



Innovative Solutions for Respiratory Health: Nursing, Medicine, Pharmacy and Laboratory Collaborations

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ABSTRACT

Introduction: Integrated respiratory care refers to a patient-focused approach that involves proactive and coordinated treatment. It is given via clinical leadership and a multidisciplinary team that works together seamlessly. This process entails reconsidering established limitations and responsibilities, and necessitates respiratory experts to acquire novel proficiencies in the supervision of both immediate and prolonged ailments via cooperative healthcare. The objective of integrated respiratory care is to optimize the treatment and satisfaction of each individual patient with a pulmonary ailment, while also enhancing long-term results for broader groups affected by respiratory disease.

Aim of work: To describe the collaboration of nursing, medicine, pharmacy and laboratory in providing innovative solutions for respiratory health.

Methods: We conducted a comprehensive search in the MEDLINE database's electronic literature using the following search terms: collaboration, nursing, medicine, pharmacy, laboratory, innovative, solutions, respiratory and health. The search was restricted to publications from 2014 to 2024 in order to locate relevant content. I performed a search on Google Scholar to locate and examine academic papers that pertain to my subject matter. The selection of articles was impacted by certain criteria for inclusion.

Results: The publications analyzed in this study encompassed from 2020 to 2024. The study was structured into various sections with specific headings in the discussion section.

Conclusion: The most successful integrated respiratory care strategy will depend on local sickness incidence, resources, and demand. Respiratory medicine faces these difficulties, as do other chronic conditions with common risk factors, such as cardiovascular disease. This technique requires collaboration with nurses, pharmacy and laboratory specialists. Due to early detection, greater accessibility, remote monitoring, simplified discharge, and the successful implementation of innovative clinical and technologically enabled approaches, the COVID-19 pandemic has accelerated pulmonary integrated care. Future study should focus on innovative care models' fundamentals and their benefits to patients, clinicians, and the healthcare system.

Keywords: *collaboration, nursing, medicine, pharmacy, laboratory, innovative, solutions, respiratory and health.*

INTRODUCTION

According to Atul Gawande, the author of 'The Checklist Manifesto: How to Get Things Right', the field of medicine has become more complicated than what individual practitioners can handle. Nowadays, even basic care physicians possess specialized knowledge and skills. According to Patel (2020), the general perception is that we have exceptional physicians and technology, but there is a lack of continuous integration to create a comprehensive system of care for individuals. Health and social care organizations are facing a growing challenge in delivering a system of care that produces results based on value and that are important to patients as individuals. Integrated care is a solution to this dilemma (Sandhu et al., 2021).

In recent years, there has been a consistent increase in the number of emergency hospital admissions, along with challenges related to longer life expectancy, multiple chronic conditions, and decreased physical strength. When queried, patients and their caregivers express a desire for integrated healthcare, a designated liaison, involvement in choices pertaining to their well-being, organized shifts in care, and assistance in their own residences. Patients now need a care model that is adaptable in urgent situations and includes self-management assistance, improved communication, collaborative care partnerships, easily accessible specialized treatment, easy follow-up, and palliative care (Boucher et al., 2023).

It is evident that primary, secondary, social care, or community services operating independently are unable to meet these needs. The lack of cohesiveness and isolated functioning among the many organizations engaged in health and social care has raised concerns. As a result, several projects have been implemented to enhance community resources and transition from a focus on hospitals to a more comprehensive health system. This necessitates a reconsideration of conventional limitations and responsibilities, whereby experts from diverse disciplines and aptitudes, sometimes affiliated with distinct organizations, collaborate in a synchronized manner (Hughes et al., 2020).

Integrated care is a shift from a responsive, illness-specific approach to a more proactive one that prioritizes the patient and focuses on the whole population. The objective is to structure

healthcare services based on the needs of the patient, ensuring that individuals get adequate treatment from the most suitable healthcare provider, at the most advantageous moment, and in the ideal setting. Ensuring prompt access to specialized healthcare is a fundamental principle of this strategy. However, integrated care goes beyond only specialized treatment and includes several creative strategies that address the overall health requirements of a specific local community (Adams and Miranda, 2024).

