



FAMILY MEDICINE GROUPS AND VISITS TO THE EMERGENCY DEPARTMENT AMONG DIABETICS IN QUEBEC BETWEEN 2000 AND 2011

Renee Carter, Ph.D. candidate, McGill University

Amélie Quesnel-Vallée, Ph.D., McGill University

Céline Plante, M.Sc., Institut national de santé publique du Québec

Philippe Gamache, B.Sc., Institut national de santé publique du Québec

Jean-Frédéric Lévesque, Ph.D., M.D., Bureau of Health Information, Australia

Background

- Since 2002, Family Medicine Groups (FMG) have been implemented across the province by physicians
- FMG model aims to promote patient enrolment (voluntary), inter-professional care (emphasis on nurses) & IT improvements (Lévesque et al. 2012)
- FMG practices are intended to have 6-10 physicians, 2 nurses, and to serve patient population of 10,000 to 20,000, longer opening hours (MSSS 2002)
- Increasing accessibility to and continuity of primary care identified by the Commissioner of Health and Welfare as priorities (CSBE 2009)
 - FMGs considered the means to achieving these goals

Background

- The rise in prevalence of diabetes in Quebec: priority for chronic disease surveillance (Émond 2002; Pigeon & Larocque 2011)
- Up to 80% of diabetes care takes place in primary care (Jaakkimainen et al. 2003; Clement et al. 2013)
 - Access to and quality of primary care is important for disease management
- Glycemic control among type 1 & 2 diabetes patients is associated with lower risk of acute and long term adverse outcomes (Imran et al. 2013; Bernard et al. 2013)
- Although patient self-care is pivotal, previous studies suggest that inter-disciplinary models of primary care are better tailored to supporting patients and providers in chronic disease management (Clement et al. 2013)

Objectives

In the context of an aging population, it is of relevance to determine whether reforms have changed access to and quality of care among those with an ambulatory care sensitive condition (eg. diabetes) that is largely managed by general practitioners

- 1) To determine whether there was a change between the pre and post reform periods in the rate of emergency department visits made by diabetics (hyperglycemic and hypoglycemic emergencies)
- 2) To determine whether shifts in trends are attributed to the introduction of the reform

Methodology

- Study design
 - Population-based retrospective study using a segmented regression analysis of an interrupted time series
 - The introduction of FMGs was treated as the ‘interruption’
 - To strengthen internal validity, a control series of visits to the emergency department for appendicitis was also analyzed
 - An outcome that we would not expect to be correlated with the reform but would respond similarly as our main outcome series to contextually relevant threats to internal validity
- Data source
 - Quebec Integrated Chronic Disease Surveillance System (QICDSS)

Methodology

- Diabetes cohort definition
 - Datasets were linked by scrambled identification numbers
 - Diabetics were identified from medical service claims and hospital admissions data using a previously validated algorithm (Hux et al. 2002; Ouhoumane 2010)
 - Exclusions: gestational diabetes
- Health and social service regions
 - Classification system that groups 18 regions into 4 categories
 - University, Peripheral, Intermediate, Remote
 - For analyses, these were further grouped into 2 regions: urban and rural
 - Exclusions: 4 regions (Outaouais, Nord-du-Québec, Nunavik, Terres-Cries-de-la-Baie-James)

Methodology

- Analyses restricted to diabetics aged ≥ 20
- Number of diabetics: 275,728 (2000/01) to 533,438 (2011/12)
- Outcome measurement
 - ICD-9 codes to identify acute diabetes complications: hyperglycemic and hypoglycemic emergencies
 - Control series: perforated and non-perforated appendicitis
 - Emergency department visits identified from medical service claims data using a previously validated algorithm (Belzile et al. 2011)
 - Mid-year diabetes population used as the denominator for the rates

