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8 **Dispensing of long-acting non-tamper-deterrent oxycodone near**  
9 **the USA-Canada border**  
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## ABSTRACT

### Background

Since 2010, tamper-deterrent (TD) long-acting oxycodone has been available in both the USA and Canada, however generic non-tamper-deterrent (NTD) brands of oxycodone have only been introduced in Canada. We aimed to determine if the introduction of generic NTD oxycodone products in Canada has led to increased sales from Canadian pharmacies close to the USA border.

### Methods

We conducted a retrospective analysis of long-acting oxycodone dispensing trends from Canadian community pharmacies in geographic areas contiguous with the Canada-USA border between February 1<sup>st</sup> 2012 and January 31<sup>st</sup> 2014. We reported the monthly numbers of tablets of long-acting oxycodone dispensed by province, and within each prescribing region near the US-Canada border.

### Results

Over the 2-year study period, 8,662,845 long-acting oxycodone tablets were dispensed by Canadian pharmacies in geographic areas contiguous with the US border. During the study period reductions were seen in overall dispensing volumes in the border regions of Ontario, British Columbia, Quebec and New Brunswick. Volumes remained constant in Manitoba and Saskatchewan. There was an overall increase in dispensing of LA oxycodone in Alberta, but this was due to the new TD form. Examination of the dispensing patterns in 51 border areas after marketing of NTD oxycodone brands in Canada revealed no patterns suggestive of trafficking.

### Interpretation

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3 There were no large increases in the dispensing of prescriptions for generic NTD long-acting  
4 oxycodone in Canadian pharmacies close to Canada-US border crossing such as were seen  
5 after the withdrawal of the original form of NTD OxyContin in the USA in 2010.  
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## INTRODUCTION

Since its introduction in 1996, long-acting (LA) oxycodone has been the target of regulatory efforts to curb misuse, including changes in regulatory policy, product labeling, and product formulation.[1-7] The August 2010 introduction of a tamper-deterrent (TD) formulation of LA oxycodone in the US and the immediate removal of the original formulation (OxyContin) from the US market were seen as important steps to reduce the likelihood of misuse.[8] The original form of OxyContin remained available in Canada until late 2011 and we reported that an excess of approximately 250,000 tablets were dispensed by retail pharmacies on the Canadian side of the Detroit–Windsor Tunnel in 2010/11.[9] This was rapidly reversed after warnings were issued to prescribers and pharmacies.[5]

In August 2011 Purdue Pharma received Notice of Compliance from Health Canada to market a TD formulation of OxyContin in Canada, OxyNEO. In contrast to the US Food and Drug Administration (FDA),[7] Health Canada authorized marketing of generic non-tamper-deterrent (NTD) versions of LA oxycodone in November 2012,[7] reopening the potential for the prescribing behavior observed in Canada near the Detroit–Windsor Tunnel in 2010/11.

Given their abuse potential, the differential availability of generic NTD formulations of LA oxycodone between the US and Canada has raised concerns of large-scale, organized drug-seeking behavior across the international border. We analyzed dispensing data from Canadian pharmacies close to the US-Canada border to look for evidence of trafficking of these products.

## METHODS

We conducted a population-based serial, cross-sectional study of all LA oxycodone dispensed by Canadian pharmacies located in areas adjacent to US-Canada border crossings (by land, bridge or ferry) between February 1, 2012 and January 31, 2014. This period includes the date of introduction of generic LA oxycodone to the market (November 26, 2012). We

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3 studied dispensing close to 113 border crossings, excluding the 3 crossings between Yukon and  
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5 Alaska because of incomplete dispensing records. Dispensing regions close to border  
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7 crossings were delineated by forward sortation areas (FSAs), a well-established unit of  
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9 aggregation for Canadian postal codes.[10] In some cases, several border crossings lay within  
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11 one dispensing region. In total, the 113 border crossings included in our analyses were mapped  
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13 to 51 dispensing regions (Supplementary Appendix eTable 1). All prescriptions for LA  
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15 oxycodone dispensed by retail pharmacies within each FSA were included in the study.  
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20 We used the IMS Brogan Geographic Prescription Monitor database to quantify retail  
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22 prescription volumes for all LA oxycodone products over our study period. This includes both  
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24 privately and publicly funded prescriptions. This database captures data from a representative  
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26 sample of 5700 retail pharmacies across Canada, which provides monthly estimates by  
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28 geographic area at the product form and strength level. These projections used methods that  
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30 incorporate factors including the number of pharmacies in a given region, the distance between  
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32 IMS-captured and un-captured pharmacies, and the size of the pharmacies.[11] The resulting  
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34 product-level projected volumes are representative of all pharmacies in Canada, and are used  
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36 regularly for research purposes.[9;12] Over the 2-year study period, monthly prescription  
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38 volumes (numbers of tablets dispensed) for all LA oxycodone products were obtained for each  
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40 of the 51 dispensing regions, stratified by formulation type (brand vs. generic). Tablet numbers  
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42 are presented at the level of province and dispensing region.  
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47 Because several FSAs are rural, sparsely populated and less likely to be sources of  
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49 trafficked drugs, we conducted additional analyses of LA oxycodone prescription volumes in  
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51 more populated areas close to (but not contiguous with) the US-Canada border. In each  
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53 province, we identified 2 cities with populations greater than 10,000 that were within 150  
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55 kilometers (93 miles) of a border crossing (Supplementary Appendix eTable 2). We excluded  
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57 Ontario, the most populous province, from this exercise as highly populated Ontario centres in  
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3 close proximity to the US-Canada border were included in the primary analysis. Dispensing  
4 regions were defined in these cities using FSAs, and LA oxycodone volumes were evaluated in  
5 the same way as in the primary analysis. The graphs displaying prescribing rates over time  
6 were inspected visually as we were unable to obtain sufficient historical data to enable formal  
7 time series analyses.  
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## 13 14 15 **RESULTS**

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18 We identified 1 to 8 border crossings within each of the 51 dispensing regions. The  
19 population density varied substantially, from 0.14 residents per km<sup>2</sup> (near the Rainy River  
20 International Bridge between Ontario and Minnesota) to 4,796 residents per km<sup>2</sup> (near the  
21 Victoria-Port Angeles ferry crossing between British Columbia and Washington). Over the study  
22 period, 8,662,845 LA oxycodone tablets were dispensed by pharmacies in these dispensing  
23 regions. Between the first full month of generic LA oxycodone availability (December 2012) and  
24 the end of the study period, generic formulations comprised 11.9% (536,926 of 4,527,083) of  
25 the total number of dispensed tablets, although this varied considerably by province, from 0.1%  
26 in Saskatchewan to 29.3% in Quebec (Supplemental Appendix eTable 3).  
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38 Over the entire 2-year study period dispensing volumes did not change dramatically at  
39 the provincial level (Figure 1). Reductions were seen in overall dispensing of LA oxycodone in  
40 the border regions of Ontario, British Columbia, Quebec and New Brunswick. Volumes  
41 remained constant in Manitoba and Saskatchewan. There was an overall increase in dispensing  
42 of LA oxycodone in Alberta, but this was driven by the new TD form.  
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50 Between the introduction of the generic formulations in December 2012 and the end of  
51 the study period (January 2014) the number of tablets dispensed near the US-Canada border in  
52 each province decreased in British Columbia (20.1% decrease from 66,195 to 52,868 tablets),  
53 Ontario (16.6% decrease from 179,667 tablets to 149,861 tablets monthly) and Quebec (1.3%  
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3 decrease from 48,541 to 47,925 tablets monthly) (Figure 1). In Manitoba and New Brunswick,  
4 there were slight increases in the amount of LA oxycodone dispensed near the border over this  
5 time (7.8% increase from 12,028 to 12,969 tablets monthly in Manitoba and 3.5% increase from  
6 29,391 to 30,425 tablets monthly in New Brunswick). Both Alberta and Saskatchewan  
7 demonstrated substantial relative increases in the volume of LA oxycodone dispensed near the  
8 border between December 2012 and January 2014 (48.8% increase from 13,933 to 20,736  
9 tablets monthly in Alberta and 94.4% increase from 5,053 to 9,823 tablets monthly in  
10 Saskatchewan). However, only 3,216 tablets and 125 tablets of NTD oxycodone were  
11 dispensed in the border prescribing regions in Alberta and Saskatchewan respectively over this  
12 time.  
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26 We inspected prescribing patterns for the 51 individual dispensing regions adjacent to  
27 the Canada-US border, seeking the type of signal previously observed at pharmacies adjacent  
28 to the Detroit-Windsor Tunnel.[9] No substantial fluctuations in volume of LA oxycodone  
29 dispensing were observed (Supplementary Appendix eFigures 1-6). The data for the 14 border  
30 crossing regions in Ontario are given in Figure 2. Similarly, no substantial fluctuations in monthly  
31 prescribing volumes were detected by the analysis of dispensing volumes in larger cities near  
32 the US-Canada border (Figure 3).  
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## 42 **INTERPRETATION**