Collaborative care between pharmacists, physicians, nurses and laboratory technicians has been recognized to improve pharmacotherapeutic outcomes and provide increased value and efficiency to the health care system (Dilles et al., 2020). In this paper, we describe the collaboration of nursing, medicine, pharmacy and laboratory in providing innovative solutions for respiratory health.

AIM OF WORK

To describe the collaboration of nursing, medicine, pharmacy and laboratory in providing innovative solutions for respiratory health.

METHODS

A comprehensive search was conducted on recognized scientific platforms, including Google Scholar and Pubmed, using specific keywords such as collaboration, nursing, medicine, pharmacy, laboratory, innovative, solutions, respiratory and health.

The aim was to gather all relevant research papers. The articles were chosen according to certain criteria. Upon conducting a comprehensive analysis of the abstracts and notable titles of each publication, we eliminated case reports, duplicate articles, and publications without full information. The reviews included in this research were published from 2020 to 2024.

RESULTS

The current investigation concentrated on the collaboration of nursing, medicine, pharmacy and laboratory in providing innovative solutions for respiratory health between 2020 and 2024. As a result, the review was published under many headlines in the discussion area, including Integrated Respiratory care, Roles for respiratory specialists, Role of Technology in Respiratory Medicine

DISCUSSION

1. Integrated Respiratory care

Although several lung disorders may be avoided, respiratory illness constitutes a substantial and rising portion of the worldwide burden of chronic diseases. In 2018, there were a total of 9.5 million fatalities worldwide attributed to respiratory illness, as reported by Boers et al. (2023). Respiratory illness ranks as the third most common cause of mortality in the UK, resulting in 80,000 fatalities annually. Among these, chronic obstructive pulmonary disease (COPD) alone accounts for 23,000 deaths. It is important to note that the aforementioned figures do not include deaths caused by lung cancer, which claims an additional 35,000 lives each year. Respiratory illness is complex and impacts 20% of the population in the UK. There are more than 30 distinct

lung disorders, many of which are chronic, and they contribute to a considerable number of years lived with disability. Admissions to hospitals for respiratory disease have increased in recent years at a rate three times higher than all other acute admissions. Lung disease is a significant contributor to the challenges faced by the NHS during the winter season. The majority of respiratory admissions are unplanned, and their numbers double during the winter period (Shi et al., 2024).

A significant and increasing portion of healthcare spending and resources are allocated towards addressing these disorders. However, there is considerable variation in access to treatment, patient results, and patient experience. Dyspnea is a frequently seen symptom that may be present in several disorders, such as cardiovascular and systemic diseases. Consequently, the identification of respiratory diseases might be challenging or postponed. The prevalence of COPD or asthma in the UK is estimated to be up to 6 million individuals. However, issues persist in terms of misdiagnosis, delayed diagnosis, and inadequate long-term care of airways disease (Wulandari et al., 2023).

The UK has lower lung cancer survival rates compared to Europe and other wealthy countries. An estimated 1.5 million individuals in the UK may be affected with sleep apnoea, however only a small fraction of them have received an official diagnosis. Pneumonia, chronic obstructive pulmonary disease (COPD), and asthma are common reasons for hospital admission. However, not all patients get care from a respiratory specialist, and many are released only to be hospitalized again. In the UK, respiratory inhalers are one of the most expensive drugs in terms of their impact on the health economy. Their prescription rates have been increasing rapidly in recent years. However, there are notable deficiencies in the evidence supporting their use, and there is growing concern about the potential for excessive use, harm, and wastage (Attar-Zadeh et al., 2021).

The NHS Long Term Plan in 2019 emphasized the need of enhancing respiratory health and care, making it a priority. The execution of this plan relies on integrated care, as stated by England and Improvement (2020). The main respiratory priorities outlined in the Plan are enhancing the prompt and accurate diagnosis of respiratory diseases through reliable spirometry testing, increasing availability of pulmonary rehabilitation programs, optimizing medication usage, especially for inhaled therapies, developing better care pathways for patients with community-acquired pneumonia, including access to nurse-led supported discharge, and ensuring that patients experiencing breathlessness due to either cardiac or respiratory conditions have improved access to education and rehabilitation services (England and Improvement, 2020).

