DATA MATTERS

A General Method for Identifying Excess Revisit Rates: The Case of Hypertension

Méthode générale pour déterminer les taux de reconsultation excessifs : le cas des patients hypertendus

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Abstract

Objective: To provide a description and application of a novel methodology for comparing actual to expected visit rates at the physician level (controlling for patient characteristics) that could be employed in healthcare monitoring and management.

Data Sources/Study Setting: Two fiscal years (1997/1998 and 1998/1999) of health utilization data extracted from linked administrative data sets on a population-based cohort of 13,688 patients (aged 25+ with hypertension) involving 157 physicians.
Study Design: We re-analyzed data from a previously published retrospective cohort study to develop and apply a new methodology for identifying higher or lower than expected physician visit rates for hypertension.
Data Collection/Extraction Methods: We matched each study physician's hypertensive patients on the basis of age, sex, income and co-morbidity to an equal number of control patients drawn from the cohort. We then compared visit rates between the actual practice and the matched control practice.
Principal Findings: Although the correlation between the visit rates of the two groups of practices was high (r=.87), there were notable differences in rates, suggesting substantial discretionary practice among physicians.
Conclusions: The methodology outlined in this paper provides a basis for identifying variations in visit levels related to discretionary practice patterns and patient preferences. Deviation from expected visit rates provides a potentially useful measure for performance feedback and quality improvement activities.

Résumé

Objectif : Décrire et appliquer une nouvelle méthodologie pour comparer les taux de reconsultation réels et attendus chez les médecins (en tenant compte des caractéristiques des patients) qui pourrait servir à la surveillance et à la gestion des soins de santé.
Sources des données/cadre de l'étude : Des données sur l'utilisation des soins de santé provenant de deux exercices (1997/1998 et 1998/1999) ont été extraites d'ensembles de données administratives couplées sur une cohorte stratifiée représentative de 13 688 patients hypertendus âgés de 25 ans et plus; en tout, 157 médecins étaient concernés.
Conception de l'étude : Nous avons ré-analysé les données d'une étude de cohorte rétrospective publiée antérieurement en vue d'élaborer et d'appliquer une nouvelle méthodologie pour repérer les taux de consultation plus ou moins élevés que prévu pour l'hypertension.
Collecte de données/méthodes d'extraction : Nous avons jumelé les patients hypertendus de chaque médecin participant à l'étude selon l'âge, le sexe, le revenu et la comorbidité à un nombre égal de patients témoins de la cohorte. Nous avons ensuite comparé les taux de consultation entre la pratique réelle et la pratique témoin assortie.
Constatations principales : Bien que la corrélation entre les taux de visite des deux groupes de pratiques soit élevée (r=.87), d'importantes différences ont été observées dans les taux, ce qui suggère des pratiques très discrétionnaires chez les médecins.
Conclusions : La méthodologie énoncée dans le présent document offre un fondement pour déceler les variations dans les taux de consultation liées aux pratiques discrétion-

naires des médecins et aux préférences des patients. L'écart entre les taux de consultation réels et attendus offre une mesure qui pourrait s'avérer utile pour la rétroaction sur le rendement et les activités d'amélioration de la qualité.

Access to primary care office revisits for patients with chronic conditions such as hypertension is chiefly determined by physician behaviour in designating revisit intervals. It is generally assumed that physicians will schedule follow-up appointments at equal intervals for patients of similar age (Rosenberg and Moore 1997), gender (Sayer and Britt 1996; Verbrugge 1985), income (Roos et al. 1998) and co-morbidity (Kravitz et al. 1992). However, this straightforward approach ignores the discretionary nature of physician practice patterns and patient preferences.

We previously reported an analysis of physician revisit frequencies in a group of 13,688 hypertensive patients of 157 general practitioners in Edmonton, Canada (Cree et al. 2001). Our model explained 28% of the total variation in physician visit frequencies of hypertensive patients, leaving much of the variation unexplained owing to the lack of adjustment for unmeasured characteristics. About 80% of the total explainable variation was accounted for by physician practice patterns and referrals to other physicians. We also found that over 80% of patients visited their physicians more frequently than recommended in the guidelines for hypertension management, and that this revisit rate varied substantially across physicians.

