined by the choice of drug. However, the advent of more drugs, devices and combinations is increasing the treatment options available for each patient, even though this can mean that staying ahead of current respiratory pharmacology is challenging (Booth, 2015).

CLASSES OF INHALERS

There are two distinct classes of inhalers: aerosol and powder. Broadly speaking, most aerosol devices involve the same technique with a few individual nuances. Similarly, the different powder inhalers have an almost identical technique. However, as the technique for aerosol inhalers is different to that of powder inhalers, there is a school of thought that patients should be prescribed either aerosol or powder inhalers, but not both. There is little evidence supporting this philosophy, but nevertheless it is worth considering.

AEROSOL INHALERS

There are two types of aerosol inhalers:

1. Metered dose inhaler (MDI)
2. Breath-actuated inhaler.

Metered dose inhalers

The MDI relies on a canister of gas, which usually contains a propellant as well as the active drug. When the device is actuated, the propellant and the drug pass through a narrow opening and are aerosolised into the atmosphere. MDIs require either the canister to be compressed, or a button to be pushed at the same time as inhaling.

The name 'metered dose inhaler' may in itself be confusing, as in fact all inhalers deliver a metered dose (including powder inhalers). However, the MDI label has stuck and traditionally these are the most commonly prescribed inhalers.

The correct technique for all aerosol inhalers is for the patient to take a slow gentle inhalation, which should last for as long as possible. Inhaling too quickly can mean that not enough of the drug is deposited into the lungs where it is needed (Al-Showair, 2007; Capstick and Clifton, 2012) — this is one of the most common errors when using aerosol inhalers.

An important consideration when using an MDI is to coordinate the release of the aerosol with the precise moment of inhalation. Performing these two manoeuvres simultaneously can be very difficult, which accounts for the MDI's reputation as being difficult to use (Melani et al, 2011).

How to use an MDI

1. Check the inhaler for debris and clean if needed
2. Shake the inhaler
3. Exhale fully, away from the inhaler
4. Place the mouthpiece inside the mouth and over the teeth, obtaining a good seal with the lips
5. Commence gentle inhalation
6. Compress the canister to release the drug into the mouth
7. Continue the gentle inhalation for about five seconds
8. Hold the breath for as long as possible, or up to 10 seconds.

If a second dose is required, wait for approximately 30 seconds before repeating from step 2. Steps 5 to 7 require careful coordination, and some people cannot perform these correctly. Also, some MDIs have a dose counter, which indicates the number of doses left. Older MDIs have no counter and it is not possible to determine how many doses remain — even when it feels like there may be a little drug remaining in the canister, it may only be leftover propellant.

How to use an MDI with a spacer

1. Shake the inhaler
2. Fit the inhaler to the aperture in the spacer
3. Depress the canister to release the drug
4. Place the mouthpiece of the spacer inside the mouth and take several breaths in and out.

If a second dose needs to be taken, wait approximately 30 seconds before repeating from step 1.

Large-volume spacers such as the Volumatic® (GSK), provide greater lung deposition and in an emergency may be as good as a nebuliser in delivering short-acting B2-agonist therapy. Small volume spacers such as the Aerochamber® (GSK) have a built-in 'whistle' that activates if the patient is breathing-in too deeply, as well as a universal aperture which fits many different types of MDIs. In order to reduce the infiltration of unwanted bacteria, all plastic spacers should be washed with mild detergent or cleaned as per the manufacturer's instructions.

The 'soft mist' MDI

The Respimat® (Boehringer Ingelheim) is an MDI which warrants a sub-category of its own. To all intents and purposes it is an MDI, however there are some subtle differences. The aerosol is generated using a spring rather than a propellant gas — the resulting 'soft mist' is emitted at a much lower velocity and over a much longer time. This reduces the problem of trying to coordinate the activation and inhalation, as well as ensuring that little of the drug is deposited in the mouth (where it may cause side-effects), rather than delivering most of the medicine to the lungs where it is needed. There are no published trials or manufacturer advice on the use of this type of MDI with a spacer, therefore this should probably be avoided. Before use, the Respimat needs to be assembled by inserting the cartridge into the device. Clear instructions are provided, although some patients may require the assistance of a pharmacist, for instance.

