The Impact of Non-Fee-For-Service Reimbursement on Chronic Disease Surveillance Using Administrative Data

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ABSTRACT

Objective: Use of physician service claims and other administrative data is increasingly being advocated for chronic disease surveillance. However, such data may be vulnerable to reimbursement policy changes. We sought to determine how non-fee-for-service (non-FFS) primary care affects the detection of diabetes using physician claims data.

Methods: Ontarians over age 66 with diabetes and receiving care in a non-FFS setting were identified using prescription claims for glucose-lowering drugs written by non-FFS physicians. We compared the date of incident treatment in this cohort with the diagnosis date in the Ontario Diabetes Database, a validated administrative data algorithm to detect persons with diabetes. We assessed the rate of detection and, among detected cases, whether detection was late (more than 6 months after the index prescription). Survival methods were used to assess detection over time.

Results: Only 49.7% of prescription-defined diabetes cases were detected within six months of the index prescription; 23.7% remained undetected after up to nine years of follow-up. Detected individuals had higher rates of hospitalization for vascular complications than missed cases (15.1% vs 4.8%, p<0.0001), suggesting that they were at a more advanced stage of disease.

Conclusions: Non-FFS reimbursement arrangements for primary care physicians appear to undermine the utility of administrative data for chronic disease surveillance, leading to both decreased sensitivity and biased detection. Provisions for alternative means to collect diagnostic information should be considered as these arrangements are introduced.

Key words: Population surveillance; health care evaluation mechanisms; diabetes mellitus

Health care administrative data have been proposed as an important resource for chronic disease surveillance. In a single-payer context they provide population-based data that are free from many of the biases inherent in survey methods. They provide an efficient means of examining disease trends over time and across regions. For example, both provincial and federal initiatives have used administrative data to track diabetes rates and outcomes.[1-3] The extension of these methods to other chronic diseases has been advocated.[4]

In the case of conditions for which care is frequently provided on an inpatient basis, such as congestive heart failure, hospital discharge abstracts provide a reliable data source for disease surveillance.[5] In contrast, for chronic diseases treated largely on an outpatient basis such surveillance efforts are heavily dependent on outpatient physician service claims. In the National Diabetes Surveillance System (NDSS) the algorithm used to detect diabetes mellitus (DM) requires either one hospitalization record or two physician service claims with a diagnostic code of diabetes; however, nearly 75% of cases are detected by physician service claims alone.[2] As a consequence, patients who receive their primary care in settings where physician service claims are not generated will not be detected until the patient receives care for diabetes from a specialist or in an emergency department, and may be missed altogether.

If the detection algorithm employed in the NDSS and related surveillance activities is insensitive, then the burden of disease will be underestimated. These calculated rates of DM incidence and prevalence could be adjusted, for instance, through the use of capture-recapture techniques,[6] in which the population count is corrected for the rate of under-detection using a factor derived from the proportion of detected cases that appear in an independently derived

sample. However, one of the advantages of using administrative data for surveillance is the opportunity to look beyond mere incidence and prevalence to examine process and outcomes of care among persons with the diagnosed condition. If an insensitive diagnostic algorithm is used, process and outcomes of care measures derived in that selected population would be biased, reflecting the experience of a subset of persons who more regularly access physicians' services. If, on the other hand, the algorithm provided inadequate specificity, then measured disease rates would be inflated, and process and outcome metrics would be diluted by the experience of a substantial proportion of persons actually free of disease. The possibility of imperfect specificity also raises concerns about the use of capture-recapture or other techniques to correct measured prevalence for under-detection, since such methods do not routinely adjust for false positives.

Ontario has seen a marked increase in patients receiving care through alternative funding arrangements over the last decade. While the more popular models involve a blend of fee-for-service and capitated reimbursement, the growth in pure non-fee-for-

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Table 1. Detection of Diabetes Using Administrative Data Among Patients Receiving Care in Non-Fee-For-Service Settings

	Frequency	Percentage
True positives	1663	49.7
Late entry*	894	26.7
Missed cases	792	23.7

* Late entry defined as detection of diabetes more than six months after the index prescription for a glucose-lowering drug

Figure 1. Time to detection of diabetes using administrative data among cases detected more than 6 months after an index prescription for a glucose-lowering drug (late detection)

service (non-FFS) models has been dramatic, from just over 15,000 to over 1,900,000 persons (1999 to 2008). Given this shift toward alternative physician reimbursement models, we sought to determine the impact of non-FFS reimbursement arrangements on the detection of DM using administrative data in Ontario.
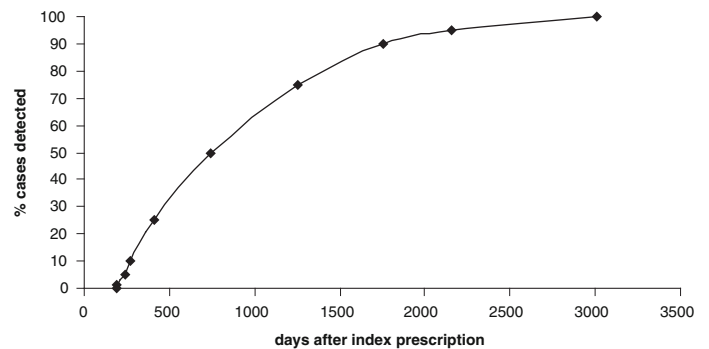
METHODS