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45 In this population-based study of Canadian retail pharmacies located near the US-  
46 Canada border, we found no indication of increased volumes of LA oxycodone dispensing  
47 following the introduction of generic non tamper deterrent formulations in Canada. This  
48 suggests that, despite the differential availability of these formulations, there has not been high-  
49 volume diversion of these drugs from Canadian retail pharmacies into the US, such as we  
50 observed at the Detroit–Windsor Tunnel in 2010 and 2011.[9]  
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3 Our findings may be influenced by the slow adoption of generic formulations of LA  
4 oxycodone in most regions of Canada. Indeed, Quebec is the only province that borders the US  
5 in which generic formulations represented a significant proportion of the LA oxycodone market  
6 (29%). This high rate of uptake is driven by a public drug plan policy in Quebec that only  
7 reimburses patients for the lowest cost generic equivalent of brand name agents, when generics  
8 are available.[13] This likely incentivizes patients in Quebec to receive generic LA oxycodone  
9 due to the large cost differential between generic and brand name formulations of this drug.  
10 Despite this high rate of dispensing in Quebec, the volume of LA oxycodone dispensed close to  
11 the Quebec/USA border crossings did not increase after the introduction of the generic NTD  
12 formulations.  
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26 This study has several limitations. The methods we employed are likely to detect only  
27 geographically concentrated, high-volume diversion of drugs dispensed from Canadian retail  
28 pharmacies close to US-Canada border crossings. Although this method previously detected  
29 such patterns,[9] diversion of small volumes would not be captured. Although the consistency of  
30 the findings reinforce the suggestion that there is no large-scale diversion occurring from  
31 Canada into the US, it does not preclude the possibility of increased LA oxycodone dispensing  
32 in localized regions that were not included in this analysis. Second, interventional time series  
33 analysis could not be performed due to limitations of data availability prior to the interventions of  
34 interest. Finally, we are unable to obtain data on stolen oxycodone tablets, and therefore this  
35 analysis is restricted to describing volumes of LA oxycodone legally obtained from Canadian  
36 retail pharmacies.  
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50 Despite these findings, Canadian clinicians and pharmacists should remain cautious in  
51 their prescribing and dispensing of non-tamper-deterrent formulations of oxycodone because of  
52 their high potential for misuse and abuse.  
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The statements, findings, conclusions, views, and opinions contained and expressed in this publication are based in part on data obtained under license from IMS Health Canada Inc. concerning the following information service(s): IMS Brogan Geographic Prescription Monitor database, data period February 2012 to January 2014. All Rights Reserved. The statements, findings, conclusions, views, and opinions contained and expressed herein are not necessarily those of IMS Health Canada Inc. or any of its affiliated or subsidiary entities

## GUARANTOR

Tara Gomes had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

## COMPETING INTERESTS

The authors report having no competing interests.

## REFERENCES

- 1  
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7 (1) Dhalla IA, Mamdani MM, Sivilotti ML, Kopp A, Qureshi O, Juurlink DN. Prescribing of  
8 opioid analgesics and related mortality before and after the introduction of long-acting  
9 oxycodone. *CMAJ* 2009;181:891-896.
- 10  
11  
12  
13  
14 (2) Cicero TJ, Inciardi JA, Munoz A. Trends in abuse of Oxycontin and other opioid  
15 analgesics in the United States: 2002-2004. *J Pain* 2005;6:662-672.
- 16  
17  
18  
19 (3) Increase in poisoning deaths caused by non-illicit drugs--Utah, 1991-2003. *MMWR Morb*  
20 *Mortal Wkly Rep* 2005;54:33-36.
- 21  
22  
23  
24 (4) The Narcotics Safety and Awareness Act, 2010. *Ontario Ministry of Health and Long-*  
25 *Term Care* [serial online] 2010.
- 26  
27  
28  
29 (5) Gilson AM, Fishman SM, Wilsey BL, Casamaluapa C, Baxi H. Time series analysis of  
30 California's prescription monitoring program: impact on prescribing and multiple provider  
31 episodes. *J Pain* 2012;13:103-111.
- 32  
33  
34  
35 (6) Health Canada. Notice of Decision for OxyNEO. [http://www.hc-sc.gc.ca/dhp-](http://www.hc-sc.gc.ca/dhp-mps/prodpharma/sbd-smd/drug-med/nd_ad_2012_oxyneo_141379-eng.php)  
36 [mps/prodpharma/sbd-smd/drug-med/nd\\_ad\\_2012\\_oxyneo\\_141379-eng.php](http://www.hc-sc.gc.ca/dhp-mps/prodpharma/sbd-smd/drug-med/nd_ad_2012_oxyneo_141379-eng.php). 2011.
- 37  
38  
39  
40 (7) Health Canada. Statement on the authorization of generic OxyContin. [http://www.hc-](http://www.hc-sc.gc.ca/ahc-asc/media/ftr-ati/_2012/2012_176-eng.php)  
41 [sc.gc.ca/ahc-asc/media/ftr-ati/\\_2012/2012\\_176-eng.php](http://www.hc-sc.gc.ca/ahc-asc/media/ftr-ati/_2012/2012_176-eng.php). 2012.
- 42  
43  
44  
45 (8) U.S. Food and Drug Administration. FDA Approves New Formulation for OxyContin.  
46 <http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/2010/ucm207480.htm>  
47 . 2010.
- 48  
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- (9) Gomes T, Paterson JM, Juurlink DN, Dhalla IA, Mamdani MM. Reformulation of controlled-release oxycodone and pharmacy dispensing patterns near the US-Canada border. *Open Med* 2012;6:e141-e145.
- (10) Canada Post. Listing of Forward Sortation Area codes (FSA). [https://www.canadapost.ca/cpo/mc/assets/pdf/business/nps/lettermailfsalist\\_septoct2010.pdf](https://www.canadapost.ca/cpo/mc/assets/pdf/business/nps/lettermailfsalist_septoct2010.pdf) [serial online] 2010.
- (11) IMS. Audit Training: Compuscript. <http://canadaelearning.imshealth.com/cs/index.html>. 2013.
- (12) Fischer B, Jones W, Krahn M, Rehm J. Differences and over-time changes in levels of prescription opioid analgesic dispensing from retail pharmacies in Canada, 2005-2010. *Pharmacoepidemiol Drug Saf* 2011;20:1269-1277.
- (13) Régie de l'assurance maladie Québec. Public prescription drug insurance plan: change to the price paid for brand name drugs. <http://www.ramq.gouv.qc.ca/SiteCollectionDocuments/citoyens/en/depliants/depl-modification-prix-paye-medicaments-origine-en.pdf>. 2013.