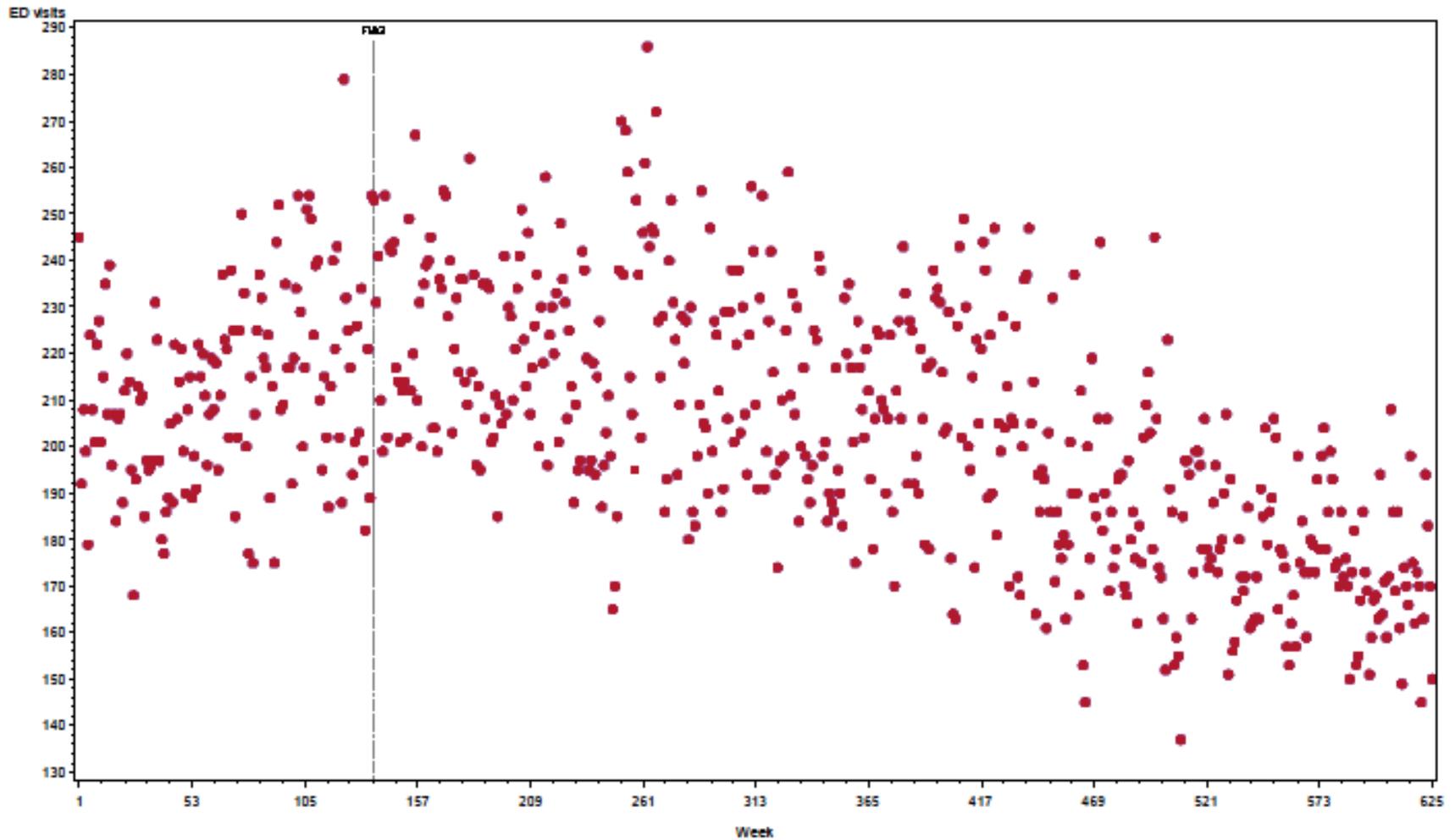
Methodology

- Statistical analysis
 - Time series was produced from daily emergency department records: aggregated to the number of visits per week
 - 626 weeks (observations) between April 1, 2000 and March 31, 2012
 - Fit a regression line to each segment of the series using a negative binomial distribution
 - Model covariates: intervention, time since the intervention, time trends, fixed effects for year, seasonality, population age composition
 - Contrasted the estimated rate of visits from the model with the extrapolated rate of visits, had the reform not occurred
 - Effect of the reform was computed 3, 6, and 9 years following initial implementation (T_3 , T_6 , T_9)
 - For each time point, the extrapolated rate was subtracted from the model rate estimate (95% CI calculated using the Satterthwaite method)