Prescription claims for glucose-lowering drugs for persons over the age of 66 years written between April 1, 1994, and March 31, 2003, were obtained from the Ontario Drug Benefit Plan. Both oral hypoglycemic agents and insulin were included. The first of these prescriptions in the observation window of April 1, 1995, to March 31, 2003, was defined as the index prescription. Newly treated patients were identified by excluding patients who had received a glucose-lowering drug in the year before study entry. We restricted the cohort to patients receiving their prescription from a non-FFS primary care physician as defined in the Corporate Provider Database.[7]

This cohort of persons with drug-defined DM who were receiving care from a non-FFS physician was then linked to the Ontario Diabetes Database (ODD), an administrative data-derived registry of persons in Ontario with diagnosed DM.[2] Briefly, persons with two physician service (Ontario Health Insurance Plan, OHIP) claims for DM or one hospitalization with DM as a diagnosis in the Canadian Institute for Health Information Discharge Abstracts Database (CIHI DAD) in a two-year period were labeled as having DM. The ODD has been validated in the general primary care population and found to have a sensitivity of 86% and specificity of greater than 97%.[2] The diagnosis date was defined as the date of entry to the ODD. For persons entering the ODD on the basis of two OHIP claims entry was defined as the date of the first OHIP claim for DM, and for those entering on the basis of a hospitalization it was defined as the date of that hospitalization or of an OHIP claim for DM preceding that hospitalization by not more than two years. Cases prevalent in the ODD on April 1, 1995, and any cases entering the ODD up to March 31, 2004, were identified.

The diagnosis date was compared with the date of the index prescription to determine the sensitivity of the ODD algorithm for persons receiving care in a non-FFS context. We categorized cases as "true positives" when the diagnosis date in the ODD was either before or within 182 days after the index script, "late entry" when the diagnosis date was more than 182 days after the index script and "missed" when the patient never appeared in the ODD.

We reasoned that patients who had been seen by other providers, such as specialists and emergency department physicians, would be more likely to be detected in the ODD even if their primary care physician did not submit claims to OHIP. However, such utilization would be more common among persons with more advanced disease. To assess for this bias, the comorbidity burden among true positives and missed cases was described by examining hospitalization and drug claims data. Records identifying specific comorbidities in the CIHI DAD were examined in a window from five years prior to the index to one year thereafter. Drug claims for risk-factor-modifying medications commonly used by persons with DM were examined in the one year before the index prescription. Proportions with the selected comorbidities or drug therapies were compared using a chi square test.

We constructed a Kaplan-Meier survival curve to characterize the time to administrative data diagnosis of diabetes. For these models, the index date was the date of the index prescription for a glucose-lowering drug, and cases were censored at death or March 31, 2004. All analyses were carried out in SAS version 8 (SAS Institute, Cary, NC).

Ethics approval was obtained from the Research Ethics Board of the Sunnybrook Health Sciences Centre.

RESULTS

We identified 140,535 index prescriptions for glucose-lowering drugs, of which 3,349 or 2.4% were written by non-FFS physicians. Table 1 shows the proportion of true positives, late entries and missed cases. With a maximum follow-up to nine years, 23.7% of cases remained undetected. Among cases detected late, the median time to detection was 2.05 years (Figure 1).

True positives did not differ from missed cases in age or sex, but they were more likely to have been hospitalized (184 vs 72 hospitalizations per 100 patient years, p<0.001). Their hospitalization patterns suggested a heavier burden of comorbidity, which would be consistent with a more advanced stage of diabetes. In contrast, there was no significant difference in the use of angiotensin-converting enzyme inhibitors or angiotensin-receptor blocking drugs (p=0.07) and no difference in use of lipid-lowering drugs (p=0.60) (Table 2).

DISCUSSION

The current study demonstrates that, in Ontario, individuals with diabetes who are receiving care in a non-FFS setting are significantly less likely to be detected in surveillance programs dependent on administrative data algorithms. Those who are detected are more likely to have been hospitalized for vascular complications of diabetes, suggesting that not only is detection reduced but it is also biased toward the detection of patients with more advanced disease.

