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Integrated respiratory care

Irem Patel

Abstract
Integrated respiratory care is patient-centred, proactive and coordinated care delivered through clinical leadership and a multidisciplinary ‘team without walls’. It involves rethinking traditional boundaries and roles, and requires respiratory specialists to develop new skills in the management of both acute and long-term conditions through collaborative care. The aim of integrated respiratory care is to enhance the care and experience of the individual patient with a lung condition and to improve long-term outcomes for populations with respiratory disease. Integrated care is a central tenet of how systems will implement the respiratory elements of the NHS Long Term Plan. The COVID-19 pandemic has accelerated the development of integrated care approaches to the multidisciplinary management of acute and chronic respiratory disease.

Keywords chronic disease model; integrated care; long-term conditions; respiratory outcomes

Introduction
Atul Gawande, author of ‘The checklist manifesto: how to get things right’, states that: ‘medicine’s complexity has exceeded our individual capabilities as doctors ... we are all specialists now, even primary care doctors ... the public’s experience is that we have amazing clinicians and technologies ... but little consistent sense that they come together to provide an actual system of care, from start to finish, for people’.1 Providing a system of care which delivers value-based outcomes that matter to patients as people2 is an increasing challenge for health and social care organisations. Integrated care is a response to this challenge.

Recent decades have seen a steady rise in acute hospital admissions, coupled with issues of increasing longevity, multimorbidity and frailty. When asked, patients and their carers say that they want coordinated care, a known point of contact, to be involved in decisions relating to them, to have planned transitions of care and to be supported at home.3 Patients therefore increasingly need a model of care that is responsive in the acute setting but also encompasses supported self-management, enhanced communication, partnerships of care, accessible specialist care, convenient follow-up, and palliative care.

The evidence is that primary, secondary, social care or community services working alone cannot address these demands. Concern around poor cohesion and silo-working among the multiple agencies involved in health and social care has led to a number of initiatives to strengthen community resources and move ‘from hospitals to health systems’.4 This requires a rethinking of traditional boundaries and roles, with professionals of different backgrounds and skills, frequently employed by different organisations, working together in a coordinated way.

Integrated care involves a move from reactive, disease-specific care to a more proactive patient-centred and population-focused approach. The aim is to organise care around the patient, such that people receive the right care from the most appropriate professional, at the optimal time and in the best environment. Timely access to specialist care is a central tenet of this approach, but integrated care encompasses a broader definition of specialist care and provides opportunities for innovative approaches that focus on the wider health needs of a local population.

The NHS Long Term Plan, published in 2019, sets out priorities for the health system around cardiovascular disease, stroke, diabetes and respiratory disease, with an implementation framework underpinned by integrated, more personalised care, digital enablement and a population health approach.5 All of these have particular relevance to multidisciplinary teams and their skill base which will be increasingly important as Integrated Care Systems mature into the key health care delivery units within the NHS. The impact of the COVID-19 pandemic has added a further dimension to this: a requirement to refocus on prevention, equity of access, culturally competent responses to local need and health inequalities, all of which require a partnership approach across systems.

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**Key points**

- The organisation of current healthcare needs to evolve to meet the changing needs of patients and carers, and for the sustainability of the system
- Integrated care involves coordinated patient-centred care which redefines traditional boundaries and roles
- The prevalence of respiratory conditions, evidence of significant unmet need and unwarranted variation have led to the development of a number of models of integrated respiratory care
- There are a number of new roles for respiratory specialists working in an integrated system, which include taking responsibility for the respiratory health of a population. Clinical effectiveness in these new roles requires specialists to develop new skills and relationships
- The COVID-19 pandemic has accelerated this process due to a renewed focus on early detection, enhanced access, remote monitoring and supported discharge, as well as the impact of health inequalities on health outcomes

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Integrated care for respiratory conditions

Despite the fact that many lung conditions are preventable, respiratory disease accounts for a significant and growing part of the global chronic disease health burden. Globally, there were 9.5 million deaths due to respiratory disease in 2008. Respiratory disease is the third leading cause of death in the UK, accounting for 80,000 deaths/year including 23,000 deaths caused by chronic obstructive pulmonary disease (COPD) alone, but not including lung cancer, which kills an additional 35,000 people each year. Respiratory disease is multifaceted and affects 1 in 5 people in the UK; there are over 30 different lung conditions, many of which are long-term, and these account for significant disability-adjusted life-years. Hospital admissions for respiratory disease have risen in recent years at three times the rate of all acute admissions and lung disease is a major factor in winter pressures faced by the NHS; most respiratory admissions are non-elective and during the winter period they double in number.