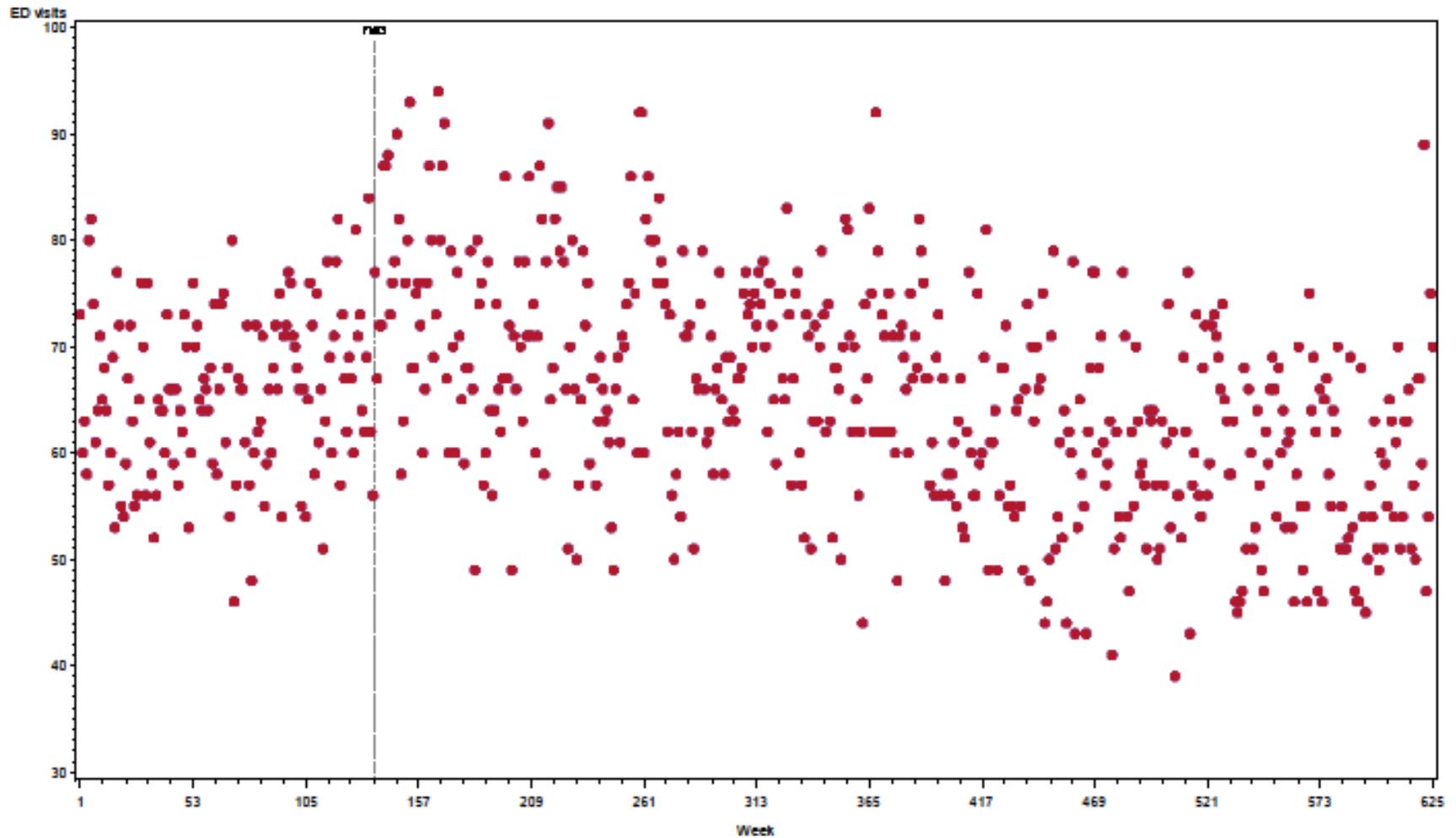
Methodology

- Ethics review
 - QICDSS and its use for chronic disease surveillance has been approved by government bodies in legal possession of the databases, Quebec's Comité d'éthique de santé publique, and the Commission d'accès à l'information