How to use a soft mist MDI

1. Twist the body of the canister through 180 degrees until it clicks
2. Open the mouthpiece
3. Check the inhaler for debris and clean if necessary
4. Exhale fully, away from the inhaler
5. Place the mouthpiece inside the mouth, obtaining a good seal with the lips and being careful to keep the air vents in the side of

the mouthpiece clear. Point the mouthpiece toward the back of the mouth
6. Commence gentle inhalation
7. Press the button to release the aerosol into the mouth
8. Continue slow inhalation until a maximum breath has been taken
9. Hold the breath for as long as possible, or up to 10 seconds.

Breath-actuated inhalers

Breath-actuated aerosol inhalers rely on the patient's inhalation to trigger the activation of the aerosol. Once the patient has started to breathe in, the vacuum created releases a metered dose of the drug for the patient to inhale. Breath-actuated inhalers do away with the need to coordinate activation and inhalation, and therefore may be easier for some people to use.

How to use a breath-acutuated inhaler

1. Remove or 'flip open' the cap (the Autohaler® [Teva UK] also needs to be loaded by pushing up the red button that is located on the top)
2. Shake the inhaler
3. Breathe out away from the inhaler to empty the lungs
4. Place the mouthpiece inside the mouth, obtaining a good seal with the lips
5. Commence a slow inhalation allowing the device to fire, then continue breathing-in until a maximum breath has been taken
6. Hold the breath for as long as possible, or up to 10 seconds.

If a second dose is needed, wait approximately 30 seconds before repeating from step 1. The Easi-Breathe® (Teva UK) is re-loaded by closing and then opening the cap — it can also be used through a spacer by unscrewing the top and using as a conventional MDI.

POWDER INHALERS

Powder inhalers are also known as 'dry powder inhalers' or DPIs (even though there is no such thing as a 'wet' powder inhaler).

All DPIs require a reasonably high inspiratory effort and unlike aerosol inhalers it is virtually impossible to inhale too hard. Patients with low inspiratory flows may not be able to properly inhale the powder.

There are two types of DPI:
1. Capsule
2. Multidose.

Capsule DPIs

Capsule inhalers require a plastic capsule of powdered medicine to be loaded into the inhaler. The capsules come inside a foil blister packet, which keeps the powder dry. It is important that the capsules are only removed from the foil packet immediately before use. Once the capsule has been placed in the inhaler's chamber it is pierced by pressing a button on the side of the device, allowing the powder to flow out of the capsule.

How to use a capsule DPI

1. Remove the capsule from the foil packet. Some foil packets require the backing to be peeled open rather than the capsule being 'burst' through the foil
2. Place the capsule into the chamber
3. Pierce the capsule by pressing the button on the device
4. Exhale away from the inhaler to empty the lungs
5. Place the mouthpiece inside the mouth to obtain a good seal with the lips
6. Breathe-in as hard as possible, for as long as possible
7. Hold the breath for as long as possible, or up to 10 seconds
8. Check that the capsule is empty. If not, repeat from step 4
9. Discard the empty capsule.

Multidose DPIs

Multidose DPIs hold the drugs within the inhaler itself, and therefore do not require loading. There is usually a cap or lid to remove before the device is primed, usually using a lever or button, or by 'twisting' the device. The inhalation technique is the same for all DPIs, requiring a long hard inspiratory breath in.

How to use a multidose DPI

1. Remove or slide the cap open
2. Prime the inhaler as per instructions (usually by twisting or pulling the device, or by pressing a lever or button)
3. Exhale away from the inhaler to empty the lungs
4. Place the mouthpiece inside the mouth to obtain a good seal with the lips
5. Breathe-in as hard as possible, for as long as possible
6. Hold the breath for as long as possible, or up to 10 seconds.

Due to the innovative designs of multidose DPIs each varies slightly in the way it is activated. For example, the Turbohaler® (AstraZeneca) requires the base to be twisted one way and then the other until it 'clicks'; whereas the Accuhaler® (GSK) has a lever that needs to be pulled-back (if a second dose is required, the inhaler needs to be closed and then re-opened again). Alternatively, some inhalers (e.g. Eklira® Genuair® [Almirall];

Easyhaler® [Orion Pharma]) are activated by a button. More than any other, this group of inhalers requires clinicians to consult the individual manufacturer instruction sheets.

Some DPIs incoporate a lactose carrier that patients can taste, whereas others (i.e. the Turbohaler) have no, or little taste, which may be alarming if patients are used to tasting or feeling the sensation of an aerosol spray or powder in their mouth. While sensing the drug inside the mouth may be reassuring for patients, it is actually more important that it is deposited in the lungs than in the mouth or oropharynx.

