DATA MATTERS

The Rising Prevalence of Asthma: True Increase, Diagnostic Exchange or Diagnostic Accuracy?

Prévalence à la hausse de l'asthme : hausse réelle, substitution de diagnostic ou exactitude diagnostique?

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(see Acknowledgements)

Abstract

In the midst of frequent reports about "the asthma epidemic," results from a number of studies by the Manitoba Centre for Health Policy have shown stable or decreasing prevalence of an overall indicator of respiratory diseases which includes asthma. To resolve these apparently contrary findings, we conducted a time trend analysis using administrative data. Results revealed significant potential for diagnostic exchange: asthma prevalence increased, but that of bronchitis decreased.

Résumé

Dans le contexte des fréquents rapports indiquant une « épidémie d'asthme », les résultats de plusieurs études effectuées par le Centre des politiques de santé du Manitoba montrent une prévalence stable ou en déclin d'un indicateur global des maladies respiratoires, y compris l'asthme. Afin de résoudre la contradiction apparente de ces résultats, nous avons effectué une analyse évolutive des tendances au moyen de données administratives. Les résultats révèlent une forte possibilité de substitution de diagnostic : la prévalence de l'asthme a augmenté, mais celle de la bronchite a diminué.

In Manitoba, as in Canada and elsewhere, many studies have reported increasing rates of asthma prevalence over time, especially among children (Akinbami and Schoendorf 2002; Burney et al. 1990; Erzen et al. 1995; Garner and Kohen 2008; Kozyrskyj and Hildes-Ripstein 2002; Kozyrskyj et al. 2004; Lawson and Senthilselvan 2005; Lundback et al. 2001; Manfreda et al. 1993; Mannino et al. 2002; Millar and Hill 1998; Moorman et al. 2007; Senthilselvan et al. 2003; Senthilselvan 1998). This "asthma epidemic" has raised concern among clinicians, researchers, policy makers and the public, sparking new studies to understand the causes of this increase. There are also significant potential implications for population health and the management of health services.

Contrary to this increasing trend for asthma, the results in a series of "atlas-style" population health reports by the Manitoba Centre for Health Policy (MCHP) since the mid-1990s have shown stable, then slightly decreasing rates of a larger grouping of respiratory conditions, including asthma and other respiratory diseases (Martens et al. 2003; Fransoo et al. 2005, 2009). These two sets of findings – increasing rates of asthma amid stable or decreasing rates of the larger grouping – seemed contrary, prompting further investigation.

Key messages:

The prevalence of asthma increased over time, especially among children, but seems to have leveled off by 1997.

The noted increase may not accurately reflect underlying population health status, but rather, temporal shifts in diagnostic categories used.

The MCHP reports used a grouping called "total respiratory morbidity" (TRM), which combines several related diseases: asthma, bronchitis, emphysema and chronic obstructive pulmonary disease (COPD). The idea was developed by a team of respirologists doing research using clinical and administrative data (Erzen et al. 1995, 1997; Huzel et al. 2002; Manfreda et al. 1993). Their work revealed significant inconsistency in the diagnostic coding of respiratory diseases between generalists and specialists, and among individual physicians. That is, what one physician called "asthma" might be diagnosed as "chronic bronchitis" by another, depending on patient age and clinical characteristics, and the physician's background and training (Dodge et al. 1986; Erzen et al. 1997; Manfreda et al. 2004; Tinkelman et al. 2006). Similar observations have been reported by others, attributed to "diagnostic exchange" (Fletcher 1978; Dodge et al. 1986; Burney et al. 1990; Lundback et al. 2001; Tinkelman et al. 2006). The TRM grouping was created to overcome the limitations associated with inconsistent coding across these related diagnoses, and reflect the overall level of respiratory disease in a population served by a mix of providers.

The objective of this analysis was to describe long-term trends in the diagnosed prevalence of total respiratory morbidity, along with that of its constituent diagnoses. Rudimentary case definitions were used in order to provide a "big picture" view of changes in diagnostic codes assigned, knowing that diagnostic accuracy for each condition would be affected. The larger goal was to examine the possibility of diagnostic exchange among related disorders, versus true changes in the prevalence of disease in the population.

Methods

Using administrative data from 1984/85 through 2010/11, we calculated the prevalence of total respiratory morbidity and its six constituent diagnoses: asthma, acute bronchitis and bronchiolitis, chronic bronchitis, bronchitis NOS (not otherwise specified), emphysema and chronic obstructive pulmonary disease (ICD-9-CM codes 493, 466, 491, 490, 492 and 496, respectively; ICD-10-CA codes J20-J21, J40-J45). While Manitoba has introduced new physician tariffs over the study period, none affect claims for these diagnoses, which remain eligible for reimbursement using any tariff.