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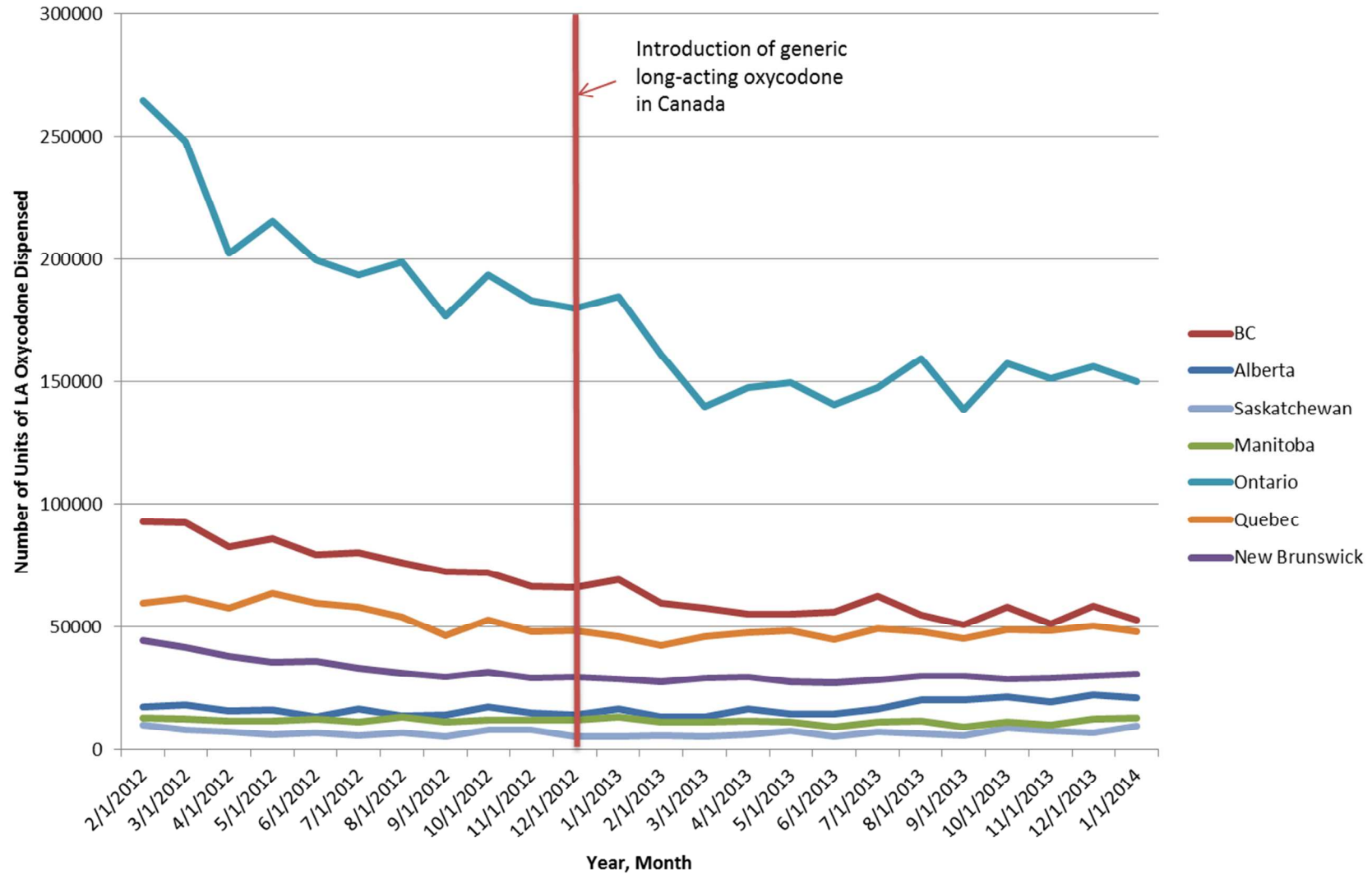
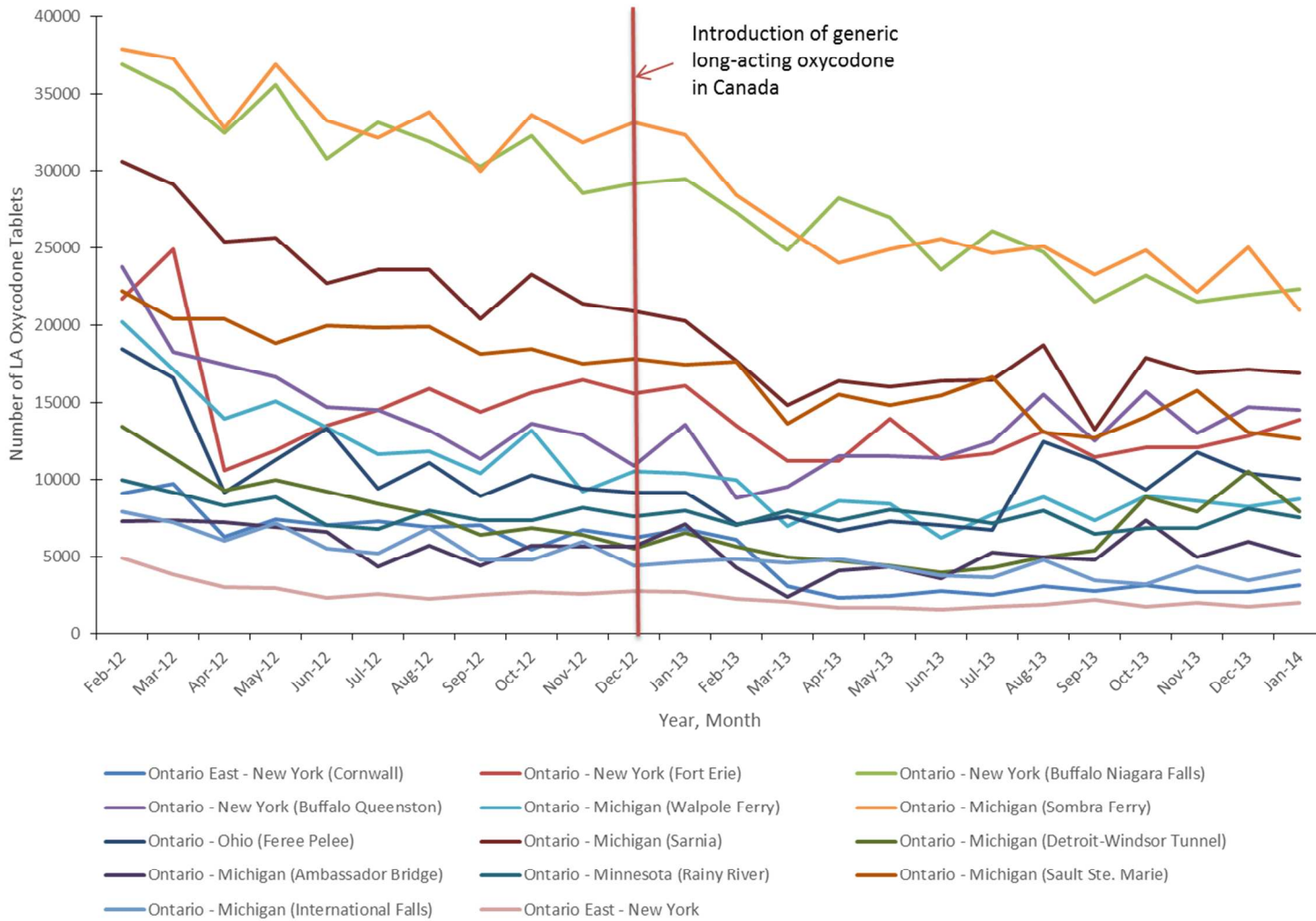


