EVALUATION OF THE MANITOBA IMPROVE PROGRAM

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ABOUT THE MANITOBA CENTRE FOR HEALTH POLICY

The Manitoba Centre for Health Policy (MCHP) is located within the Department of Community Health Sciences, College of Medicine, Faculty of Health Sciences, University of Manitoba. The mission of MCHP is to provide accurate and timely information to healthcare decision-makers, analysts and providers, so they can offer services which are effective and efficient in maintaining and improving the health of Manitobans. Our researchers rely upon the unique Population Health Research Data Repository (Repository) to describe and explain patterns of care and profiles of illness and to explore other factors that influence health, including income, education, employment, and social status. This Repository is unique in terms of its comprehensiveness, degree of integration, and orientation around an anonymized population registry.

Members of MCHP consult extensively with government officials, healthcare administrators, and clinicians to develop a research agenda that is topical and relevant. This strength, along with its rigorous academic standards, enables MCHP to contribute to the health policy process. MCHP undertakes several major research projects, such as this one, every year under contract to Manitoba Health, Health Living and Seniors. In addition, our researchers secure external funding by competing for research grants. We are widely published and internationally recognized. Further, our researchers collaborate with a number of highly respected scientists from Canada, the United States, Europe, and Australia.

We thank the University of Manitoba, Faculty of Health Sciences, College of Medicine, Health Research Ethics Board for their review of this project. MCHP complies with all legislative acts and regulations governing the protection and use of sensitive information. We implement strict policies and procedures to protect the privacy and security of anonymized data used to produce this report and we keep the provincial Health Information Privacy Committee informed of all work undertaken for Manitoba Health, Health Living and Seniors.

Faculty of Health Sciences | University of Manitoba

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ACRONYMS

CMT	Care Management Technologies
CNSC	Comprehensive NeuroScience of Canada
DIN	Drug Identification Number
DPIN	Drug Program Information Network
IMPROVE	Improving Medication Prescribing and Outcomes Via Education
MCHP	Manitoba Centre for Health Policy
MHHLS	Manitoba Health, Healthy Living and Seniors
PHIN	Personal Health Identification Number
RCT	Randomized Controlled Trial
QI	Quality Indicator
SSRI	Selective Serotonin Reuptake Inhibitor

EXECUTIVE SUMMARY

Clinical practice guidelines are continually evolving with the introduction of new information and new therapies, interventions, and medications for dealing with complex medical conditions or diseases. With so much information to absorb, current efforts to continually update physicians may not always be enough to prevent potentially inappropriate prescribing behaviours. Those involved in translating new research findings into practice have developed various methods to address this potential shortfall. In April 2011, the Manitoba Government introduced an audit-and-feedback program that aims to improve the safety and health outcomes for Manitobans receiving mental-health medications. The Manitoba IMPROVE Program (Improving Medication Prescribing and Outcomes via Education) is administered by a subsidiary of Care Management Technologies (CMT), Comprehensive NeuroScience of Canada (CNSC), based in Winnipeg. Fifteen Quality Indicators (QIs) for potentially inappropriate prescribing were included in the program. Drug-dispensation data from community pharmacies were analyzed, and when a QI was triggered, an educational package was mailed to the prescribing physician.

The Manitoba IMPROVE Program (IMPROVE) was designed with ongoing evaluation in mind to assess the intervention's effect on the QI rates. Implementation of the program proceeded in two waves. Half of eligible physicians were assigned randomly to an intervention group who began to receive educational packages about their prescribing behaviours immediately. The other half of eligible physicians were scheduled for delayed implementation; they did not begin to receive educational packages until over one year later. This half functioned as a control group in the evaluation. A primary set of QIs concentrated on prescription behaviours for benzodiazepines (six QIs) and anti-insomnia agents (two QIs). A group of secondary QIs initiated six months after the first group concentrated on other types of drugs (opioids, selective serotonin reuptake inhibitors, antidepressants, and antipsychotics).