Although our results were consistent with those from other studies (DeSalvo et al. 2003; Schwartz et al. 1999; DeSalvo et al. 2000; Petitti and Grumbach 1993; Tobacman et al. 1992; Welch et al. 1999), the inability to adjust for important (unmeasured) characteristics produced a model of low predictive value.

The primary objective of this paper is to provide a description and application of a novel methodology for comparing actual to expected visit rates at the physician level that controls for patient characteristics and could be employed in healthcare monitoring and management. Our approach could inform policy development regarding the equitable distribution of healthcare resources based on needs and ensuring that patients have appropriate access to primary care.

Methods

Sample

This is a retrospective cohort study involving linked administrative health databases maintained by Alberta Health. The patient selection and variable validities for this

study have been detailed elsewhere (Cree et al. 2001). Briefly, hypertensive patients were identified based on an ICD-9 code of hypertension in the primary diagnosis field on the physician claim for reimbursement. Our study period extended over two fiscal years from 1997/1998 to 1998/1999. Patients were aged 25+ years, had at least one hypertension-related physician visit in each of the two study years, and had at least two visits to their primary physician in each of the two years. The patient's primary physician was a general practitioner, practising at least 10 months of each study year and seeing at least 50 hypertensive patients during 1998/1999. The original cohort was used as the basis for constructing control groups for each physician's practice.

Variables

The *outcome of interest* was the total number of unreferred physician visits made by all patients to each physician in 1998/1999. Input variables included patient demographic and health data as well as physician information.

PATIENT DEMOGRAPHIC VARIABLES

We collected data on patients' sex and age, grouping age into the intervals 25–44, 45–64, 65–74, 75–84 and 85+. Socio-economic status was defined by assigning each patient to an income quintile based on the income of his or her neighbourhood of residence.

PATIENT HEALTH VARIABLES

The number of referrals in 1998/1999 was categorized as 0, 1 or 2, 3 or more, and the number of co-morbidities was dichotomized into <3 or ≥ 3.

PHYSICIAN CHARACTERISTICS

Data were collected from the Alberta Physician Claims and Physician Stakeholder databases, from which we extracted physicians' sex and age. Altogether there were 157 physicians in the sample, 115 male and 42 female. Relatively few were aged less than 35 years (three physicians) and over 60 years (16 physicians), with the remainder spread fairly evenly across the remaining age spectrum. Their practice characteristics varied, but they were relatively equally distributed in terms of the average number of patients seen daily. Twenty-nine physicians saw fewer than 24 patients per day, 42 had average daily visit levels of 24–29 patients, 30 physicians had 30–34 visits per day, 23 had 35–39 visits per day and 33 physicians saw more than 40 patients per day. Physicians were also classified into three groups based on their total payments received: those billing less than a full-time equivalent (FTE) general practitioner

($150,000; n=66); those billing average to high ($150,000 to $272,600; n=72); and those billing at a high level (>1.5 FTE or $272,600; n=19). Based on the area of residence of the majority of the physician's patients, practice location was dichotomized into lower-income area (comprising the two lowest of the five neighbourhood income groups) with 70 physicians, and higher-income area (comprising the top three neighbourhood income groups) with 87 physicians.

Construction of comparison practices

Using the data from the previously published study, the present study employed a new methodology designed to estimate excess (or insufficient) revisit rates by constructing control groups at the level of the physician's practice against which one can compare actual visit rates. The pool for the construction of the control groups was the 13,688 hypertensive patients in the initial study. For each of the 157 physicians in the study we constructed a simulated control practice of equal size consisting of patients randomly matched for age, sex, income and co-morbidity. Each physician was assigned two patient groups: his or her actual patients and the controls matched to the actual patients. Thus, the patient composition of the simulated practice shadowed the physician's actual patient practice, reflected a wide sampling of physician practice styles throughout the system and provided a measure of expected visit levels.

To bring a broader perspective to discrepancies between the actual number of visits delivered and visits expected to be delivered based on the simulated practices, the procedure was repeated a total of 10 times for each practice, redrawing matched samples from the population and constructing 10 different control practices. The creation of multiple control practices allowed an associated distribution of "expected visit levels" for each physician.