 - This study is part of a doctoral thesis project approved by the Faculty of Medicine's Institutional Review Board at McGill University

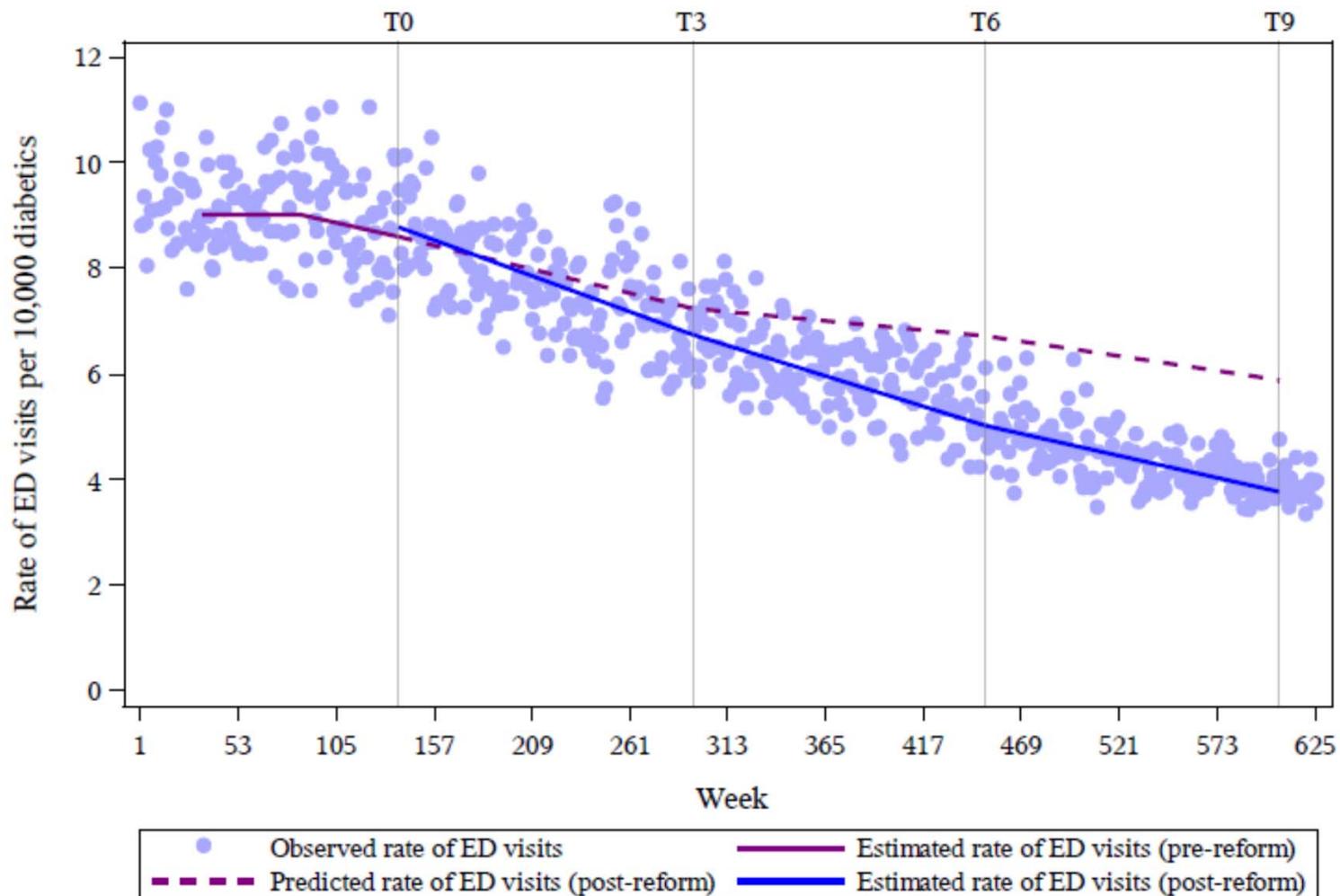
Results: Number of weekly visits (urban)