Methods and Analysis

Quality-indicator audits were conducted monthly on independently anonymized data transferred from Manitoba Health, Healthy Living and Seniors (MHHLS) to CNSC. After CNSC identified all QI triggers they sent a complete list to MHHLS to provide address information for the educational mailing package. A dataset of all QI triggers, with patients' encrypted Personal Health Identification Numbers (PHINs), physician identification numbers, and additional QI-related variables, was transferred to MCHP for the evaluation. After removal of outliers, the analysis cohort comprised 571 intervention physicians and 576 control physicians.

An initial look at the QIs revealed that many were not triggered frequently enough to be analyzed. QIs that targeted a pediatric population (<18 years old) had very low numbers of QI triggers (<200 total for each), as did two QIs related to simultaneous prescriptions for two or more different selective serotonin reuptake inhibitors (SSRIs; <1000 total for each). In contrast to these, many of the QIs related to benzodiazepine prescriptions had high quality-indicator trigger rates (QI trigger rates), with one QI having a total number of triggers greater than 50,000. The primary analysis used an intention-to-treat framework, where the monthly rate of QI triggers for the intervention group of physicians was compared to the monthly rate of QI triggers for the control group of physicians. An effect of IMPROVE would be found if, over the course of the study period, the change in QI trigger rates for intervention physicians was greater than the change seen in the control-group physicians.

Results and Interpretation

The intention-to-treat analysis found that IMPROVE had a significant positive impact on five of the six primary QIs that were tested. Three of these were among the highest frequency QIs (>13,000 triggers in the study period), an important factor when evaluating the program's overall impact. All five were related to benzodiazepine prescribing or anti-insomnia agent prescribing. Table E.1 summarizes the frequency of QI trigger rates and results for the analyses.

Table E.1: Summary of Intervention Effect and Number of Quality Indicator Triggers in the Manitoba IMPROVE Program, 2011–2013

Quality Indicators	Frequency of QI Triggers	Intervention Effect
Primary		
Benzodiazepines for youth	Low	Insufficient triggers
Benzodiazepines for adults	High	Significant
Benzodiazepines for older adults	Moderate	Significant
Long-acting benzodiazepines for older adults	High	Significant
High-dose benzodiazepines for youth	Low	Insufficient triggers
High-dose benzodiazepines for adults	Moderate	No change
Anti-insomnia agents for adults	High	Significant
Anti-insomnia agents for older adults	Moderate	Significant
Secondary		
Psychotropics for adults	Moderate	No change
Multiple SSRIs for adults	Low	Insufficient triggers
Multiple SSRIs for older adults	Low	Insufficient triggers
Multiple prescribers of opioids for adults	Moderate	No change
Multiple prescribers of opioids for older adults	Low	No change
Failure to refill antidepressants	High	No change
Failure to refill antipsychotics	Low	No change

High frequency: greater than 13,000

Moderate: between 1,000-13,000

Low: less than 1,000

SSRI: Selective Serotonin Reuptake Inhibitor (type of anti-depressant)

Several of the QIs that did not reveal an effect of the Manitoba IMPROVE Program were not entirely in the control of the physicians. Two were focussed on patients failing to refill newly prescribed medications that should be filled more than once, and another two QIs were related to patients filling opioid prescriptions from multiple prescribers (i.e., double doctoring). On the other hand, QIs for which the program had an effect were related only to a physician not writing certain types of prescriptions.

A further analysis on just the intervention physicians found that groups of physicians who responded to the educational packages—i.e., whose QI trigger rate decreased significantly over time—were not systematically different from physicians that did not respond. This suggests that the universal application of the program to physicians is appropriate, as opposed to a more targeted approach.

The success of the Manitoba IMPROVE Program is evident from this evaluation. For the secondary QIs that did not show an effect, a decision ought to be made regarding their continued administration. Perhaps they could be replaced with different QIs that may prove to be more effective. The results of this evaluation agree with a previous review of audit-and-feedback interventions that suggest that a new QI should be fairly frequent at baseline and target a reduction in certain types of prescriptions for which a decrease in inappropriate prescribing instances is in the control of a single responsible prescriber (Ivers, Jamtevdt, Flottorp, et al., 2012).