Statistical analysis

We first calculated the expected total visit levels for each physician by computing the average from the 10 simulated control practices. We compared the visit levels between the actual and control practices using the Pearson's correlation.

At the practice level, the 10 control practices provide the distribution of the expected visit levels for each physician. The 10 shadow practices were used to calculate mean expected levels of visits for a physician with the given patient profile. The actual visit level in each physician's practice was then compared to the distribution for that physician to determine the match between actual and expected visit levels. We were thus able to identify physicians whose practice visit rates were either above or below the range of expected visits as characterized by the 10 simulated practices.

FIGURE 1. Actual visit rates, by practice, in relation to the visit rates in the 10 simulated practices

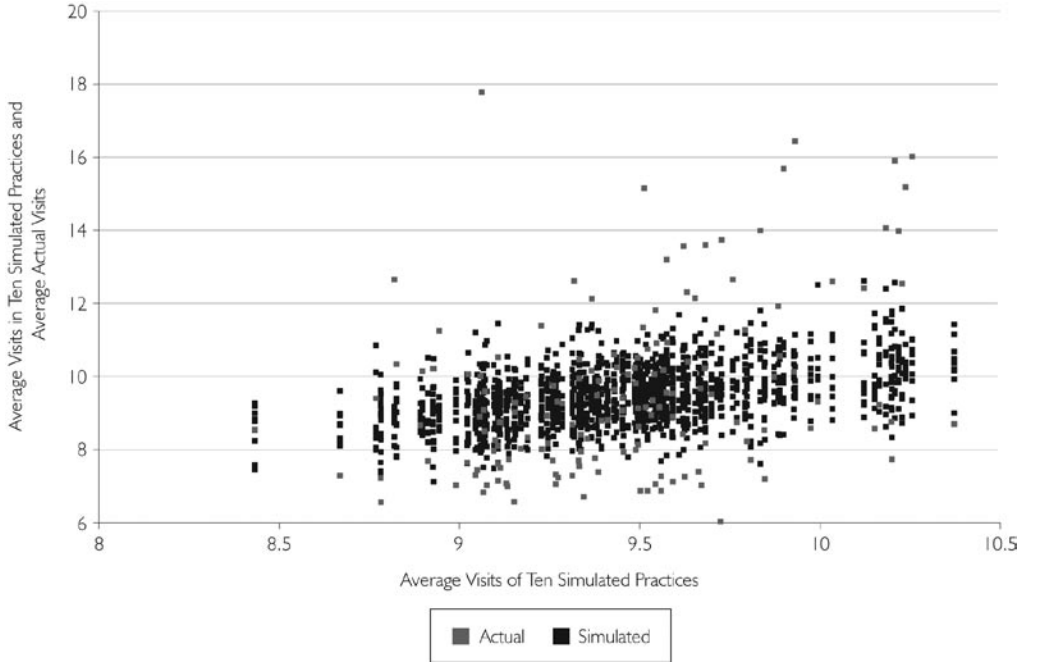
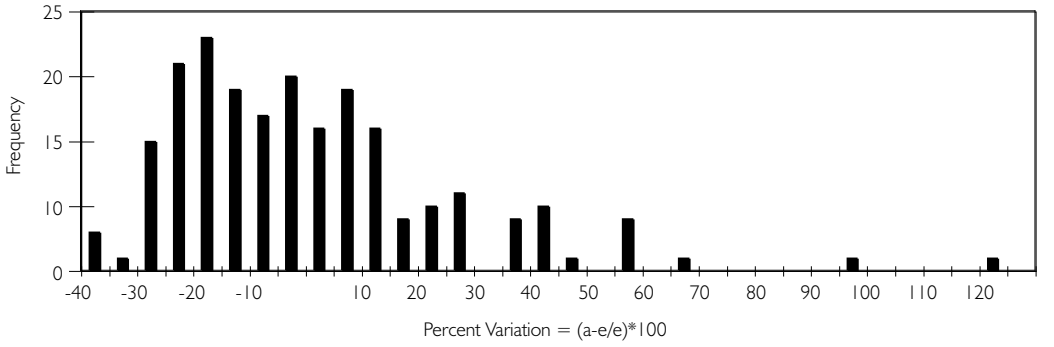


FIGURE 2. Percentage variation of actual average visit levels from average of 10 simulated practices



Results

The physician-level correlation between the total number of visits made by the actual and control groups was quite strong (r=.87). However, Figure 1 shows that many of the physicians had average visit rates that were beyond the range of those in the 10 simulated practices. Each vertical band of points represents the range of visit levels of the 10 simulated practices for a single physician. The lighter points represent the average visit rate for the physician's actual practice. Forty-one physicians had actual visit rates in excess of the highest rate in a simulated practice. Sixty-one had rates lower than the lowest simulated practice, while only 55 had rates that fell within the range of the 10 simulated practices.

