Lung Cancer and COPD: Opportunities to Leverage Lung Cancer Screening Programs to Improve COPD Diagnostics

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Abstract

Lung cancer and chronic obstructive pulmonary disease (COPD) have many shared risk factors and not surprisingly, the two diseases often coexist. This article highlights the burden of COPD among patients with lung cancer in Ontario and explores opportunities to enhance lung cancer screening programs. We propose pursuing integrated strategies that incorporate new advances in artificial intelligence to improve disease diagnostics and navigate the complexity of caring for people with coexisting lung diseases. Evidence supports that this is a vulnerable population with unmet needs and poor outcomes that deserves urgent attention and action to promote earlier diagnosis and alleviate suffering.

Introduction

People with chronic obstructive pulmonary disease (COPD) are over six times more likely to develop lung cancer compared with the general population (Butler et al. 2019). This heightened risk of lung cancer among people with COPD is largely attributable to the overlap in risk factors, most notably cigarette smoking. However, the association between COPD and lung cancer has also been shown to exist in a cohort of never-smokers, suggesting that COPD is an independent risk factor for developing lung cancer (Park et al. 2020).

ICES data have shown that COPD impacts people with lung cancer at all stages of their disease trajectory, which has important implications for healthcare providers and policy makers, regarding everything from diagnosis (Butler et al. 2023a) to symptom burden (Butler et al. 2023b) and disease management (Goffin et al. 2021) to providing care at the end of life (Butler et al. 2023c).

Burden of COPD Among People With Lung Cancer in Ontario

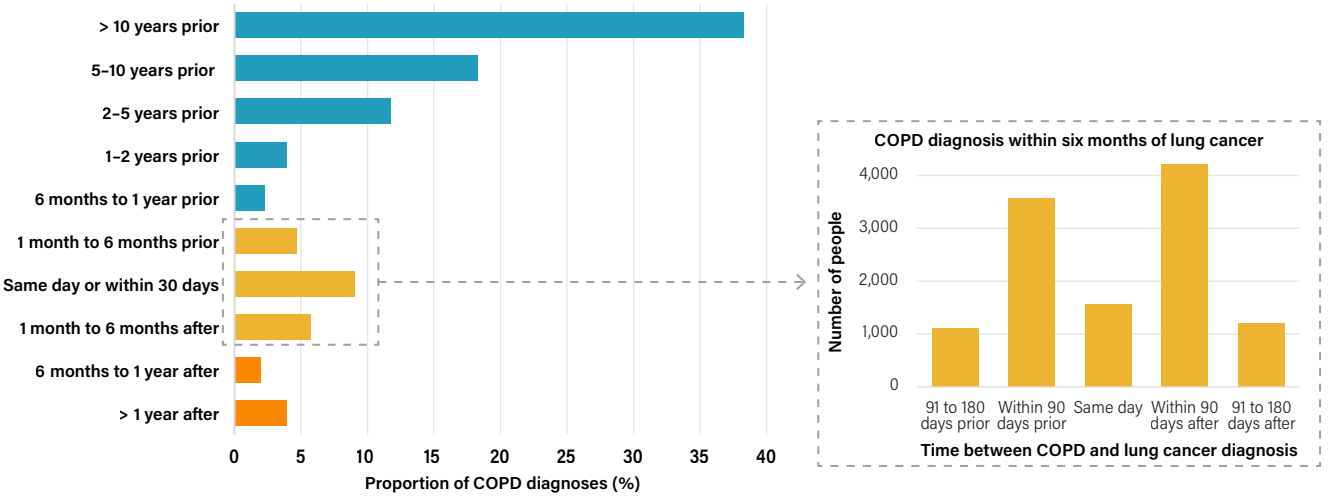
In a cross-sectional analysis of patients with lung cancer in Ontario who were diagnosed between 2008 and 2018, we found that the burden of COPD was high, with 59% of lung cancer patients also having a COPD diagnosis.

COPD diagnoses peaked around the time of lung cancer diagnoses, with more than one in 10 people being diagnosed with both diseases within a six-month window (Figure 1). This suggests that incidental findings of COPD are common, which is not entirely surprising given that COPD is widely underdiagnosed. Global estimates suggest that up to 81% of people with COPD have it as an undiagnosed disease (Lamprecht et al. 2015), and Canadian estimates suggest that around two-thirds of people with COPD have it as an undiagnosed disease (Gershon et al. 2018; Hill et al. 2010; Labonte et al. 2016). Since the diagnostic assessment for lung cancer often includes chest imaging, incidental findings of COPD are not surprising, particularly the emphysema subtype, which is often evident on X-rays or computed tomography (CT) scans.