CHAPTER 1: OVERVIEW OF PHYSICIAN PRESCRIBING INTERVENTIONS

Medical practice guidelines are continually evolving with the introduction of new therapies, interventions, and medications for dealing with complex medical conditions and diseases. Beyond the introduction of new treatments, much is also learned about the application of existing medications and treatments. Sometimes guidelines address situations where medications may be inappropriate given the circumstances of the patient being treated—i.e., something physicians should probably not be doing—and sometimes guidelines address practices that a physician *should* be doing. While guidelines are intended to produce the best care, they are not always up-to-date with the latest evidence, and may not address, or apply to all potential patient-caregiver interactions. Despite these shortcomings, keeping up to date with new guidelines can be fundamental to good practice.

In order to stay informed, the numerous professional colleges that oversee medical practitioners require licensed physicians to engage in continuing medical education (CME) activities to ensure continued development and familiarity with current practice. However, with so much information to absorb, CME may not always be enough to prevent potentially inappropriate prescribing behaviours. Those involved in translating new research and findings into practice have developed various methods to address this potential shortfall.

Maintaining knowledge of current guidelines and recommendations for care, particularly related to prescribing behaviours, is not a minor issue for patient care in Manitoba. Sketris and colleagues (Sketris, Langille Ingram, & Lummis, 2009) described an environment where 22,000 different drug products are on the market, 94% of patient visits resulted in a written prescription (which may or may not actually be filled), and over 80% of 400 million dispensed prescriptions in Canada were written by family physicians. The challenge facing physicians when making a decision about patient treatment is that there are many competing and sometimes complementary factors that influence decision-making (Sketris et al., 2009). These factors can be divided into a few categories. Prescriber factors such as competency, experience, and knowledge are important factors that could affect a decision. Regulations and licensing from professional societies, government legislation, control policies, and public financing for drugs could also affect decisions. Patient factors such as age and other diseases or drugs also play a role. A patient's socioeconomic status, knowledge, and beliefs about treatment may affect a prescriber decision. Finally, the media can influence both physicians and patients, and the private sector can have an effect through marketing to physicians and direct marketing to patients. An intervention aimed at altering prescribing behaviours of physicians would have to address many of these factors when a treatment decision is made.

In practice, there are two major approaches to bringing attention to inappropriate prescribing behaviours: academic detailing and audit-and-feedback. The two approaches are quite different in how they address prescribing behaviours of physicians, in terms of how physicians are targeted for participation, how inappropriate prescribing is brought to their attention, and how change may be measured as the intervention is carried out. In practice, they may be used separately or in concert to promote good prescribing behaviours.

Academic detailing is a process whereby physicians are engaged in educational in-person meetings with other physicians or healthcare professionals such as pharmacists or nurses (Soumerai & Avorn, 1990). The intent is to highlight particular prescribing behaviours and communicate the findings of research on potential negative consequences. Discussion includes the results of **randomized controlled trials** (**RCTs**)[1] or other research pointing to the improvement in the health of patients. Research into this approach suggests that it works best when affiliated with a recognized source of unbiased information, and that follow-up visits improve the intervention's effectiveness. These programs are typically carried out by university-affiliated institutions, non-profits, or other

1 Terms in bold typeface are defined in the Glossary at the end of this report

organizations without ties to the pharmaceutical industry. The most effective forms of academic detailing can be very labour-intensive and time consuming (Bauer, 2002), and for those reasons may best be targeted (i.e., aimed at particular physicians) rather than universal. Research has shown that well-run academic-detailing programs can be effective in altering the behaviour of participating physicians (Bauer, 2002; Horn et al., 2007).

Audit-and-feedback interventions can be run very differently from academic detailing. They do not require in-person meetings with participating physicians, although many may include in-person meetings. The fundamental component of this type of intervention is a review of physician behaviours related to the target of the intervention. An evaluation of these with reference to desired behaviours is then undertaken, and some feedback is provided to the physician. This feedback is meant to encourage a physician to come in line with accepted guidelines or with the preferred course of action supported by current evidence. The review of physician behaviour should be as close to current as possible so that the information remains relevant. Many audit-and-feedback interventions also include a target or goal for the physician and feedback may include graphic representation of their performance compared to other physicians, or their own performance over time.