Figure 1 Volumes of long-acting oxycodone tablet dispensing in regions near USA-Canada border crossings by province. February 2012 – January 2014



**Figure 2. Volumes of long-acting oxycodone tablet dispensing in regions near US-Canada border crossings in Ontario. February 2012 – January 2014**

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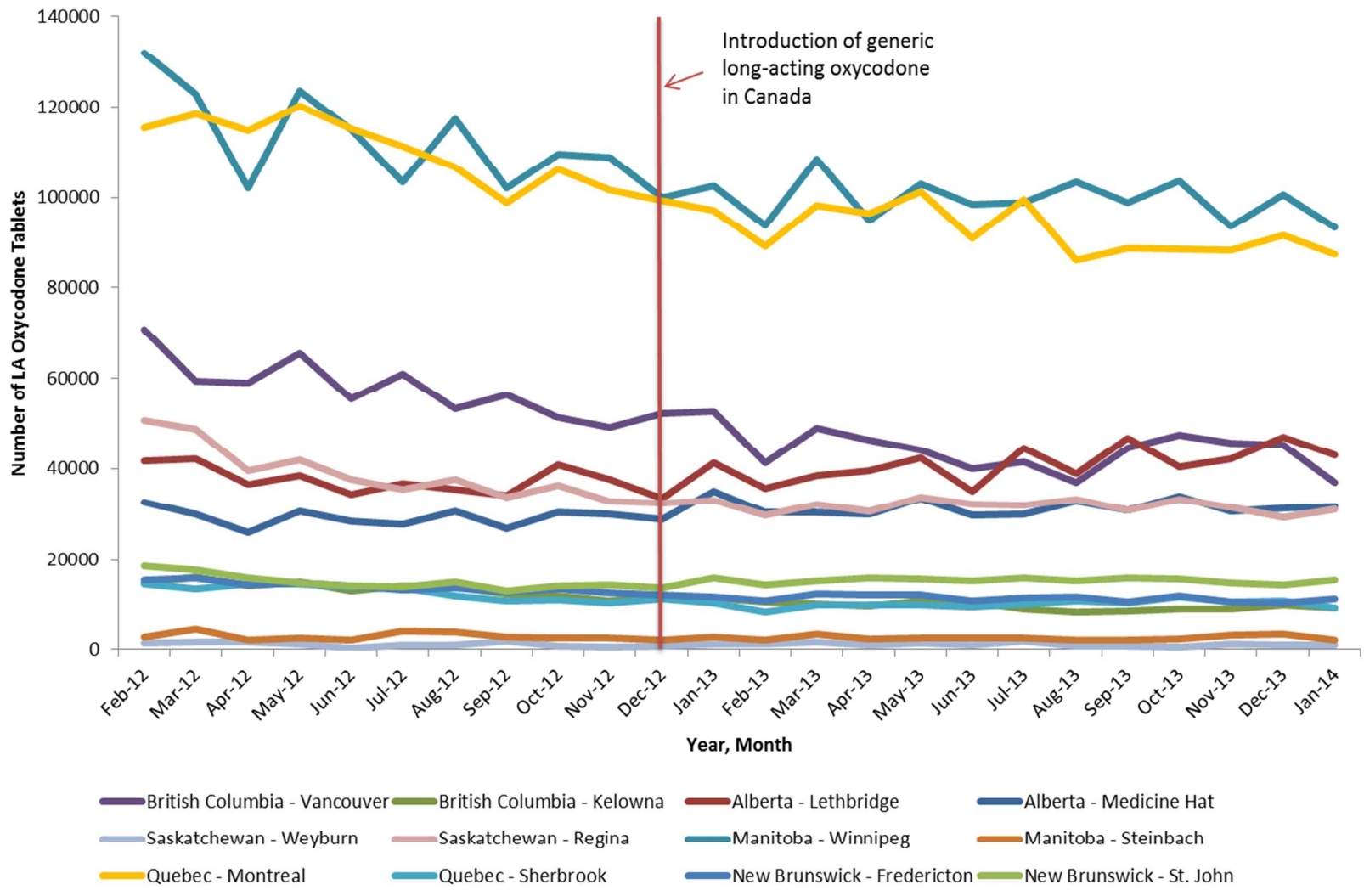


Figure 3: Volumes of long-acting oxycodone tablet dispensing in cities within 150km of USA-Canada border crossings. February 2012 – January 2014.

## Supplementary Appendix

eTable 1: List of all Prescribing Regions and Border Crossings (US-Canada) contained within each Region

Prescribing Region <i>Border Crossings</i>	# Crossings	Canadian Province	US State
<b>ALBERTA-MONTANA</b> <i>Whitlash-Aden</i> <i>Piegan-Carway</i> <i>Sweetgrass-Coutts</i> <i>Del Bonita-Del Bonita</i> <i>Wildhorse-Wildhorse</i> <i>Chief Mountain</i> <i>Willow Creek</i>	<b>7</b>	<b>Alberta</b>	<b>Montana</b>
<b>BC-IDAHO-MONTANA</b> <i>Porthill-Rykerts</i> <i>Roosville-Roosville</i> <i>Eastport-Kingsgate</i>	<b>3</b>	<b>British Columbia</b>	<b>Idaho and Montana</b>
<b>BC-WASHINGTON EAST</b> <i>Frontier-Paterson</i> <i>Metaline Falls-Nelway</i> <i>Boundary-Waneta</i>	<b>3</b>	<b>British Columbia</b>	<b>Washington</b>
<b>BC-WASHINGTON CENTRAL</b> <i>Laurier-Cascade</i> <i>Danville-Carson</i> <i>Ferry-Midway</i> <i>Oroville-Osoyoos</i>	<b>4</b>	<b>British Columbia</b>	<b>Washington</b>
<b>BC-WASHINGTON NIGHTHAWK</b> <i>Nighthawk-Chopaka</i>	<b>1</b>	<b>British Columbia</b>	<b>Washington</b>
<b>BC-WASHINGTON SUMAS</b> <i>Sumas-Abbotsford Huntington</i>	<b>1</b>	<b>British Columbia</b>	<b>Washington</b>
<b>BC-WASHINGTON WEST</b> <i>Blaine-Pacific Highway</i> <i>Blaine-Douglas</i>	<b>2</b>	<b>British Columbia</b>	<b>Washington</b>
<b>BC-WASHINGTON PT ROBERTS</b> <i>Point Roberts-Boundary Bay</i>	<b>1</b>	<b>British Columbia</b>	<b>Washington</b>
<b>BC-WASHINGTON LYNDEN</b> <i>Lynden-Aldergrove</i>	<b>1</b>	<b>British Columbia</b>	<b>Washington</b>
<b>BC-ALASKA</b> <i>Ketchikan</i> <i>Dalton Cache-Prince Rupert</i>	<b>2</b>	<b>British Columbia</b>	<b>Alaska</b>
<b>BC ISLAND-WASHINGTON</b> <i>Anacortes</i> <i>Friday Harbor-Washington State Ferry Terminal</i>	<b>2</b>	<b>British Columbia</b>	<b>Washington</b>