INHALER SELECTION

It may be useful to involve the patient in the selection of the device, and helping them make an informed decision is key to ensuring that the correct inhaler is chosen.

INSPIRATORY FLOW RATE

Inspiratory flow rate can be tested by one of the following clinical aids:

- Inspiratory flow whistles: these emit a 'squeak' or whistle when the patient breathes in at an inspiratory flow rate of 30 litres/minute or above. They are supplied free of charge by the manufacturers of some DPIs and can be ordered via company websites or phone and posted direct to the clinician. Inspiratory flow whistles are single-patient use and therefore present a low cross-infection risk
- In-Check DIAL® (Clement Clarke): this device measures the inspiratory flow rate through different inhalers and there are different versions that can check flow rates for aerosols and DPIs. Using this device with a one-way disposable inspiratory mouthpiece will reduce risk of cross-infection (although this may not be acceptable for immunocompromised patients such as those with cystic fibrosis or bronchiectasis, or patients infected with high-risk pathogens such as pseudomonas)
- Trainhaler® and Flo-tone® (Clement Clarke): these devices emit an audible whistle when patients inhale at the correct inspiratory flow rate. They also have an MDI trainer attachment, which produces a 'wooshing' sound similar to that emitted by an MDI
- Vitalograph AIM® (aerosol inhalation monitor) (Vitalograph): this device checks the patient's inhaler technique with both MDIs and DPIs and can pinpoint any flaws, such as the patient's inspiratory flow rate being too high or low, incorrect firing of the inhaler, or the patient not holding in their breath for long enough, etc.

Other factors to consider when selecting an inhaler include:

- Manual dexterity: this requires careful consideration, for instance patients with arthritic fingers may have difficulty handling capsules or activating MDI canisters
- Dose counter: most DPIs have a display indicating how many doses are left and the modern generation of MDIs have an identical feature, which can help to reduce the risk of the patient running out
- Drug: certain medicines are only available for use with particular inhalers.

CONCLUSION

Choosing the correct inhaler has been the subject of much debate over the years and one large systematic review identified many studies featuring different inhaler designs (Brocklebank et al, 2001), with the researchers concluding that overall MDIs were more cost effective than DPIs. However, this review was published back in 2001 and with the cost of modern DPIs coming down, this may no longer be the case. Finally, it would appear that the old adage holds true — the best device is the one that the patient will use. RCT

REFERENCES

Al-Showair RAM (2007) The potential of a 2Tone Trainer to help patients use their metered-dose inhalers. *CHEST J* 131(6): 1776–82

Booth A (2015) Drugs and devices table. Primary Care Training Centre. Available online: www.primarycaretraining.co.uk/resource/respiratory-disease (last accessed 31 July, 2015)

BMJ Group and the Royal Pharmaceutical Society (2015) *British National Formulary*. BMJ Group and the Royal Pharmaceutical Society, London

Brocklebank D, Ram F, Wright J, et al (2001) Comparison of the effectiveness of inhaler devices in asthma and chronic obstructive airways disease: a systematic review of the literature. *Health Technol Assess* 5(26): 1–149

Capstick TGD, Clifton IJ (2012) Inhaler technique and training in people with chronic obstructive pulmonary disease and asthma. *Expert Rev Respir Med* 6(1): 91–103

Global Initiative for Asthma (2014) *Global Strategy for Asthma Management and Prevention*. Available online: www.ginasthma.org/documents/4 (last accessed 31 July, 2015)

Melani AS, Bonavia M, Cilenti V, et al (2011) Inhaler mishandling remains common in real life and is associated with reduced disease control. *Respir Med* 105(6): 930–8

National Institute for Health and Care Excellence (2010) *Chronic Obstructive Pulmonary Disease: management of chronic obstructive pulmonary disease in adults in primary and secondary care*. NICE, London. Available online: www.nice.org.uk/guidance/cg101 (last accessed 31 July, 2015)

National Institute for Health and Care Excellence (2013) *Asthma: NICE quality standard* [QS25]. NICE, London. Available online: www.nice.org.uk/guidance/qs25/chapter/quality-statement-4-inhaler-technique (last accessed 31 July, 2015)

Scottish Intercollegiate Guidelines Network (2014) *British Guideline on the Management of Asthma*. Available online: www.sign.ac.uk/guidelines/fulltext/141/index.html (last accessed 31 July, 2015)