Within each fiscal year, people with at least one physician visit or one hospitalization coded with one of these disorders was defined as a "case" of that disease for that year. People could be assigned to only one disease each year. Those with diagnoses for more than one disease were assigned to the one for which they had the most diagnoses in that year. When two diagnoses were equally frequent, the person was assigned to the one for which the first diagnosis in that year was received. The population was separated into five age groups: 0–4, 5–19, 20–49, 50–74 and 75+ years. This approach was not intended to assess data quality nor to provide definitive diagnoses for each patient, as it has been shown to be imprecise when using administrative data (Aaron et al. 2008). Rather, our intent was to examine population-based rates of the "diagnosed prevalence" of the total and each of the conditions over time.

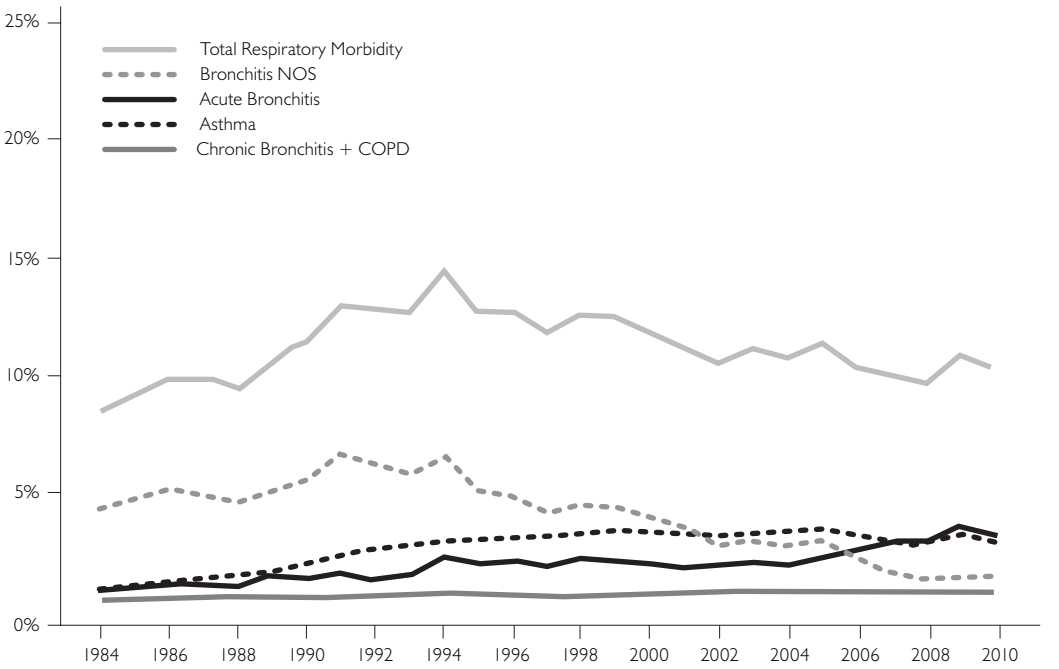
Virtually all Manitoba residents are included in the data system, which has been extensively studied and validated (Roos et al. 1993, 2005). Analyses were conducted on a secure server, using SAS version 9.2. This work was initiated as part of a larger report on population health in Manitoba (Fransoo et al. 2009).

Results

Preliminary analyses revealed that chronic bronchitis, emphysema and COPD were considerably less common than the other diagnoses, so these three were combined and are shown as "chronic bronchitis + COPD."

Figure 1 shows the overall time trends in the diagnostic prevalence of TRM and each of the diagnoses studied. The prevalence of TRM rose sharply from about 8.5% of the population in 1984/85 to almost 15% in 1994/95, then fell through 2001/02, at which time it seems to have stabilized around 11%.