Audit-and-feedback interventions have been used to address many different kinds of healthcare professionals' behaviours, such as increasing appropriate or reducing inappropriate testing or screening, increasing appropriate disease management, or increasing appropriate general care (Gardner, Whittington, McAteer, Eccles, & Michie, 2010). One such intervention has even been undertaken to address something as specific as reducing inappropriate caesarean sections (Kiwanuka & Moore, 1993). While audit-and-feedback interventions may not require direct contact with physicians, the "audit" portion of the intervention implies a level of surveillance of physicians' practice. This is typically achieved through access to electronic medical records. For an audit-and-feedback intervention of prescribing behaviours, it would require access to complete listings of physicians' prescriptions for some defined period of time, or at least all of the prescriptions for the drugs that are being addressed in the intervention.

Research into audit-and-feedback interventions has also shown that these interventions can be effective. Wessell et al., (2012) conducted a study of an audit-and-feedback intervention that found a significant reduction in potentially inappropriate therapy and potential drug-disease interaction. Their study also included physician "champions" within each clinic where the intervention was tested, site visits by a research team, and network meetings with practice liaisons (Wessell et al., 2012). This was a more resource-intensive version of an audit-and-feedback program than the **Manitoba IMPROVE Program** (IMPROVE) that is evaluated in this report. While such results are very promising, previous studies of audit-and-feedback programs related to prescribing behaviours rarely employed the use of a RCT design, the gold standard for evaluation. Most studies have compared **rates** of physician behaviours before implementation to the rates after implementation of an intervention (Ivers, Jamtevdt, et al., 2012).

A Cochrane review of audit-and-feedback interventions identified over 3,000 published articles on audit-and-feedback interventions of medical practice, but only 109 RCTs that met the basic inclusion criteria for a systematic review. Only 70 were able to be analyzed further, however, and only 26 comparisons were included in a sub-analysis on prescribing behaviours. The rest had an unacceptable or high risk for bias, did not include a baseline measure of performance necessary to adequately assess an intervention (i.e., groups were only compared after the intervention), or measured patient outcomes rather than physician behaviours. The general review also addressed which aspects of audit-and-feedback interventions proved most effective. First, poor baseline performance was associated with greater effects. The effects were also larger if feedback was provided by a senior colleague, both verbally and in writing, and when it included specific targets and some type of action plan (Ivers et al., 2012). It will be made clear in the next chapter that much of the above does not apply to the Manitoba IMPROVE Program, though it is an audit-and-feedback program. However, two factors clearly do apply: 1) That the intervention should target a decrease in current behaviours; and 2) That it is directed at prescribing behaviours. It remains to be seen whether IMPROVE's simple written feedback generated from administrative data has an impact on physician prescribing behaviours.

All of the analyses presented in this report used data from the **Population Health Research Data Repository**, housed at the **Manitoba Centre for Health Policy**. De-identified data from various datasets (e.g., hospital discharge abstracts, **physician visits**, and prescription drugs) in the Repository can be linked using a unique person-level identifier, a scrambled version of the **Personal Health Identification Number** issued to every Manitoban by **Manitoba Health**, **Healthy Living and Seniors** (formerly Manitoba Health).

CHAPTER 2: THE MANITOBA IMP℞OVE PROGRAM

Manitoba IMP℞OVE Program

Brief Description

In April 2011, the Manitoba Government introduced a program that aims to improve the safety and health outcomes for Manitobans receiving mental-health medications (Manitoba Government, 2011). This first-in-Canada initiative, called the Manitoba IMP℞OVE Program (Improving Medication Prescribing and Outcomes Via Education, or IMP℞OVE), is an audit-and-feedback protocol. To date, no other population-based audit-and-feedback program run on administrative data is known to have been conducted in an open, universal insurance healthcare system in Canada, particularly as it relates to the prescribing behaviours of physicians.