Substantial and rising amounts of healthcare expenditure and resources are directed at managing these conditions, yet access to care, patient outcomes and patient experience are highly variable. Breathlessness is a commonly shared symptom that overlaps with many other conditions including cardiovascular and systemic disease, so the diagnosis of respiratory disease can be difficult or delayed. Up to 6 million people suffer from COPD or asthma in the UK, but misdiagnosis, late diagnosis and inappropriate long-term management of airways disease continue to pose challenges. Lung cancer survival rates in the UK trail those in Europe and the rest of the developed world. Up to 1.5 million people may have sleep apnoea in the UK, although far fewer are currently diagnosed. Pneumonia, COPD and asthma are among the most frequent causes of acute admission to hospital, but not all patients see a respiratory specialist and many are discharged only to be readmitted. Respiratory inhalers are among the most costly drugs to the health economy in the UK, with exponential rises in their prescription in recent years; however, there are significant gaps in their evidence-based use and increasing concern about potential overuse, harm and waste.

For these reasons, improving respiratory health and care was highlighted as a priority in the NHS Long Term Plan in 2019, and integrated care is key to its implementation. Respiratory priorities in the Plan include improved timely accurate diagnosis of respiratory disease with quality assured spirometry; improved access to pulmonary rehabilitation; medicines optimisation in particular for inhaled therapies; improved care pathways for patients with community acquired pneumonia including access to nurse led supported discharge; and that patients with breathlessness due to either cardiac or respiratory disease have improved access to education and rehabilitation. Delivering these initiatives consistently at population level will require multidisciplinary teams, including respiratory nurses, physiotherapists, pharmacists and physiologists, to collaborate across the system, working with for example, social prescribers, lay educators, mental health and social care. Therefore integrated respiratory care has risen to prominence as a means of both enhancing the care of the individual patient with a lung condition and improving outcomes for the population with respiratory disease.

Much of the rationale for and evidence behind integrated respiratory care currently focuses on patients with COPD. Implementation of a chronic care model for patients with COPD has been shown to improve patient outcomes and reduce hospital admissions by up to 30%. Components of this model include:

- patient education and supported self-management including pulmonary rehabilitation
- decision support systems including guidelines and staff education
- bundles of care, for example the COPD discharge bundle
- clinical information, for example disease registers, and information-sharing
- advanced access for patients to knowledgeable healthcare providers including on admission avoidance and hospital-at-home schemes

However this approach is not limited to the care of patients with COPD. Integrated respiratory care aims to bring these evidence-based components of care together in a patient-centred structured model and can be considered for a number of lung conditions including asthma, bronchiectasis, interstitial lung disease, community acquired pneumonia, lung cancer, respiratory failure and sleep-disordered breathing. The British Thoracic Society defines integrated respiratory care as ‘the best possible care for the patient, delivered by the most suitable health professional, at the optimal time, in the most suitable setting’. It also states that ‘secondary care specialists should be more aware of our responsibility for the welfare of populations, not just the patient before us … most management of disease is in the community and it is no longer acceptable to squirrel away knowledge in hospitals’.

An important aspect of this model therefore includes respiratory specialists (consultants, physiotherapists, specialist nurses, lung function technicians, pharmacists) working together across hospital and community, and linking with generic teams. To enable this, multidisciplinary members of an integrated team must develop new knowledge and skills around the management of long-term conditions and collaborative care-planning. They need to understand the wider determinants of health, and how to navigate their local health and social care system, taking an increasingly biopsychosocial approach to patient care.

Roles for respiratory specialists working in this way include:

- working with medical admission units and hospital-at-home teams to oversee admission avoidance and supported discharge schemes
- working with primary care teams to support accurate diagnosis, quality-assured spirometry and evidence-based long-term management of respiratory disease
- supporting evidence-based treatment of tobacco dependence for sick smokers
- supporting and coordinating responsible respiratory prescribing across a locality
- overseeing and delivering home oxygen assessment and review services
- delivering comprehensive pulmonary rehabilitation
- overseeing domiciliary ventilatory support and sleep services in the community
- supporting assessment and management of patients with complex breathlessness in the community, working with colleagues in cardiology, psychology and other disciplines
- working with others to support patients with respiratory disease at the end of life
• acting as a learning resource to support respiratory knowledge and skills among colleagues in the community (primary care, district nursing, community pharmacy)

Another element which has been increasingly adopted is a virtual clinic model, which can take many different forms but essentially involves the coming together of specialists and generalists to systematically review clinical care, usually for pre-defined cohorts of patients, working towards agreed quality improvement aims. This approach has been shown to drive improvements in clinical care and healthcare costs at a population level and may have increased currency in a post-COVID healthcare landscape. Primary care clinicians and teams are also of course key to integrated respiratory care, and specific roles can operate either within an individual practice or across a locality. These can include respiratory leadership and championing respiratory health, overseeing referral pathways through triage and peer-to-peer support, supporting respiratory competencies and facilitating different providers to work innovatively together through commissioning.