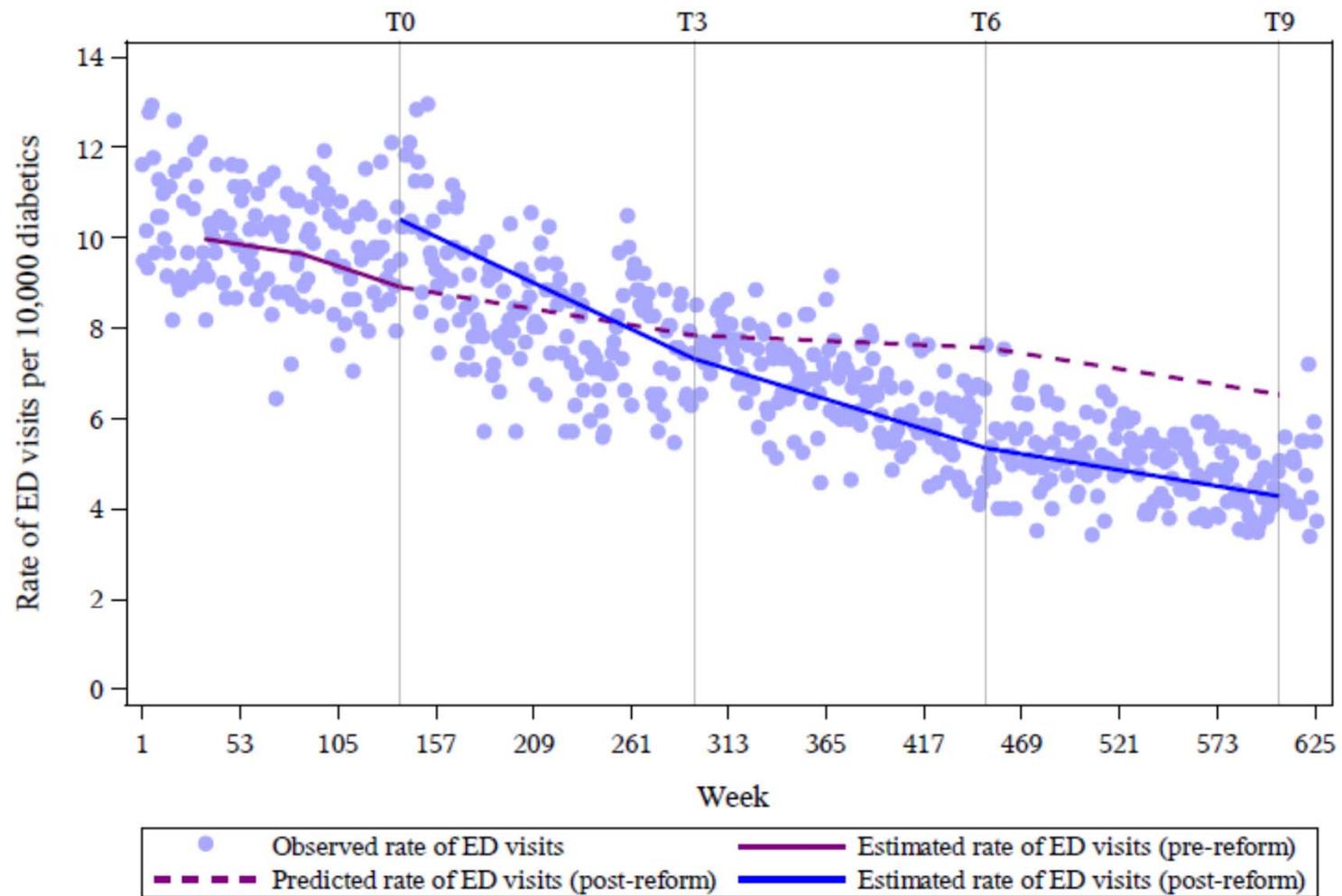
Results: Number of weekly visits (rural)