To consistently implement these initiatives on a population level, it will be necessary to form multidisciplinary teams consisting of respiratory nurses, physiotherapists, pharmacists, and physiologists. These teams will need to collaborate with other professionals such as social prescribers, lay educators, and those in the fields of mental health and social care. Integrated respiratory care has gained attention as a method to improve the treatment of individual patients

with lung conditions and enhance outcomes for the population with respiratory illness (Pierucci et al., 2021).

The primary justification and supporting data for integrated respiratory care mostly center on individuals diagnosed with COPD. The implementation of a chronic care approach for patients with COPD has shown a significant improvement in patient outcomes and a reduction in hospital admissions by as much as 30% (Cosío et al., 2021).

The constituents of this model comprise:

- Providing patients with information and guidance to help them manage their condition, such as via pulmonary rehabilitation programs
- Decision support systems, such as rules and staff training, are used to assist in making informed decisions.
- Medical protocols, such as the COPD discharge bundle, which consist of a set of coordinated interventions and treatments for the management of patients with chronic obstructive pulmonary disease.
- Clinical information, such as illness registries and the sharing of information
- Enhanced patient access to proficient healthcare practitioners, including initiatives aimed at averting hospital admissions and delivering treatment in the comfort of patients' homes.

Nevertheless, this technique may be used to the management of individuals with many medical conditions, not only restricted to COPD. Integrated respiratory care seeks to consolidate these evidence-based elements of treatment within a patient-focused organized framework. This approach can be applied to various lung conditions such as asthma, bronchiectasis, interstitial lung disease, community acquired pneumonia, lung cancer, respiratory failure, and sleep-disordered breathing. Integrated respiratory care, as defined by the British Thoracic Society, refers to the provision of the highest quality treatment for patients by the most appropriate healthcare practitioner, at the most opportune moment, and in the most acceptable environment. Furthermore, it emphasizes that secondary care experts should possess a heightened awareness of our duty towards the well-being of whole communities, rather than only focusing on the individual patient in front of us... The majority of illness management occurs inside the community, and it is no longer considered appropriate to hoard information exclusively within hospitals (Banks et al., 2020).

A crucial component of this strategy is the collaboration of respiratory experts (consultants, physiotherapists, specialized nurses, laboratory technicians, pharmacists) in both hospital and community settings, as well as their integration with general teams. In order to do this, it is necessary for members of a diverse team to acquire new knowledge and abilities in the field of long-term condition management and collaborative care-planning. In order to provide effective patient care, it is important for individuals to have a comprehensive understanding of the many factors that influence health, as well as the ability to navigate the local health and social care system. This involves adopting a biopsychosocial approach, which considers the biological, psychological, and social aspects of a patient's well-being (Tramonti et al., 2021).

2. Roles for respiratory specialists

Historically, it has been difficult to establish a clear causal link between the actions of respiratory specialists (RS) and specific results. Recent research indicates that RSs may provide favorable and secure results in several domains of respiratory therapy. The RS is expected to be very efficient when positioned at the core of the interdisciplinary team. Collaborative patient care may lead to improvements in quality of life and functionality. This supports government policies for people suffering from chronic, recurring disorders that are common in many respiratory conditions. The RS's duties have been expanded, resulting in more autonomy and responsibility. RSs must ensure that they possess the necessary depth and breadth of knowledge required to fulfill their specific responsibilities (Vitacca et al., 2020).