Impact of COVID-19 on integrated respiratory care

The incidence of and mortality rates from lung disease are higher in disadvantaged groups and socially deprived areas. The most deprived communities have higher rates of tobacco dependence, are exposed to higher levels of air pollution, have poorer housing and are more likely to be subject to occupational hazards. The impact of multi-morbidity in people with respiratory disease often exacerbates these issues. The global COVID-19 pandemic has dealt a shock to health systems and society around the world. It has also shone a light on the lack of preparedness for novel respiratory pathogens and exacerbated many pre-existing health inequalities.

As part of the acute response to COVID-19, generalist and specialist respiratory multidisciplinary teams in the UK have come together to deliver new pathways of both face to face and virtual care. Initiatives to support early detection of COVID-19 related silent hypoxia, using remote pulse oximetry and clinical monitoring, whether by telephone, video consultation or digital apps have required clinical teams to rapidly change models of care, clinical pathways and roles. Many of these pathways have involved joint working between respiratory multi-professional teams, primary care and acute care, and have either drawn on existing integration or accelerated it. Enhanced access to respiratory advice and support for generalist teams is part of this approach. COVID-19 virtual wards, usually delivered by secondary care teams for patients following acute admission, are pragmatic solutions rapidly stood up to safety net and support higher risk patients on discharge, resulting in many thousands of patients receiving ongoing virtual care from their hospital team after leaving hospital. Virtual ward models have varied, and have used different methods of remote monitoring including paper based systems, online platforms, wearable sensors and apps. Evaluation of these initiatives is ongoing, but they have been shown to be safe. By demonstrating the scale of patient and system benefit achievable through multidisciplinary integration around an acute respiratory episode, these are likely to inform future models of care for other conditions. The requirement to shield high risk respiratory patients during the pandemic, and the need to continue to treat and support them remotely, has been a huge challenge but has also accelerated innovation in patient centred care. The striking reduction in acute COPD and asthma exacerbations and admissions seen during the COVID-19 pandemic provides food for thought in how clinical teams will need to adapt the paradigm of care in the future; patient initiated follow up, home treatment and digitally enabled integrated care are likely to be some of the ways this will be developed and explored.

Summary

The combination of interventions that define the optimal model of integrated respiratory care are likely to depend on local disease prevalence, resources and need. These challenges are not unique to respiratory medicine and there are inevitable synergies with the organisation of care for other long-term conditions that cluster together and share common risk factors, for example cardiovascular disease. Joint working with colleagues within other specialities such as gerontology and diabetes mellitus as well as primary and community care is a key part of this approach. The COVID-19 pandemic has accelerated the focus on respiratory integrated care due to a renewed emphasis on early detection, enhanced access, remote monitoring, supported discharge and the successful implementation of new clinical and digitally enabled pathways. Future research needs to focus on exploring the key components of new models of care in different settings and the benefits that these can bring to patients, clinicians and the healthcare system.

REFERENCES

1 Gawande A, http://www.newyorker.com/online/blogs/newsdesk/2011/05/atul-gawande-harvard-medical-school-commencementaddress.html#ixzz2QFENvFV (accessed 7 April 2016).
2 Porter ME. What is value in healthcare? N Engl J Med 2010; 363: 2477–81.
3 National Voices. What patients want from integration. 2012. http://www.nationalvoices.org.uk/sites/www.nationalvoices.org.uk/files/what_patients_want_from_integration_national_voices_paper.pdf.
4 The Kings’ Fund. Acute hospitals and integrated care. From hospitals to health systems. 2015, http://www.kingsfund.org.uk/publications/acute-hospitals-and-integrated-care (accessed 7 April 2016).
5 NHS long term plan implementation framework June 2019, https://www.longtermplan.nhs.uk/wp-content/uploads/2019/06/long-term-plan-implementation-framework-v1.pdf.
6 British Thoracic Society. Position statement. The role of the respiratory specialist in the provision of integrated care and long term conditions management, https://www.brit-thoracic.org.uk/document-library/delivery-of-respiratory-care/integrated-care/btsintegrated-care-position-statement-october-2014/ (accessed 7 April 2016).
7 Patel Irem, Grainne D’Ancona, Baxter Noel, et al. The future hospital: integrated working and respiratory virtual clinics as a means of delivering high-value care for a population. Future Hosp J 2016; 3: s28.
8 Greenhalgh Trisha, Knight Matthew, Inda-Kim Matt, Fulop Naomi J, Leach Jonathan, Vendrola-Padros Cecilia. Remote management of covid-19 using home pulse oximetry and virtual ward support. BMJ 2021; 372: n677. https://doi.org/10.1136/bmj.n677.