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4	<b>BC ISLAND-WASHINGTON BELLEVILLE</b>	<b>1</b>	<b>British Columbia</b>	<b>Washington</b>
5	<i>Port Angeles-Belleville Terminal</i>			
6	<b>MANITOBA-MINNESOTA</b>	<b>5</b>	<b>Manitoba</b>	<b>Minnesota</b>
7	<i>Lancaster-Tolstoi</i>			
8	<i>Pembina-Emerson</i>			
9	<i>Pinecreek-Piney</i>			
10	<i>Roseau-South Junction</i>			
11	<i>Warroad-Sprague</i>			
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13	<b>MANITOBA CENTRAL-N DAKOTA</b>	<b>3</b>	<b>Manitoba</b>	<b>North Dakota</b>
14	<i>Maida-Windygate</i>			
15	<i>Neche-Gretna</i>			
16	<i>Hannah-Snowflake</i>			
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18	<b>MANITOBA WCENTRAL-N DAKOTA</b>	<b>4</b>	<b>Manitoba</b>	<b>North Dakota</b>
19	<i>Sarles-Crystal City</i>			
20	<i>St. John-Lena</i>			
21	<i>Dunseith-Boissevain</i>			
22	<i>Hansboro-Cartwright</i>			
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24	<b>WEST MANITOBA-N DAKOTA</b>	<b>3</b>	<b>Manitoba</b>	<b>North Dakota</b>
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30	<b>MANITOBA-N DAKOTA WALHALLA</b>	<b>1</b>	<b>Manitoba</b>	<b>North Dakota</b>
31	<i>Walhalla-Winkler</i>			
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33	<b>NEW BRUNSWICK-MAINE MILLTOWN</b>	<b>1</b>	<b>New Brunswick</b>	<b>Maine</b>
34	<i>Milltown-Milltown</i>			
35	<b>NEW BRUNSWICK-MAINE NE</b>	<b>3</b>	<b>New Brunswick</b>	<b>Maine</b>
36	<i>Madawaska-Edmundston</i>			
37	<i>Limestone-Gillespie</i>			
38	<i>Hamlin-Grand Falls</i>			
39				
40	<b>NEW BRUNSWICK-MAINE CAMPOBELLO</b>	<b>1</b>	<b>New Brunswick</b>	<b>Maine</b>
41	<i>Lubec-Campobello</i>			
42				
43	<b>NEW BRUNSWICK-MAINE VANCEBORO</b>	<b>1</b>	<b>New Brunswick</b>	<b>Maine</b>
44	<i>Vanceboro-St. Croix</i>			
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46	<b>NEW BRUNSWICK-MAINE NORTH</b>	<b>3</b>	<b>New Brunswick</b>	<b>Maine</b>
47	<i>Fort Kent-Clair</i>			
48	<i>Van Buren-St. Leonard</i>			
49	<i>Fort Fairfield-Andover</i>			
50	<i>Easton-River de Chute</i>			
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52	<b>NEW BRUNSWICK-MAINE HOULTON</b>	<b>1</b>	<b>New Brunswick</b>	<b>Maine</b>
53	<i>Houlton-Woodstock Road</i>			
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55	<b>NEW BRUNSWICK-MAINE CALAIS</b>	<b>1</b>	<b>New Brunswick</b>	<b>Maine</b>
56	<i>Calais-St. Stephen</i>			
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	<b>3</b>	<b>Ontario</b>	<b>New York</b>
<b>ONTARIO EAST-NEW YORK</b> <i>Cape Vincent-Point Alexandria</i> <i>Alexandria Bay-Lansdowne</i> <i>Ogdensburg-Prescott</i>			
<b>ONTARIO EAST-NEW YORK CORNWALL</b> <i>Massena-Cornwall</i>	<b>1</b>	<b>Ontario</b>	<b>New York</b>
<b>ONTARIO-NEW YORK FORT ERIE</b> <i>Buffalo-Fort Erie</i>	<b>1</b>	<b>Ontario</b>	<b>New York</b>
<b>ONTARIO-NEW YORK BUFFALO NF</b> <i>Niagara Falls-Niagara Falls</i> <i>Buffalo-Niagara Falls-Fort Erie and Niagara Falls</i>	<b>2</b>	<b>Ontario</b>	<b>New York</b>
<b>ONTARIO-NEW YORK BUFFALO QUEENSTON</b> <i>Lewiston-Niagara Falls</i>	<b>1</b>	<b>Ontario</b>	<b>New York</b>
<b>ONTARIO-MICHIGAN WALPOLE FERRY</b> <i>Algonac-Walpole Island Ferry</i>	<b>1</b>	<b>Ontario</b>	<b>Michigan</b>
<b>ONTARIO-MICHIGAN SOMBRA FERRY</b> <i>Marine City-Sombra Ferry</i>	<b>1</b>	<b>Ontario</b>	<b>Michigan</b>
<b>ONTARIO-OHIO FEREE PEELE</b> <i>Sandusky-Pelee Island</i>	<b>1</b>	<b>Ontario</b>	<b>Ohio</b>
<b>ONTARIO-MICHIGAN SARNIA</b> <i>Port Huron-Sarnia</i>	<b>1</b>	<b>Ontario</b>	<b>Michigan</b>
<b>ONTARIO-MICHIGAN DW TUNNEL</b> <i>Detroit-Windsor</i>	<b>1</b>	<b>Ontario</b>	<b>Michigan</b>
<b>ONTARIO-MICHIGAN AMBASSADOR</b> <i>Detroit-Windsor</i>	<b>1</b>	<b>Ontario</b>	<b>Michigan</b>
<b>ONTARIO-MINNESOTA RAINY RIVER</b> <i>Baudette-Rainy River</i>	<b>1</b>	<b>Ontario</b>	<b>Minnesota</b>
<b>ONTARIO-MICHIGAN SAULT STE MARIE</b> <i>Sault Ste. Marie-Sault Ste. Marie</i>	<b>1</b>	<b>Ontario</b>	<b>Michigan</b>
<b>ONTARIO-MINNESOTA INT FALLS</b> <i>International Falls-Ranier</i>	<b>1</b>	<b>Ontario</b>	<b>Minnesota</b>
<b>QUEBEC-MAINE ESTCOURT</b> <i>Estcourt Station-Pohenegamook</i>	<b>1</b>	<b>Quebec</b>	<b>Maine</b>
<b>QUEBEC EAST-MAINE</b> <i>St Aurelie-St Aurelie</i> <i>Jackman-Armstrong</i>	<b>2</b>	<b>Quebec</b>	<b>Maine</b>
<b>QUEBEC EAST-MAINE PAMPHILE</b> <i>St. Pamphile-St. Pamphile</i> <i>St-Just-de-Bretenieres-St-Just-de-Bretenieres</i>	<b>2</b>	<b>Quebec</b>	<b>Maine</b>
<b>QUEBEC-MAINE WOBURN</b> <i>Coburn Gore-Woburn</i>	<b>1</b>	<b>Quebec</b>	<b>Maine</b>