The peak in co-diagnoses of COPD and lung cancer revealed via ICES data provides an opportunity for lung cancer screening programs that have recently been implemented in Ontario. Screening for COPD is not recommended among the general population (Agustí et al. 2023). However, lung cancer screening programs invite individuals who are considered "high-risk" – individuals aged 55–74 with a significant smoking history (Cancer Care Ontario 2024). The population that is eligible for lung cancer screening includes people who are also at risk of developing COPD in addition to individuals who may already have COPD (either diagnosed or undiagnosed). Given the aforementioned burden of undiagnosed COPD among people with lung cancer in Ontario, we would expect that the burden of undiagnosed COPD among people at risk for lung cancer would be even more substantial. As such, there is an opportunity to leverage existing lung cancer screening programs to improve COPD diagnostics by simultaneously screening for COPD.

Logistically speaking, simultaneous screening for lung cancer and COPD could be achieved in many different ways. For example, spirometry – which is required to appropriately diagnose COPD according to the Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines

FIGURE 1.
Timing of chronic obstructive pulmonary disease (COPD) diagnosis in relation to lung cancer diagnosis



(Agustí et al. 2023) – could be performed when referring individuals for lung cancer screening or assessing their eligibility for screening programs (Lam et al. 2020; Tisi et al. 2022). Alternatively, spirometry could be available at screening sites and fully integrated into lung cancer screening programs, albeit this approach would require a great deal of coordination and resources. Another approach would be to utilize and assess low-dose CT (LDCT) scans obtained via lung cancer screening for evidence of emphysema, although this approach could miss individuals with non-emphysematous COPD. In all these approaches, new advances in artificial intelligence (AI) and machine learning (ML) might be developed to provide a less resource-intensive route to enhance the efficiency of screening programs.

Application of AI to Enhance Lung Cancer Screening Programs

One of the promising applications of AI and ML in healthcare is disease diagnostics. Leveraging AI and ML to interpret LDCT images could revolutionize lung cancer screening by improving diagnostic rates and risk prediction, and even allowing for screening in geographic areas where radiologists are scarce (Adams et al. 2023). In a small Chinese lung cancer screening cohort, a deep learning–based algorithm even outperformed radiologists in the detection of lung cancer nodules (Cui et al. 2022). Similarly, when provided with limited clinical data and full spirometry results, an AI model has been shown to outperform respirologists in diagnosing COPD and other chronic respiratory diseases (Topalovic et al. 2019).

AI algorithms could potentially be used to diagnose COPD using the baseline LDCT scans obtained via lung cancer screening programs. A review of LDCT images by radiologists in the International Early Lung Cancer Action Program (I-ELCAP) revealed that emphysema was detected via LDCT in 24% of the participants, with 77% of these individuals having no prior diagnosis of COPD (Steiger et al. 2021). AI-based analysis of CT images has also been shown to correlate well with spirometry results (Wiedbrauck et al. 2024) suggesting that this is a promising avenue for exploration, which leverages existing LDCT scans to simultaneously screen for lung cancer and COPD.

Looking Forward: An Integrated Approach to Care

Dual screening programs for COPD and lung cancer would not only allow for earlier intervention for both diseases, but it would also provide opportunities for personalized risk prediction and customization of the subsequent screening schedule (Adams et al. 2023). An important consideration, however, is that any incidental findings of COPD would need to be communicated to both the individual and their healthcare providers to initiate appropriate guideline-based treatments. As such, future research on dual screening programs should utilize an implementation science–based lens and include outcomes related to follow-up care for incidental COPD diagnoses. In addition, AI technology is readily advancing and requires further validation testing before it can be implemented into clinical practice.

Consideration of COPD in the context of lung cancer does not end with screening. We have shown that lung cancer patients with COPD experience more severe symptom burden than lung cancer patients without COPD and that the majority of patients with early-stage disease do not receive palliative care despite reporting severe symptoms

(Butler et al. 2023b, 2023c). These findings speak to the need for an integrated approach to caring for lung cancer patients with COPD between oncologists, respirologists, primary care physicians and allied health professionals. Integration would also be a key component when pursuing dual screening programs given the level of coordination required for such an endeavour. Despite these challenges, dual screening programs have immense potential to improve the efficiency of COPD and lung cancer diagnostics. HQ

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