



Summary Report

NB-IRDT Chronic Obstructive Pulmonary Disease Research Program – Report Two: Investigation of the Canadian Chronic Disease Surveillance System (CCDSS) and the New Brunswick COPD Health Information Platform (NB-CHIP)

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Project Title

NB-IRDT Chronic Obstructive Pulmonary Disease Research Program – Report two: Investigation of the Canadian Chronic Disease Surveillance System (CCDSS) and the New Brunswick COPD Health Information Platform (NB-CHIP)

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Read the Full Report

Why is This Study Important?

Chronic obstructive pulmonary disease known as COPD - is a common chronic condition that limits airflow to the lungs and is often recognized by its symptoms, such as coughing and shortness of breath. While COPD is both preventable and treatable, it is nonetheless one of the leading causes of hospitalizations and deaths in New Brunswick, placing a large burden on the healthcare system. Yet, to understand the true impact of COPD, we first have to ask how many New Brunswickers have it. This is where things begin to get tricky.



Previous reports on the prevalence of COPD in New Brunswick come to very different conclusions about the number of cases in the province, with results ranging from 25,000 to 57,000 in 2016.^{2,3} This doesn't mean these reports were poorly done, but rather that different data sources use different criteria for identifying COPD, and these can produce different results.

Two common ways of identifying COPD cases in administrative data involve using the Canadian Chronic Disease Surveillance System (CCDSS), which reflects a physician diagnosis, and using pulmonary function testing (PFT) results. Because PFT is the recommended gold standard for diagnosing COPD, one might expect COPD diagnostic data to be accompanied by PFT data. Unfortunately, this isn't always the case. Sometimes COPD diagnoses lack a corresponding PFT, suggesting people are being diagnosed without support from the recommended test. Conversely, sometimes people whose PFT results are indicative of COPD go undiagnosed.

This report describes the prevalence of these discrepancies in New Brunswick, and it examines which segments of the population may be most affected. The results have implications for our understanding of COPD disease burden at the population level and also provide insight into clinical practices surrounding how we diagnose COPD in the province.

How Was This Study Completed?

To undertake this study, researchers at NB-IRDT used linked NB COPD Health Information Platform (NB-CHIP) PFT data, CCDSS COPD diagnosis data, demographic Citizen Data, and hospital Discharge Abstract Data to create a cohort of New Brunswickers with respiratory complaints. All individuals age 35 or older who had a physician visit or hospitalization associated with COPD (CCDSS), or who received a PFT (NB-CHIP), between 2007 and 2017 were included in the analysis, and CCDSS COPD case status was compared against both the presence and results of PFTs.

This report describes the alignment between COPD diagnoses in the CCDSS, PFT usage, and PFT results. It also examines the relationship between each of these factors in relation to individual and health system characteristics - specifically age, sex, geographic health zone, area-level income, body mass index, frailty risk, and severity of airflow limitation.



Limitations

While reading the results on the next pages, it is important to remember that there are certain limitations to this study. For instance, the timing of COPD diagnoses and PFTs could skew results if an individual who was diagnosed during the study period received their only PFT before 2007. In this case, results would erroneously suggest the individual was diagnosed without receiving a PFT.

Further, NB-CHIP only includes information on PFTs conducted in a designated clinic, not in physicians' offices or other settings. This could similarly create the appearance that an individual was diagnosed without receiving a PFT, even though they received one.

Understanding the Data: CCDSS and NB-CHIP

Canadian Chronic Disease Surveillance System (CCDSS)

The CCDSS COPD database contains surveillance data on COPD in New Brunswick.

An individual is flagged as a COPD case if the administrative records show a physician service billing or hospital discharge reflecting a COPD diagnosis.

New Brunswick COPD Health Information Platform (NB-CHIP)

The NB-CHIP database contains pulmonary function testing (PFT) lab data from New Brunswick.

NB-CHIP contains information on patients' PFT results, as well as full pulmonary function reports from the province's two Regional Health Authorities.

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Pulmonary function testing (PFT) is a type of medical exam that measures how well your lungs are working. This test involves blowing into a machine called a spirometer. The spirometer measures how much air you can breathe in and out, how fast you can blow air out of your lungs, and how easily you can move air in and out of your lungs.

According to clinical guidelines, spirometry, or PFT, is necessary to establish a COPD diagnosis. This makes PFT data a valuable tool for helping identify overdiagnosis and underdiagnosis of COPD.

Here's how our study defines over- and underdiagnosis of COPD:



Overdiagnosed patients are individuals who have been flagged as COPD cases by the CCDSS but have PFT data indicating normal airway functioning.



Underdiagnosed patients are individuals whose PFT results show airflow limitation that matches COPD diagnostic criteria but who are not flagged as COPD cases in the CCDSS.

Findings: COPD Diagnoses With/Without a PFT

Between 2007 and 2017, the CCDSS flagged **46,700** COPD cases in New Brunswick. Of these cases...

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23% were overdiagnoses 69% lacked a complete PFT

In other words, **23%** of COPD diagnoses had PFT results that did not match the criteria for a COPD diagnosis.