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4	<b>QUEBEC-VERMONT EAST</b>	<b>6</b>	<b>Quebec</b>	<b>Vermont</b>
5	<i>Beebe Plain-Stanstead</i>			
6	<i>Pittsburg-Chartierville</i>			
7	<i>Beecher Falls-East Hereford</i>			
8	<i>Canaan-Hereford Road</i>			
9	<i>Derby Line-Stanstead (55)</i>			
10	<i>Derby Line-Stanstead (Rte 143)</i>			
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12	<b>QUEBEC-VERMONT CENTRAL</b>	<b>3</b>	<b>Quebec</b>	<b>Vermont</b>
13	<i>East Richford-Glen Sutton</i>			
14	<i>Richford-Abercorn</i>			
15	<i>North Troy-Highwater</i>			
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18	<b>QUEBEC-VERMONT WEST</b>	<b>8</b>	<b>Quebec</b>	<b>Vermont</b>
19	<i>Morses Line-Morses Line</i>			
20	<i>West Berkshire-Frelighsburg</i>			
21	<i>Pinnacle - East Pinnacle</i>			
22	<i>Alburg Springs-Clarenceville</i>			
23	<i>Champlain-Rouses Point-Lacolle</i>			
24	<i>Champlain- St. Bernard De Lacolle</i>			
25	<i>Overton Corners-Localle: Route 221</i>			
26	<i>Highgate Springs-Alburg-Phillipsburg-Noyan</i>			
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29	<b>QUEBEC-NEW YORK MOOERS</b>	<b>1</b>	<b>Quebec</b>	<b>New York</b>
30	<i>Mooers-Hemmingford</i>			
31				
32	<b>QUEBEC-NEW YORK WEST</b>	<b>4</b>	<b>Quebec</b>	<b>New York</b>
33	<i>Trout River-Trout River and Jamieson</i>			
34	<i>Malone-Trout River</i>			
35	<i>Massena-Dundee</i>			
36	<i>Cannon's Corner - Covey Hill</i>			
37				
38	<b>QUEBEC-VERMONT NORTON</b>	<b>1</b>	<b>Quebec</b>	<b>Vermont</b>
39	<i>Norton-Stanhope</i>			
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41	<b>SASKATCHEWAN EAST-N DAKOTA</b>	<b>6</b>	<b>Saskatchewan</b>	<b>North Dakota</b>
42	<i>Sherwood-Carievale</i>			
43	<i>Raymond-Regway</i>			
44	<i>Northgate-Northgate</i>			
45	<i>Portal-North Portal</i>			
46	<i>Fortuna-Oungre</i>			
47	<i>Ambrose-Torquay</i>			
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50	<b>SASKATCHEWAN-MONTANA</b>	<b>2</b>	<b>Saskatchewan</b>	<b>Montana</b>
51	<i>Scobey-Coronach</i>			
52	<i>Opheim-West Poplar</i>			
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54	<b>SASKATCHEWAN WEST-MONTANA</b>	<b>2</b>	<b>Saskatchewan</b>	<b>Montana</b>
55	<i>Morgan-Monchy</i>			
56	<i>Turner-Climax</i>			
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<b>SASKATCHEWAN-N DAKOTA NOONAN</b>	<b>1</b>	<b>Saskatchewan</b>	<b>North Dakota</b>
<i>Noonan-Estevan</i>			

**eTable 2: Details of Cities included in Sensitivity Analysis**

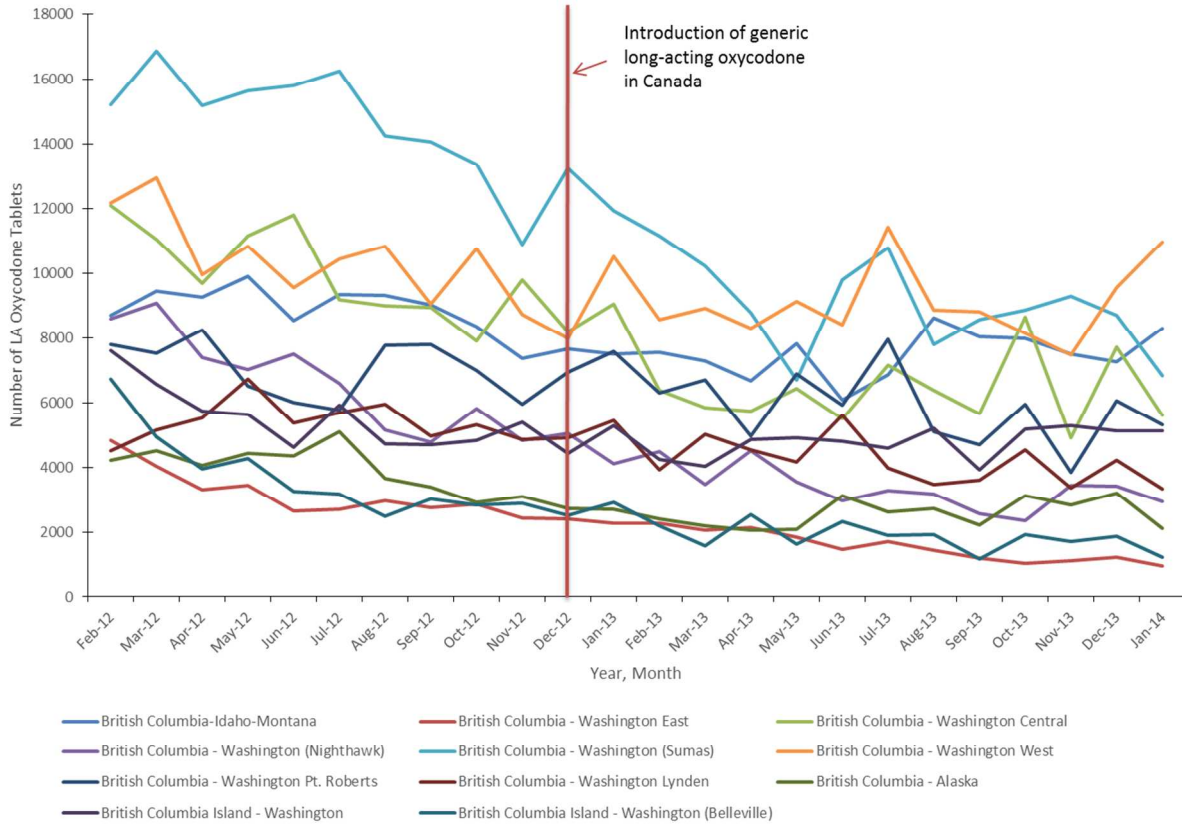
<b>Province</b>	<b>City Name</b>	<b>Approximate Distance to Border</b>	<b>Approximate Population Size</b>
Alberta	Lethbridge	104km	89,074
Alberta	Medicine Hat	140km	60,005
British Columbia	Kelowna	115km	117,312
British Columbia	Vancouver	50km	603,502
Manitoba	Winnipeg	106km	663,617
Manitoba	Steinbach	72km	13,524
New Brunswick	Fredericton	93km	56,224
New Brunswick	Saint John	113km	70,063
Quebec	Montreal	66km	1,649,519
Quebec	Sherbrooke	68km	154,601
Saskatchewan	Weyburn	76km	10,484
Saskatchewan	Regina	162km	193,100

**eTable 3: Canadian market share of generic long-acting oxycodone tablets near the US-Canada border following their introduction in Canada. December 2012 – January 2014.**