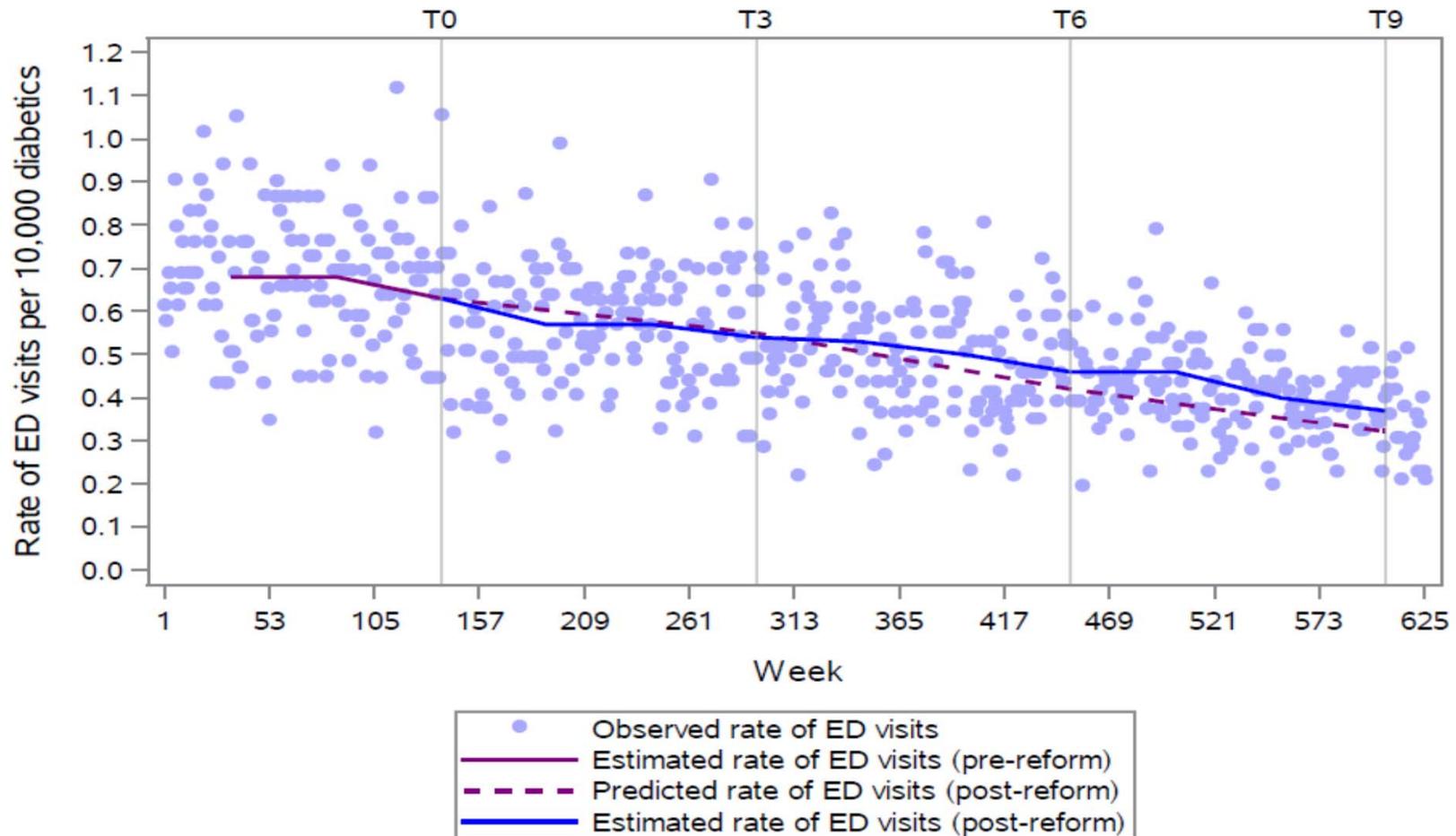
Results: Weekly series of visit rates (urban)