69% of diagnoses either did not have a PFT, or they had a PFT but did not have the recommended post-bronchodilator test, making the PFT 'incomplete.'*

This means **92%** of COPD diagnoses are either directly in contrast to PFT results or lack PFT data to support the diagnosis.

Only **4%** of CCDSS diagnoses had a positive PFT that met the clinical criteria for a COPD diagnosis.

ightarrow This doesn't equal 100%. What about the rest?

Unfortunately, ~5% of PFT records are missing airflow information and can't be used to support or challenge diagnoses.

Overdiagnoses vs. Underdiagnoses:

85% of CCDSS cases with a complete PFT were overdiagnosed
56% of respiratory complaints with a complete positive PFT (indicative of COPD) were underdiagnosed



*In some cases, diagnosis without a PFT may be intentional - for example, because a physician decided a PFT was not necessary for a particular patient or because they relied on other confirmatory clinical evidence. These scenarios are not observable in this analysis.

Snapshot: COPD Diagnoses (Demographics)

The following results are only a highlight of findings. A full breakdown of results, with accompanying statistics, is available in the <u>full report</u>.

COPD Diagnoses by Age

Individuals 85 years+ had the highest proportion of diagnoses with missing or incomplete PFTs, as well as the highest proportion of overdiagnoses and underdiagnoses.



These results may reflect the effort-dependent nature of PFTs. Some older patients may struggle or be unable to complete the test, which could render tests missing or incomplete. For these reasons, physicians also may choose not to use a PFT or may doubt the validity of test results.



Females had higher proportions of over- and underdiagnoses than males.



Overdiagnosis may be more prevalent among women due to gendered care-seeking tendencies, and the increased prevalence of underdiagnosis among women may reflect their longer life expectancy.



As area-level income decreased, COPD underdiagnoses and diagnoses with missing/incomplete PFTs grew more common.

These findings may reflect the impact of social determinants of health - namely, decreased access to care among individuals with lower income.

Snapshot: COPD Diagnoses (Demographics, cont.)

COPD Diagnoses by Body Mass Index (BMI)

Individuals classified as 'overweight' received the highest proportion of COPD overdiagnoses. As BMI increased, we also saw an increase in the prevalence of overdiagnosis.



One possible explanation for this observation may be the relationship between COPD and elevated BMI. They both share certain signs and symptoms, such as shortness of breath, which may contribute to misdiagnoses and/or to the likelihood that a physician may give a COPD diagnosis without a positive PFT.

COPD Diagnoses by Frailty

Interestingly, individuals with 'intermediate risk' of frailty had higher proportions of overdiagnoses, underdiagnoses, and diagnoses without a complete PFT than their 'high risk' counterparts.

It's possible this is because 'high risk' individuals are likely to interact with the health system more frequently, making them more likely to receive a PFT. Care providers may also be more likely to follow diagnostic guidelines when dealing with high-frailty patients.



COPD Diagnoses by Health Zone

The prevalence of overdiagnosis and underdiagnosis varied across New Brunswick's 7 geographic health zones.



These differences may reflect the role of health system organization and physician behaviour, and possibly differences in the availability of PFT resources between zones.

Conclusions

Previous NB-IRDT research on COPD¹ emphasizes the need to understand the population burden of COPD to ensure the New Brunswick healthcare system is able and prepared to meet the needs of New Brunswickers living with the disease. However, as the findings in this report show, estimating the true burden of COPD is difficult, as it is limited by the complex nature of COPD diagnoses.

By analyzing a combination of data sources available through NB-IRDT's secure platform, this report reveals that a large proportion of New Brunswickers diagnosed with COPD have not had a PFT. Among individuals who had a PFT, there were many instances of both overdiagnosis and underdiagnosis. Only 4% of COPD diagnoses in the CCDSS had accompanying positive PFT records in the NB-CHIP database. Correctly diagnosing COPD is crucial. Underdiagnosed patients may not receive the care they need, while overdiagnosed patients may be treated for COPD instead of the conditions causing their complaints.

These findings suggest that using a single data source to identify COPD cases in New Brunswick may not be the most reliable approach to take. Instead, researchers should consider using multiple sources of linked data to more reliably identify COPD cases in New Brunswick. The results of this study also provide insight into how COPD is diagnosed in New Brunswick, which may have implications for clinical practice and policy decisions in the province.

References

1. McDonald, T., Rogers, K., Daigle, B., & Ziv, A. (2020). <u>NB-IRDT Chronic</u> <u>Obstructive Pulmonary Disease research program - Report one: Investigation</u> <u>of Statistics Canada Public Use Microdata Files</u>. Fredericton, NB: New Brunswick Institute for Research, Data and Training.

2. Statistics Canada. (2022). <u>Table 13-10-0096-01: Health characteristics,</u> <u>annual estimates</u> [Data table].

3. New Brunswick Department of Health. (2016). <u>Profiles on health: chronic</u> <u>obstructive pulmonary disease (COPD) in New Brunswick</u>. Government of New Brunswick.