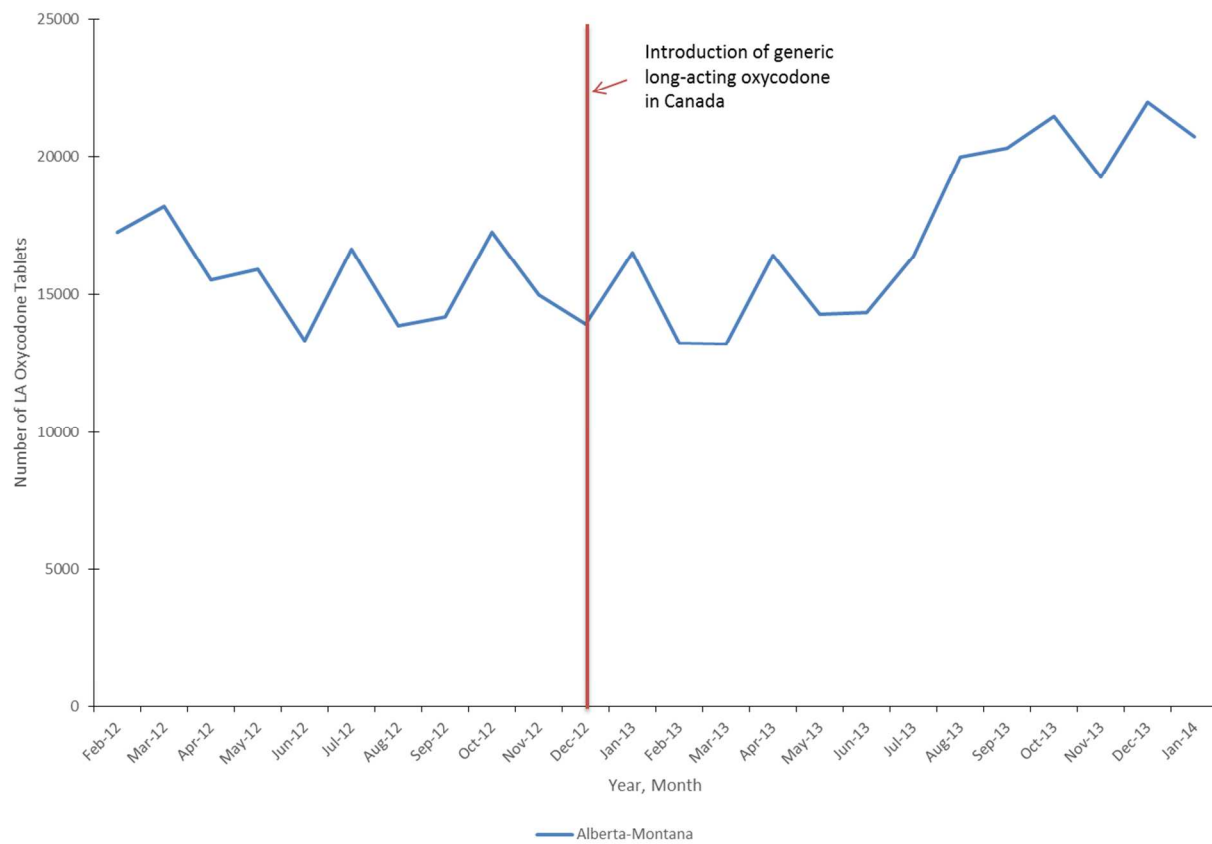
<b>Province</b>	<b>Number of long-acting oxycodone tablets dispensed</b>	<b>Number of generic long-acting oxycodone tablets dispensed</b>	<b>% generic long-acting oxycodone tablets</b>
Alberta	242,068	3,216	1.3
British Columbia	807,713	143,942	17.8
Manitoba	158,901	4,665	2.9
Ontario	2,162,448	143,549	6.6
Quebec	660,715	193,317	29.3
New Brunswick	402,872	48,112	11.9
Saskatchewan	92,366	125	0.1
<b>Total</b>	<b>4,527,083</b>	<b>536,926</b>	<b>11.9</b>

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**eFigure 1: Volume of Long-Acting Oxycodone Tablet Dispensing in Dispensing Regions Near US-Canada Border Crossings in British Columbia. February 2012 – January 2014**

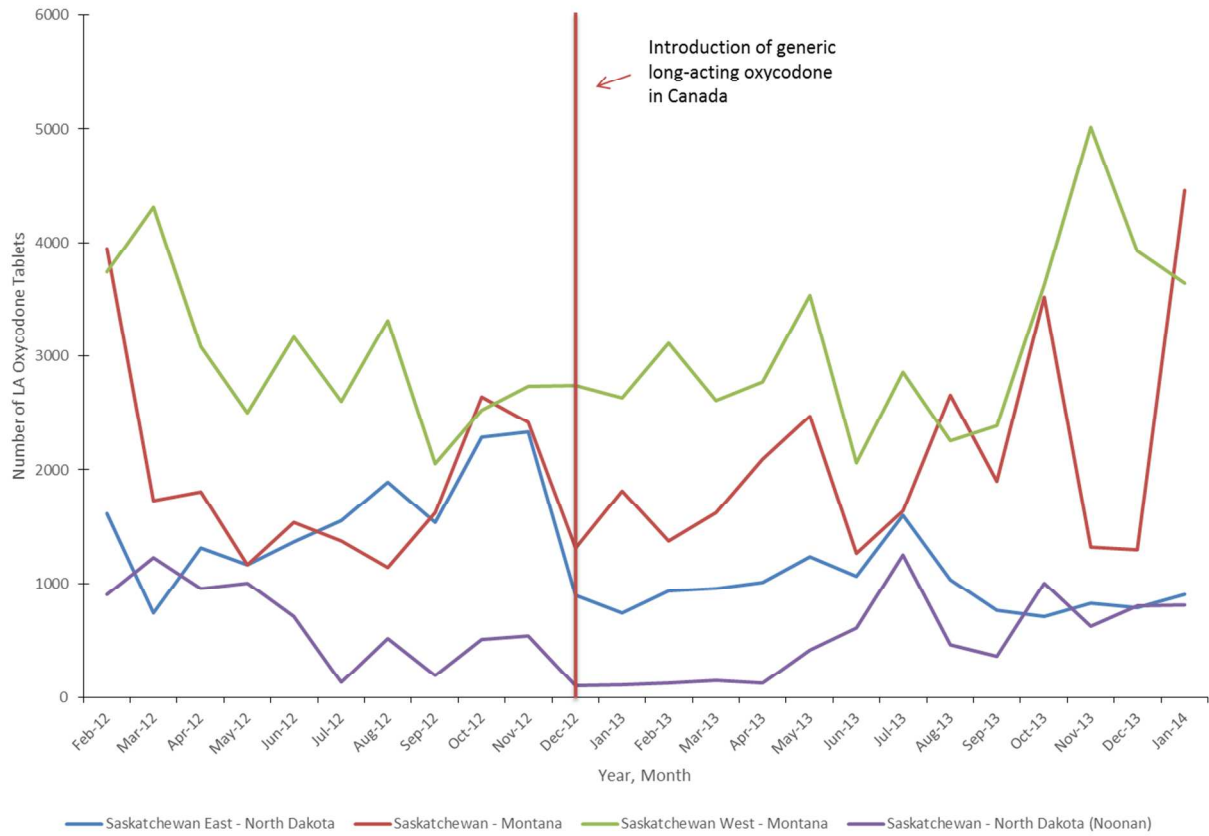


eFigure 2: Volume of Long-Acting Oxycodone Tablet Dispensing in Dispensing Regions Near US-Canada Border Crossings in Alberta. February 2012 – January 2014