Results: Weekly series of visit rates (rural)



Results: Weekly series of visit rates (control series)



Results

| Number of years since reform implementation | Rate of acute diabetes complications (per 10,000 per week) | Rate of appendicitis (per 10,000 per week) |
|---|---|---|
| | Absolute change between the estimated and predicted rate post-reform (95% CI) | Absolute change between the estimated and predicted rate post-reform (95% CI) |
| | Urban | |
| 3 | -0.50 (-1.23, -0.13) | -0.01 (-0.55, 0.53) |
| 6 | -1.69 (-2.23, -1.14) | 0.04 (-0.99, 1.07) |
| 9 | -2.12 (-2.94, -1.29) | 0.05 (-0.30, 0.40) |
| | Rural | |
| 3 | -0.54 (-1.83, 0.75) | |
| 6 | -2.23 (-3.56, -0.89) | |
| 9 | -2.25 (-3.64, -0.85) | |

Discussion

- Main findings
 - Acute complications
 - A reduction of 2.12 visits per 10,000 by the week of T_9 amounts to approximately 33,000 avoided visits in the post-reform period (urban areas)
 - A reduction of 2.25 visits per 10,000 by the week of T_9 amounts to approximately 10,000 avoided visits in the post-reform period (rural areas)
 - Appendicitis
 - Non-statistically significant differences between estimated and extrapolated results

Discussion

- Interpretation
 - Our results align with findings from Héroux et al. (2014) where a 7% reduction in the rate of total ED visits occurred among vulnerable patients enrolled with a FMG between 2002 and 2005
 - Slow reductions in the weekly rate of visits points to the nature of the FMG reform
 - In comparison to Ontario, the reform can be considered ‘low-intensity’
 - Also indicative of the gradual increase in the percentage of the population enrolled in a FMG over time
 - The overall rate decrease observed in the study is a function of the relatively stable trend in the number of weekly visits and the increasing prevalence of diabetes
 - Booth et al. (2005) showed a similar rate decrease in Ontario in the 1990s, suggesting improvements in glycemic control in primary care
 - Our results suggest that the introduction of the reform led to an additional decrease in the rate of visits

Discussion

- Limitations
 - Extrapolation: short pre-reform relative to the post-reform period
 - If we assume that trends in the 1990s in Quebec were similar to those published by Booth et al. in Ontario, then there are no severe deviations
 - Under-counting visits for acute complications due to unspecific ICD-9 coding
 - Outcome misclassification that would lead to an under-estimated effect biased toward the null
 - The extent to which we could disentangle the effects of other reforms to the health system that affected primary care services between 2002 and 2011
 - Negative outcome control series used to detect residual confounding in our measurement of the relationship of interest
 - Example: network clinics

Conclusion

- At a health system level, the FMG practice model contributed to a discernible decrease in the rate of emergency department visits for acute diabetes complications
- Promising results that support the potential for the FMG model to be scaled-up for chronic disease management

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Rationale for control outcome series

Ideally, we want:

- (1) the same set of incoming arrows for control outcome series (N) and main outcome (Y), and;
- (2) main exposure (A) does not cause negative control outcome (N)

Example of unmeasured potential confounder:

Network clinics (changing pathways of care: service corridors between primary care and specialized services with emphasis on diagnostic and imaging tests)

A = FMG implementation (*exposure of interest*)
Y = ED visits for acute complications (*outcome of interest*)
L = measured confounders
U = unmeasured confounders
N = ED visits for appendicitis (*outcome control series*)