IMP℞OVE is based on monthly reviews of mental-health-related medication prescriptions found in the **Drug Program Information Network** (**DPIN**) **Data**. If a prescription pattern is identified that suggests a patient is at risk of a negative health outcome, an alert is mailed to the prescribing physician. This patient-specific alert is educational in nature, and provides information about the clinical issue of concern, some clinical considerations to modify or improve the patient's prescription, and a list of literature references. The cover letter sent to physicians and the educational packages specific to each **quality indicator** (**QI**) are given in Appendix 1.

To execute the Manitoba IMP℞OVE Program, Manitoba Health, Healthy Living and Seniors (MHHLS) contracted with **Comprehensive NeuroScience of Canada** (**CNSC**), a company that specializes in clinical analytics (Manitoba Government, 2011). This company is a wholly-owned subsidiary of **Care Management Technologies** (**CMT**), based in Morrisville, North Carolina. Using CMT's proprietary clinical algorithms, referred to as QIs (Donley Communications, 2011), CNSC reviews the drug dispensation data to identify instances where a patient has filled prescriptions that have "**triggered**" a QI, and looks for the responsible prescriber.

MHHLS partnered with the University of Manitoba's Department of Psychiatry and Department of Family Medicine to identify clinical scenarios where drug prescribing could be improved, based on QIs previously established by CMT for audit-and-feedback programs (Manitoba Government, 2011). In selecting the QIs for Manitoba, MHHLS had CNSC screen one year of DPIN data against CMT's existing set of 140 QIs, developed from similar programs CMT has run for providers and insurers in the United States. At the same time, MHHLS created two advisory panels with representation from psychiatrists and family medicine/primary-care physicians. These two panels were led by Dr. Murray Enns, Professor and Head of the Department of Psychiatry at the University of Manitoba, and Dr. Jamie Boyd, Professor and Head of the Department of Family Medicine at the University of Manitoba. MHHLS presented the QI screening results to the panels, who then selected QIs for IMP℞OVE based on clinical scenarios that were felt to have a high clinical impact. Impact was defined both by the extent of occurrence (i.e., frequency) in Manitoba and by the importance of the clinical issue. In the end, fifteen QIs were chosen, with some minor customization of the QIs prior to the program's implementation.

MHHLS decided at the outset to roll out the program in phases. A subset of QIs that were deemed most important by the panels and MHHLS would be launched first, targeting a subset of randomly chosen physicians. During the first year of the program's implementation, a decision was also made to conduct a systematic evaluation of its effectiveness. As a result of these decisions, the implementation of the program occurred in a way that allowed this evaluation to be completed in a systematic, reliable, and valid manner. The initial launch of the program was for all intents and purposes set up as an RCT at the physician level, allowing for a full evaluation of the program's impact. As a result, much of this report uses terms typical in describing an RCT.

Randomization of Physicians

Eligible physicians were assigned randomly either to the **intervention group**, who began to receive **educational mailing packages** about their prescribing behaviours immediately, or to the **control group**, who did not receive mailings. Unfortunately, physicians working together in clinics could not be identified using available administrative data, and some contamination of effect may have occurred where intervention and control physicians practice together. The potential for any influence was felt by the study authors to be minimal. Such contamination could only result in a small bias toward finding no effect of the program on physician prescribing, since control physicians would be unintentionally exposed to the intervention. After the randomization, IMP℞OVE was conducted for over a year. At the end of the study period, a dataset was extracted for evaluating the impact of this intervention.

For the **Manitoba IMP℞OVE Program Evaluation Data**, inclusion of observations for triggered QIs was based primarily on the triggering physician's inclusion in the study group. To be eligible for the evaluation dataset, a physician had to appear in the MHHLS provider registry before May 2011. At this time, all physicians in the chosen specialty groups who were present in the registry and approved to practice in Manitoba were assigned randomly to one of the two study groups: intervention or control. The physician specialties included in the program were chosen if they were likely to provide ongoing care to patients and if psychoactive substances (i.e., drugs for mental health conditions) might be prescribed. Physicians who entered practice in Manitoba after the randomization date were not part of the study group. Any triggered QIs associated with these physicians were not included in the evaluation dataset. There were also physicians who were present in the provider registry and eligible for the program, but were excluded from the research dataset. For the most part, this was because they were not practicing physicians—they appeared in the provider registry only because they maintained a billing number with MHHLS. Other reasons for the exclusion of physicians are described below, under Creating the Evaluation Dataset. There are additional inclusion and exclusion criteria at the QI level, and these are also presented.