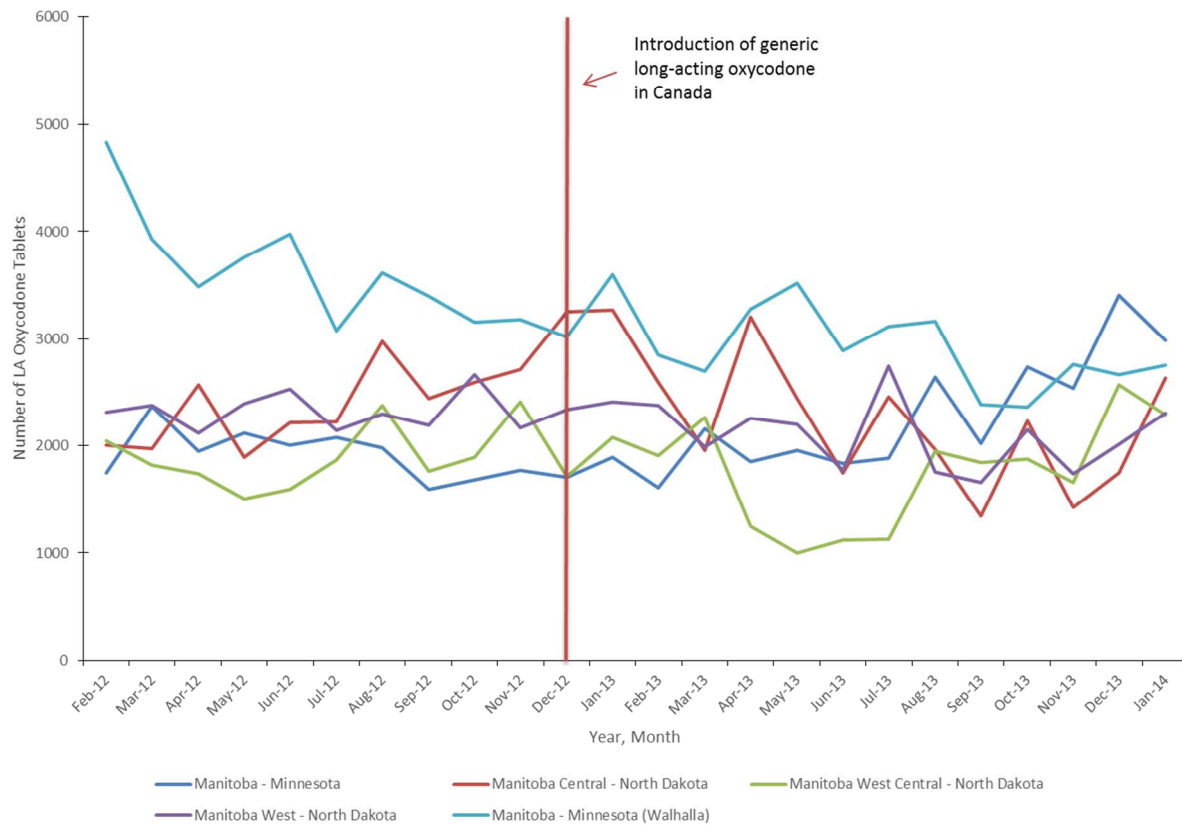


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**eFigure 3: Volume of Long-Acting Oxycodone Tablet Dispensing in Dispensing Regions Near US-Canada Border Crossings in Saskatchewan. February 2012 – January 2014**

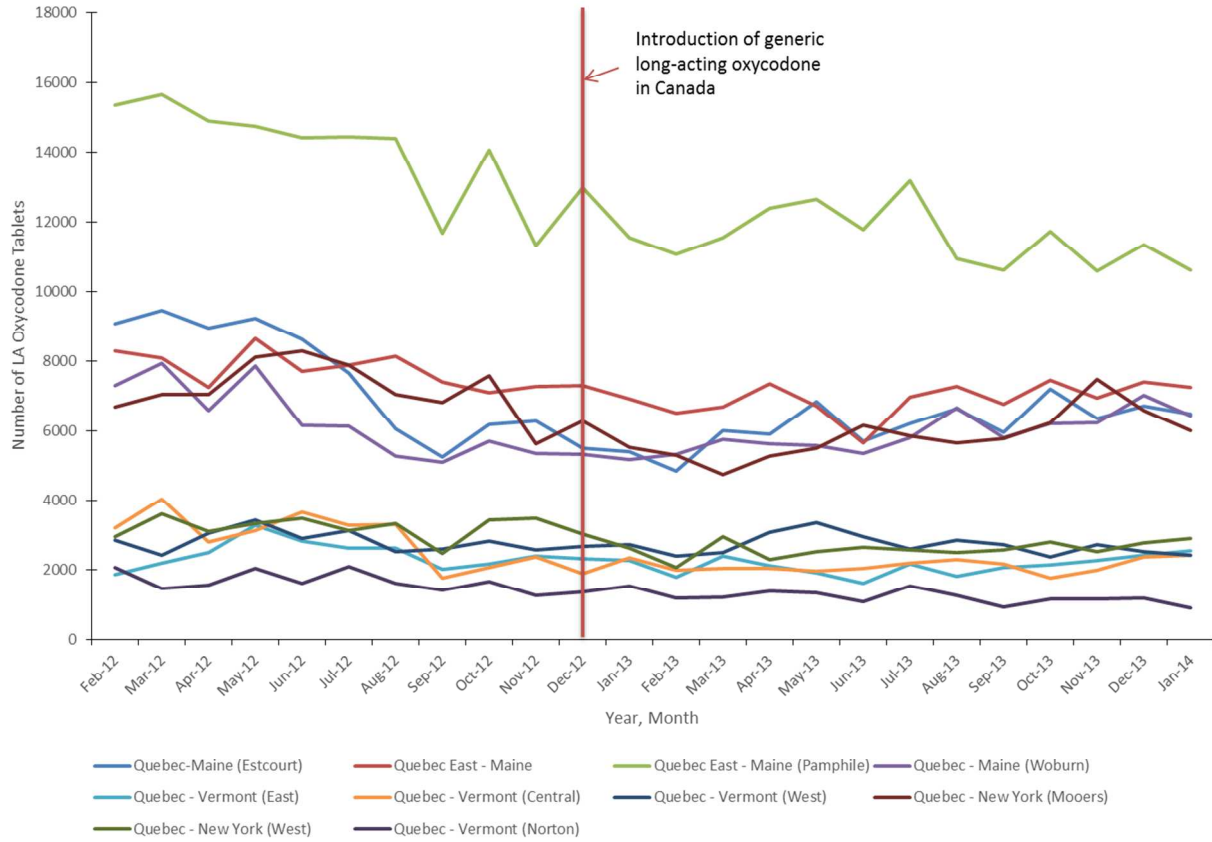


eFigure 4: Volume of Long-Acting Oxycodone Tablet Dispensing in Dispensing Regions Near US-Canada Border Crossings in Manitoba. February 2012 – January 2014



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**eFigure 5: Volume of Long-Acting Oxycodone Tablet Dispensing in Dispensing Regions Near US-Canada Border Crossings in Quebec. February 2012 – January 2014**





eFigure 6: Volume of Long-Acting Oxycodone Tablet Dispensing in Dispensing Regions Near US-Canada Border Crossings in New Brunswick. February 2012 – January 2014