Table 2. Characteristics of Diabetes Cases Receiving Care in a Non-Fee-For-Service Setting Who Were Detected or Missed Using an Administrative Data Algorithm

	True Positives (%)	Missed Cases (%)	p value
Hospitalized for cardiovascular disease	6.73	2.15	<0.0001
Hospitalized for peripheral vascular disease	2.04	0.51	0.003
Hospitalized for stroke	7.52	2.27	<0.0001
Hospitalized for any complication	15.09	4.80	<0.0001
Received an ACE* inhibitor or angiotensin receptor blocker	37.2	33.5	0.07
Received a lipid-lowering drug	20.7	21.6	0.60

* Angiotensin-converting enzyme

Non-FFS reimbursement arrangements are being widely advocated for primary care settings as a means to facilitate more comprehensive chronic disease management. Indeed the complex array of screening and treatment issues that need to be addressed in the ongoing management of persons with DM does not lend itself well to the brief encounters characteristic of an FSS setting. However, the findings described here suggest that funding arrangements aimed at improving care delivery have unintended impacts on the availability of data for surveillance, specifically the loss of physician service claims records.

It is perhaps tautological to note that patients receiving their care in a context where physician service claims are not generated are more likely to enter an administrative data registry such as the ODD on the basis of hospitalizations. However, when detection depends primarily on a patient's use of specialist or hospital services, not only is the sensitivity of the algorithm reduced but the population that is generated is biased toward patients with more advanced disease. We found that detected patients had substantially higher rates of hospitalization for vascular complications of diabetes than those who were not detected. Data on medications used to prevent diabetes complications suggest that this excess of vascular events was not primarily due to unmanaged disease, since we found that detected and undetected patients had similar rates of use of angiotensin inhibitors and lipid-lowering drugs and indeed, by design, all of these patients were receiving glucose-lowering therapy.

Not only are population-based administrative data being advocated for disease surveillance, they are also commonly used to describe the management and outcomes of chronic diseases. The development of vascular complications is an important outcome measure in patients with diabetes. In regions with a substantial proportion of non-FSS delivery, diabetes rates will appear low, but measured complication rates will be high both because of a falsely low denominator and because of a bias toward detecting more advanced disease.

There are some limitations to our study. In the practices of the non-FSS physicians there may have been many more diabetic patients who were not detected because their DM was being managed by diet alone. The study is limited to persons over age 65, who may be more easily detected because their higher rates of hospitalization place less dependence on physician claims data for meeting the diagnostic algorithm. Both of these factors would lead to an overestimation of algorithm sensitivity in the present study.

While it remains to be seen whether non-FSS arrangements improve the quality of chronic disease management, it is clear from the current study that they may represent a threat to surveillance initiatives based on the use of administrative data. Measures to improve the collection of diagnostic information, either through adjusted capitation rates based on comorbidities or through blended reimbursement strategies that retain a fee-for-service component, are available and need to be considered as alternative payment strategies are introduced.

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RÉSUMÉ

Objectif : On préconise de plus en plus l'utilisation des demandes de paiement de services médicaux et autres données administratives pour la surveillance des maladies chroniques. Toutefois, ces données peuvent être fragilisées par les changements dans les politiques de remboursement. Nous avons cherché à déterminer si l'utilisation des données de demande de paiement des médecins de premier recours non rémunérés à l'acte influence la détection du diabète.

Méthode : Pour repérer les Ontariens diabétiques de plus de 66 ans soignés dans les établissements où les médecins ne sont pas rémunérés à l'acte, nous avons consulté les ordonnances de médicaments abaissant la glycémie rédigées par les médecins non rémunérés à l'acte. Nous avons comparé la date du nouveau traitement dans cette cohorte à la date du diagnostic dans la base de données sur le diabète de l'Ontario (un algorithme éprouvé pour repérer les personnes diabétiques dans des données administratives). Nous avons évalué le taux de détection et, parmi les cas détectés, si la détection était tardive (plus de six mois après l'ordonnance de référence). Pour évaluer la détection au fil du temps, nous avons utilisé des méthodes de persévérance de la cohorte.

Résultats : Seulement 49,7 % des cas de diabète recensés au moyen des ordonnances avaient été détectés moins de six mois après l'ordonnance de référence; 23,7 % étaient restés non détectés pendant une période de suivi pouvant aller jusqu'à neuf ans. Les sujets détectés présentaient des taux d'hospitalisation pour complication vasculaire plus élevés que les cas oubliés (15,1 % c. 4,8 %, p<0,0001), ce qui donne à penser qu'ils en étaient à un stade plus avancé de la maladie.

Conclusion : Les modes de rémunération des médecins de premier recours non rémunérés à l'acte semblent réduire l'utilité des données administratives pour la surveillance des maladies chroniques; ils entraînent à la fois une sensibilité réduite et un biais de détection. Il faudrait envisager des solutions de rechange pour recueillir l'information diagnostique lorsqu'on introduit ces formes de rémunération.

Mots clés : surveillance de la population; mécanismes d'évaluation des soins; diabète