Manitoba IMP℞OVE Program Quality Indicators

Fifteen quality indicators (QIs) were run in the Manitoba IMP℞OVE Program. Approximately half of them came into effect at the start of the program (primary QIs), and the remaining (secondary) QIs were delayed until February 2012. Although the secondary QIs provide a shorter period of time for evaluation, there is one year of follow-up, so any effect of the program should be detectable. Table 2.1 below briefly describes these QIs.

Table 2.1 shows that the main focus of the initial set of QIs was on prescription behaviours related to **benzodiazepines**. Benzodiazepines are central-nervous-system depressants (they are used to slow down the nervous system) and are typically classified as having short-, intermediate-, or long-acting half-life, to reflect how long they take to be eliminated from the body. Most often, they are prescribed for anxiety or panic disorder, but are also used to treat insomnia, muscle spasticity, and alcohol withdrawal, or, more rarely, for symptoms related to epilepsy. Table 2.2 briefly describes the drug types targeted by the different QIs, and gives examples of frequently prescribed drugs and their brand names.

Table 2.1 Select Quality Indicators Included in the Manitoba IMPROVE Program Evaluation, 2011–2013

QI Number	Description	Short Name
Primary		
160	Use of two or more benzodiazepines for 45 or more days, ages 0-17	Benzodiazepines for youth
105	Use of two or more benzodiazepines for 60 or more days, ages 18-64	Benzodiazepines for adults
145	Use of two or more benzodiazepines for 45 or more days, ages 65 years and older	Benzodiazepines for older adults
138	Use of benzodiazepine with long-acting metabolites for 30 or more days, ages 65 years and older	Long-acting benzodiazepines for older adults
542	Use of benzodiazepines at a higher than recommended dose for 60 or more days, ages 0-17	High-dose benzodiazepines for youth
512	Use of benzodiazepines at a higher than recommended dose for 60 or more days, ages 18-64	High-dose benzodiazepines for adults
211	Use of two or more anti-insomnia agents for 60 or more days, ages 18-64	Anti-insomnia agents for adults
156	Use of two or more anti-insomnia agents for 60 or more days, ages 65 years and older	Anti-insomnia agents for older adults
Secondary		
206	Use of five or more psychotropics for 60 or more days, ages 18-64	Psychotropics for adults
114	Use of two or more SSRIs for 60 or more days, ages 18-64	Multiple SSRIs for adults
144	Use of two or more SSRIs for 60 or more days, ages 65 years and older	Multiple SSRIs for older adults
405	Multiple prescribers of one or more opioids for 30 or more days, ages 18-64	Multiple prescribers of opioids for adults
411	Multiple prescribers of one or more opioids for 30 or more days, ages 65 years and older	Multiple prescribers of opioids for older adults
602	Patient failed to refill newly prescribed antidepressant within 30 days of prescription ending, ages 18-64	Failure to refill antidepressants for adults
606	Patient failed to refill an antipsychotic within 30 days of prescription ending, ages 65 and older	Failure to refill antipsychotics for older adults

SSRI: Selective Serotonin Reuptake Inhibitor

Table 2.2: Drugs Included in Quality Indicator Definitions in the Manitoba IMPROVE Program, 2011–2013