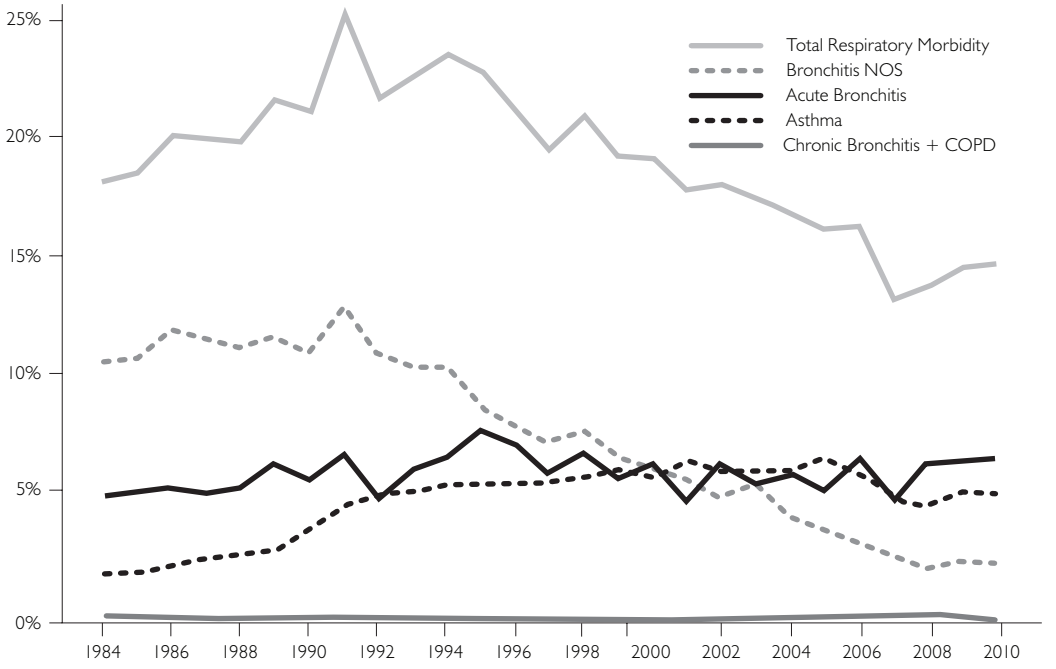
FIGURE 1. Prevalence of respiratory diseases over time, all ages



The prevalence of diagnosed asthma increased from about 1.5% in 1984/85 to just under 4% in 1999/2000, and remained relatively stable thereafter. Acute bronchitis also increased, from 1.4% to 4%. The prevalence of bronchitis NOS rose from 5% in 1984/85 to 7% in 1994/95, then fell steadily to 2% by 2008/09. The group including chronic bronchitis, emphysema and COPD increased slowly over the entire period, from 1% in 1984/85 to 1.4% in 2010/11.

The analyses by age group revealed interesting differences across the broad age groups used: the large 20- to 49-year-old group showed results largely similar to the population trends shown in Figure 1, except with slightly lower prevalence values. The younger age groups (0–4 and 5–19) revealed trends similar to each other, but different from the trends in the older age groups (50–74 and 75+). TRM prevalence values were highest and most dynamic among the 0- to 4-year-olds, shown in Figure 2. TRM prevalence rose from 18% in 1984/85 to 25% in 1992/93, then fell steadily through 2007/08, by which time it appears to have stabilized near 15%. The prevalence of asthma was 2.0% in 1984 and increased steadily to 6.7% in 2005/06 before decreasing to about 5% in 2010. Conversely, the prevalence of bronchitis NOS was stable at about 11.5% from 1984 to 1994, after which it fell sharply, to 2.5% in 2010/11. Because the drop in bronchitis NOS was later and much larger than the increase in asthma, the combined prevalence of TRM rose and then fell sharply. Similar but weaker trends were seen in the 5- to 19-year-old group, but with lower prevalence values for all conditions.