- Collaborating with medical admission units and hospital-at-home teams to supervise programs aimed at preventing hospital admissions and facilitating patient release.
- Collaborating with primary care teams to provide precise diagnosis, quality-controlled spirometry, and evidence-based, ongoing treatment of respiratory conditions.
- Advocating for the use of treatment methods for tobacco addiction that are supported by scientific evidence, particularly for those who are ill and smoke.
- Supporting and organizing the proper prescription of respiratory medications within a specific area.
- Supervising and providing home oxygen evaluation and review services
- Providing extensive pulmonary rehabilitation services.
- Supervising the provision of ventilatory support and sleep services in people's homes within the community.
- Supporting the evaluation and treatment of people experiencing complicated difficulty in breathing within the community, collaborating with professionals in cardiology, psychiatry, and other fields.
- Collaborating with colleagues to provide assistance to people suffering from respiratory illness throughout their latter stages of life.
- Serving as an educational tool to enhance respiratory knowledge and abilities among colleagues in the community, including those in primary care, district nursing, and community pharmacy.

Another emerging trend in healthcare is the implementation of a virtual clinic model. This model involves the collaboration of specialists and generalists to thoroughly evaluate clinical care for specific groups of patients, with the goal of achieving agreed-upon quality improvement objectives. This strategy has shown its ability to enhance the quality of clinical treatment and reduce healthcare expenses on a large scale. Furthermore, it may have gained more relevance in the healthcare industry after the COVID-19 pandemic. Primary care physicians and teams play a crucial role in integrated respiratory care, and they may fulfill specific responsibilities either within a single practice or throughout a particular area. These responsibilities may include leading and advocating for respiratory health, managing the process of referring patients via

triage and peer-to-peer assistance, promoting respiratory skills and fostering collaboration among various healthcare providers through commissioning (Mathews et al., 2021).

3. Role of Technology in Respiratory Medicine

- **Wearables**

Advancements in sensors, small computers, body area networks, and wireless data transmission technologies have made wearable biomedical sensors a reality. These technologies possess the potential to measure physical, physiological, and biochemical traits without hindering or limiting ordinary activities or movement. Pulse oximeters, often used in the assessment and management of acute dyspnea, oversee the assimilation of light. Pulse oximetry is crucial in the self-care of individuals with asthma and COPD. Furthermore, researchers have investigated the use of home telemonitoring systems in patients suffering from interstitial lung illnesses (Kazanskiy et al., 2022).

Pulmonary ventilation is a useful method for identifying abnormal breathing patterns, especially in those who are susceptible to sudden deterioration in their medical condition. Wearable devices are becoming acknowledged as a reliable and cost-effective healthcare tool for tracking physical activity, which is closely linked to health outcomes. Various indications may be used to evaluate exercise tolerance, and fitness trackers have the capacity to provide personalized rehabilitation or training programs (Bayoumy et al., 2021).

Various wearable devices are now being created to track the quality of indoor and outdoor air, as well as other environmental information, with the purpose of avoiding substances that cause irritation, allergies, and pollution. Nevertheless, the integration of wearables into routine clinical practice faces other obstacles, including issues of dependability, compatibility, and the need to prevent healthcare workers from being inundated with excessive data (Bousquet et al., 2021).

- **Smart Inhalers**

Administering inhaled medical treatments is essential for effectively treating individuals with chronic pulmonary conditions. Monitoring adherence to inhaler treatment using electronic devices has been possible since the 1980s. However, it is only in the last decade that the technology has become portable, dependable, and inexpensive. The progress in wireless technology and mobile computers has enabled the rapid transmission of information from the inhaler to personal devices, offering patients immediate feedback in real-time. Inadequate compliance and suboptimal breathing technique are major contributors to illness management failure, resulting in adverse clinical consequences, compromised quality of life, and escalated healthcare expenses (Melani, 2021).

Smart inhalers, also known as electronic monitoring devices, have a vital function in objectively monitoring how well patients follow their prescribed inhaler regimen and giving them immediate feedback. These devices use sensors that are either connected to or built into the inhaler. They establish a connection with a mobile application using Bluetooth technology. They provide monitoring tools, individualized notifications, and reminders to patients, aiding in the

identification and correction of patient behaviors and guiding professional decision-making processes. Research has shown enhanced compliance and reduced rates of worsening symptoms in individuals with chronic obstructive pulmonary disease (COPD) and asthma (Perumal et al., 2020).