Drug Groups	Definitions	Examples of Active Ingredients and Brand Names
Benzodiazepines	Depressants of the central nervous system with antianxiety, muscle relaxing, sedative and hypnotic properties. Used to treat anxiety disorders, panic disorder, anti-insomnia, seizures, muscle spasticity and alcohol withdrawal[1,2]	**Active ingredients:** alprazolam, bromazepam, clonazepam, clorazepic acid, diazepam, flurazepam, lorazepam, oxazepam, temazepam, triazolam **Brand name:** Ativan, Dalmane, Xanax
Anti-insomnia Agents	Medications with sedative and hypnotic effects. Used to induce or maintain sleep[2]	**Active ingredients:** flurazepam, meprobamate, nitrazepam, temazepam, trazodone, tryptophan, zopiclone **Brand names:** Tryptan, Imovane
Antidepressants	Medications with sedative or alerting effects on the central nervous system. Used to prevent or relieve mood and anxiety disorders (e.g., depression) and other conditions of the nervous system (e.g., nerve pain) [2]	**Active ingredients:** amitriptyline, bupropion, desvenlafaxine, duloxetine, escitalopram, fluoxetine, nortriptyline, paroxetine, phenelzine, serotonin reuptake inhibitors (SSRIs), sertraline, tranylcypromine, trimipramine, venlafaxine **Brand names:** Celexa, Paxil, Prozac, Zoloft
Antipsychotics	A broad group of medications used to treat various psychiatric conditions by stabilizing moods and reducing symptoms of psychosis (e.g., delusions and hallucinations), anxiety, aggression and hyperactivity[2]	**Active ingredients:** aripiprazole, chlorpromazine, haloperidol, loxapine, olanzapine, perphenazine, quetiapine, risperidone, trifluoperazine, ziprasidone **Brand name:** Abilify, Risperdal, Seroquel, Zyprexa
Opioids	Medications with effects on the central nervous and gastrointestinal systems. Used to treat symptoms of pain (acute and chronic) and coughing[1]	**Active ingredients:** butorphanol, codeine, fentanyl, hydrocodone, hydromorphone, meperidine, methadone, methocarbamol, morphine, naloxone, oxycodone, tramadol, triprolidine **Brand name:** Oxycontin, Tylenol 3, Demerol, Ultram
Psychotropics	Medications designed to influence the mind, emotions and behavior. Includes antipsychotics, antidepressants, antianxiety agents, anti-panic agents, mood stabilizers, stimulants, opiates and hallucinogens[2] Additional medications in this category are used to treat obsessive-compusive disorder, attention deficit hyperactivity disorder and other mental health conditions.	**Active ingredients:** benzodiapines, anti-depressants, anti-insomnia agents, and opioids as listed above; amphetamine, aripiprazole, atomoxetine, buspirone, carbamazepine, clomipramine, dextroamphetamine, lamotrigine, methylphenidate, moclobemide, modafinil **Brand name:** In addition to previous, Manerix, Concerta, Alertec

1 Repchinsky C (ed). Compendium of Pharmaceuticals and Specialties. Online version (e-CPS). Canadian Pharmacists Association. 2014. Available from: http://www.e-therapeutics.ca.proxy1.lib.umanitoba.ca

2 Miller BF, Keane CB. Encyclopedia and Dictionary of Medicine, Nursing, and Allied Health. 7th edition. Philadelphia, PA: Saunders; 2003

Looking again at Table 2.1[QI definitions], we can also see that several QIs are actually very similar, but apply to different age groups—for example, benzodiazepines for youth, benzodiazepines for adults, and benzodiazepines for older adults. In fact, all of the QIs in the Manitoba IMPROVE Program are analyzed within age specific categories: 0–17 years, 18–64 years, and 65 years and older. There were also two QIs in the initial group that were related to **anti-insomnia agents**—also known as hypnotics—which also include many drugs that are part of the benzodiazepine QIs (e.g., flurazepam, temazepam) in addition to other anti-insomnia agents, such as tryptophan or zopiclone.