FIGURE 2. Prevalence of respiratory diseases over time, ages 0–4 years

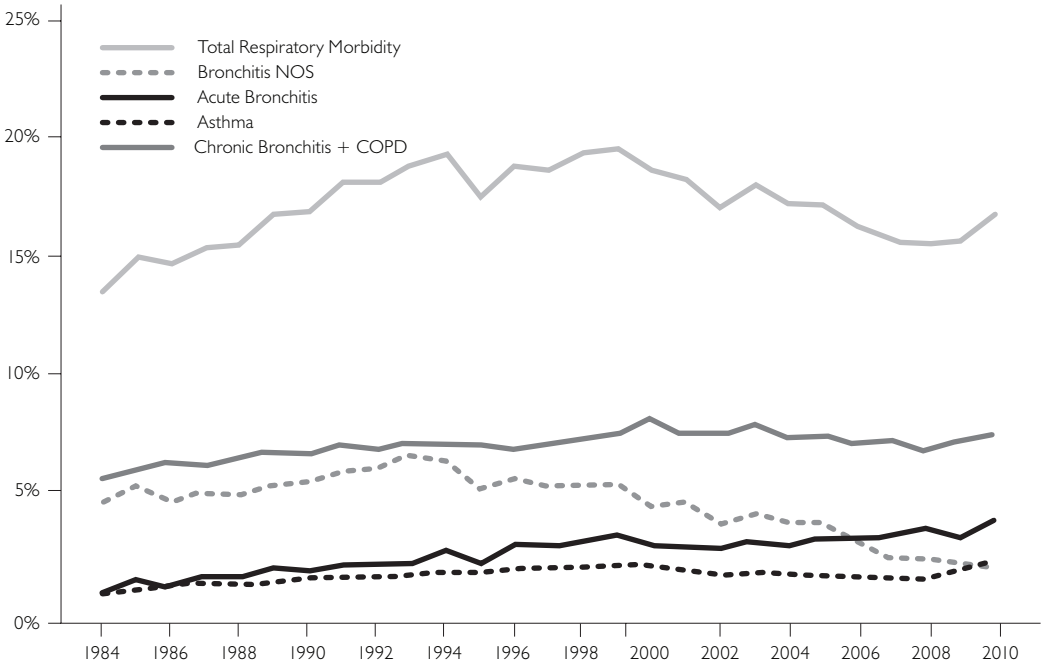


Among those aged 75+, the trends over time were much more stable, as shown in Figure 3. TRM prevalence rose from 13.5% in 1984/85 to 19.5% in 1999/2000, then fell to 15.5% in 2008/09. In this age group, asthma prevalence is much lower than in younger age groups, and that of COPD + emphysema is much higher. Asthma prevalence increased from 1.3% to 2.3%, while bronchitis NOS decreased from 5% to 2.6%, with a peak of 7% in 1993/94.

Discussion

This analysis was prompted by the desire to resolve what appeared to be contrary findings: the increasing prevalence of asthma reported by many studies, with MCHP data showing stable or decreasing prevalence of total respiratory morbidity. The results revealed that they are not contrary; both observations are true. The prevalence of asthma increased, and the prevalence of TRM decreased. The decrease in TRM was driven by the decrease in the diagnosed prevalence of bronchitis NOS, which was much larger than the increase in asthma prevalence. It is possible that diagnostic exchange may play a role in explaining these trends, with fewer people being diagnosed with bronchitis NOS and more with asthma. These results are in keeping with other reports of diagnostic exchange (Burney et al. 1990; Dodge et al. 1986; Fletcher 1978; Lundback et al. 2001; Tinkelman et al. 2006). Our finding of stabilized rates of asthma prevalence in more recent years has also been observed by others (Lawson and Senthilselvan 2005).

FIGURE 3. Prevalence of respiratory diseases over time, ages 75+



Comparing the actual prevalence values from this study to those of others is challenging, because of differences in measures used and analytic methods (Burney et al. 1990; Erzen et al. 1995; Garner and Kohen 2008; Lawson and Senthilselvan 2005; Lundback et al. 2001; Manfreda et al. 1993; Senthilselvan et al. 2003; Senthilselvan 1998). However, our primary interest was in monitoring the changes over time, using a consistent definition and data source. These data are clearly unable to resolve true changes in prevalence versus diagnostic exchange, though they do imply issues with data reliability within categories.

These trends may also indicate a positive change in clinical practice: patients may be getting "more accurate" or at least "more definitive" diagnoses, as suggested by the drop in the diagnoses for bronchitis NOS. This trend was seen in all age groups, though more clearly among younger patients. However, the available data cannot confirm that these changes are improvements – a critical distinction because misdiagnoses can result in mistreatment, which is potentially harmful.

Conclusion

Concerns about the increasing prevalence of asthma, especially in young children, need to be tempered by the decreasing prevalence of bronchitis NOS, as this shift may be an example of diagnostic exchange. Despite these changing indicators, there may be no "real" change in underlying population health status. The combined prevalence of total respiratory morbidity may be a better overall indicator of respiratory disease burden in the population than indicators of individual diseases.

These findings highlight the limitations of using administrative data alone for monitoring the prevalence of individual diseases, while simultaneously showing the insight they can provide using a broader perspective. Many studies have reported an increase in the prevalence of asthma, but none have documented concurrent decreases in the prevalence of related respiratory diseases.

Acknowledgements

Other authors of this paper include Nathan C. Nickel, PhD, Post-Doctoral Fellow, Manitoba Centre for Health Policy, Winnipeg, MB, and Dan Chateau, PhD, Researcher, Manitoba Centre for Health Policy and Assistant Professor, Community Health Sciences, Faculty of Medicine, University of Manitoba, Winnipeg, MB.

This work was supported through funding provided by the Department of Health of the Province of Manitoba to the University of Manitoba (HIPC # 2006/07-24). The results and conclusions are those of the authors and no official endorsement by Manitoba Health was intended or should be inferred. Data used in this study are from the Population Health Research Data Repository housed at the Manitoba Centre for Health Policy, University of Manitoba and were derived from data provided by Manitoba Health.

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