Smart inhaler technology has made significant progress in providing feedback on inhalation procedures, reducing the chances of serious mistakes and guaranteeing precise adherence. Nevertheless, there are obstacles that must be overcome in order to successfully execute this, including the need to address extra expenses and the way patients perceive and comply with the treatment (Mosnaim et al., 2022).

- **Portable Electronic Spirometers**

Pulmonary function tests are essential for the diagnosis and monitoring of chronic respiratory disorders, particularly in individuals with asthma and COPD. Nevertheless, spirometry is rarely conducted with the frequency it should be owing to problems such as the unwieldiness of the devices, the intricacy of the interpretation software, the need for regular calibration and maintenance, and the associated expenses of supplies. The introduction of portable medical devices has enhanced the provision and standard of healthcare, as shown by several randomized controlled trials and systematic reviews that demonstrate their effectiveness in enhancing asthma control and quality of life (Kouri et al., 2021).

A comprehensive analysis of commercially available portable electronic spirometers specifically developed for asthma patients revealed that the majority of these devices were also appropriate for diagnosing and monitoring other respiratory conditions, such as COPD, cystic fibrosis, bronchitis, and emphysema. Many devices include testing for peak expiratory flow (PEF) and forced exhaled volume in the first second (FEV1), with some devices also allowing patients to measure forced vital capacity (FVC). Nevertheless, out of all the devices, only four had obtained clearance from the FDA, and the majority of them lacked information about data security (Garin et al., 2023).

- **Digital stethoscopes**

Introduced in 1818, digital stethoscopes enhance the precision of lung auscultation by magnifying and capturing lung sounds, converting them into digital information. Seah et al. (2023) conducted a meta-analysis of research and found that computer-based algorithms were able to accurately detect aberrant pulmonary sounds with a specificity of 85% and a sensitivity of 80%.

A multicenter clinical investigation is now gathering digital lung sounds and fundamental patient data from individuals with idiopathic pulmonary fibrosis (IPF) and control people who have similar symptoms. Additional study is required to develop a distinctive and uniform technique for the proper use of digital stethoscopes. However, additional examination with a broader group of patients is necessary to document and categorize a larger variety of abnormal sounds (Lang et al., 2024).

- **Artificial Intelligence (AI) Diagnosis**

Artificial intelligence and machine learning (ML) methods have garnered substantial attention in the field of medicine, namely in the domain of respiratory medicine. AI and ML have been used to analyze thoracic imaging, lung pathology slides, and physiological data. Machine learning has been used to develop algorithms for fibrotic lung disorders by using high-resolution computed tomography (HRCT) to differentiate between typical idiopathic pneumonia (UIP) and non-UIP patterns. A comprehensive home-monitoring system called myAirCoach was evaluated to determine its clinical efficacy and patient acceptability in individuals with asthma who use inhalation medicine. The myAirCoach system yielded substantial improvements in asthma management and quality of life, accompanied by a decrease in severe asthma exacerbations. Nevertheless, artificial intelligence (AI) introduces new obstacles, including apprehensions over privacy, data security, liability, and patient autonomy (Boers et al., 2020).

CONCLUSION

The choice of therapies that construct the most efficient model of integrated respiratory care is anticipated to be impacted by the local prevalence of the condition, accessible resources, and the amount of demand. These problems are not limited to respiratory medicine and there are inevitable interactions with the arrangement of therapy for other long-term conditions that cluster together and have common risk factors, such as cardiovascular disease. Engaging in cooperation with professionals from many fields, along with primary and community care, is a crucial component of this approach. The COVID-19 pandemic has accelerated the focus on respiratory integrated care due to an increased emphasis on early detection, enhanced availability, remote monitoring, streamlined discharge, and the successful implementation of innovative clinical and technologically advanced approaches. Future research should give priority to studying the basic components of innovative care models in different situations and the benefits they may provide to patients, doctors, and the healthcare system.

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