To put the findings into a more concrete context, we considered relative deviations of the actual practices from the expected level, based on the average level obtained from the 10 simulated practices. Figure 2 depicts the departure from the expected visit levels in percentage terms. It demonstrates that 17 physicians provided visit levels that were more than 35% above the level to be expected from their average shadow practice visit levels. One physician provided 120% and another almost 100% more than the expected level. By contrast, only three physicians provided 35% fewer visits than would be expected from shadow practice averages.

The 17 physicians who provided the highest levels of visits were notably different from their 140 peers. Compared to the rest of the physician sample, they were more often aged over 60 years (24% vs. 9%) and more of the 17 were male (94% vs. 71%). Physicians who saw their patients most frequently tended, on average, to see more patients per day. Forty-one per cent of them saw more than 40 patients per day, compared to 19% of the remaining physicians. Correspondingly, the 17 physicians with the highest revisit rates were disproportionately concentrated in the highest income bracket (35% vs. 9%). Finally, almost two-thirds (65%) of the top 17 practised in lower-income neighbourhoods, compared to less than half (42%) of the remaining physicians.

Discussion and Conclusion

The purpose of this study was to provide a description and application of a novel methodology for comparing actual to expected visit rates at the physician level (controlling for patient characteristics) that could be employed in healthcare monitoring and management. Despite the relatively high correlation between the visits made by the patients of the actual and control practices, our results suggest that discretionary practice patterns and patient preferences exert a substantial influence on the number of follow-up visits. There is a wide variation in the actual number of visits in relation to the expected number as represented by simulated practices.

We used a random matching strategy to control for the existence of undue influences that plague the determination of expected visit levels for physicians. By matching key characteristics of patients in each physician's practice, we shadowed their patients with a matched set: a simulated control practice. By redrawing control practices multiple times, we constructed a distribution of expected visit levels at the practice level. Comparing those control practices to the actual practices, we were able to identify physicians with unexpectedly high or low numbers of visits.

Although most studies are constrained by the limited information contained in administrative databases, the one consistent finding across all studies has been the wide variation in physician recall/revisit rates despite the physician's efforts to provide high-quality, efficient care to patients. Yet, even the best explanatory models have

left half of the variance unexplained, perhaps because physician scheduling of return appointments is so complex as to be virtually unexplainable (Schwartz et al. 1999). The methodology outlined in this paper identifies excess or insufficient visit rates after patient characteristics are taken into account. Some physicians provide more visits to their patients than expected and others provide less. While some variation is inevitable, this methodology allows one to identify which practices deliver more or less than average quantities of care. In particular, we were able to identify some characteristics associated with tendencies to provide very high numbers of revisits compared to expected levels. While just suggestive, those characteristics provide clues for targeting education regarding practice guidelines and existing practice norms. Moreover, healthcare managers could provide physicians with a comparison of their actual to expected revisit rates, based on the practice norms of their peers. By constructing control practices matched for patient characteristics, including morbidity, we provide a retort to physicians with high revisit rates who tend to believe that their behaviour is due to the higher morbidity of the patients in their practices.

Of course, the optimal number of visits should be based on a careful study of outcomes. But in the absence of such a gold standard, our results point to the need for further research to explore reasons for the variation in the observed rates. Indeed, it may be possible to use deviation from expected visit levels, as identified here, as a basis for evaluating the effect of visit levels on various outcomes. For example, one might examine the association between mortality rate differences and visit rate differences among patients in physicians' actual practices compared to those in the corresponding simulated practices. One could do similar analyses for other outcomes, including stroke and other cardiovascular events.

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