The secondary QIs concentrated on other drugs and other types of prescribing behaviours. Rather than concurrent multiple benzodiazepines, there are QIs for adults (18–65) and older adults (65 and older) concurrent use of multiple **selective serotonin reuptake inhibitors** (**SSRIs**). For the other secondary QIs, rather than concentrating on the behaviour of a single prescriber and multiple drugs, the focus is on patients receiving prescriptions from multiple prescribers, or patients failing to refill prescriptions for drugs that would normally be dispensed at least twice to achieve effectiveness (**antidepressants** and **antipsychotics**). In contrast to the other QIs, the prescribing and dispensing of these drugs that leads to triggering the QI may be at least as, and perhaps more, dependent on patient behaviour as it is on physician behaviour.

Technical Changes to the Program

During the course of the program's administration, technical changes were made to QI definitions that affected the likelihood of QI triggers. For the February 2012 QI audit, the acceptable dose range for QI 512 was updated to reflect current research and clinical practice. A summary of these changes is given in Table 2.3, and the details are presented in Appendix 2. In addition to this dosage change, the list of drugs considered for several QIs was also changed. For the September 2012 audit, MHHLS revised the list of **Drug Identification Numbers** (**DINs**) for behavioral and **opioid** drugs to be used for the Manitoba IMPROVE Program's claims set, making both additions and deletions to the DIN list. As a result, CNSC included data on QI triggering and mailing interventions using the original DIN list from June 2011 through August 2012, and using the new DIN list from September 2012 to the end of the study period. This affected the four different QIs listed in Table 2.3. The effect of these changes was to increase the likelihood of the QI being triggered, since the primary change to the DIN list was to add more frequently prescribed drugs and delete less frequently prescribed drugs. The additions included new drugs, newly available generics, and changes in dosage. The update ensured that all relevant medications would be included in the QIs.

Table 2.3: Revised Drug Identification Numbers (DINs) and Lists Included in the Quality Indicator Definitions in the Manitoba IMPRoVE Program

Quality Indicators		Mail Out Period	Changes in Drugs	Estimated Impact
Primary				
512	High-dose benzodiazepines for adults	Feb, 2012 to Sept, 2012	Revised low and high dose ranges	37% decline in patients; 36% decline in prescribers
		Sept, 2012 to Feb, 2013	Revised DIN list	n/a
Secondary				
206	Psychotropics for adults	Dec, 2012 to Feb, 2013	Revised DIN list	Increase by 16% in QI trigger rate
405	Multiple prescribers of opioids for adults	Dec, 2012 to Feb, 2013	Revised DIN list	Increase by 19% in QI trigger rate
411	Multiple prescribers of opioids for older adults	Dec, 2012 to Feb, 2013	Revised DIN list	Increase by 19% in QI trigger rate
606	Failure to refill antipsychotics	Dec, 2012 to Feb, 2013	Revised DIN list	Increase by 4% in QI trigger rate

n/a not available

Mailing Protocol

After CNSC completed the audit for a 90-day period, a complete list of triggered QIs for all physicians was sent to MHHLS where identifying information for patients and physicians was attached. This new dataset was forwarded to CNSC, where the educational packages were assembled. The decision to filter certain QI triggers—that is, *not* to mail a package—depended on many factors other than the physician's inclusion in the intervention group. Some factors pertained to the responsible prescriber, and some to the nature of how a QI was triggered by the patient. A detailed list of mailing filters is given in Appendix 3.

The prescriber factors for mailing filters were as follows:

1. The prescriber must be identifiable
2. The prescriber must be identified as practicing in one of the listed specialties (family physician, pediatrician, psychiatrist)
3. The prescriber cannot be part of the control group

The QI factors for mailing filters were as follows (see Figure 2.1):

1. For QIs 105 (Benzodiazepines for adults), 114 (Multiple SSRIs for adults), 206 (**Psychotropics** for adults), and 211 (Anti-insomnia agents for adults), a single prescriber must be responsible for triggering the QI. If a single physician cannot be identified as responsible, then no prescriber receives an educational mailing. This will be referred to as the "multiple-prescriber filter."
2. Prescriber-requested filters. These could fall into one of three categories: a complete filter of the Manitoba IMPRoVE Program for physicians who have opted out; a filter for a particular prescriber-patient combination where the physician indicated that the treatment was appropriate; or a filter for all instances of a particular QI for a prescriber—e.g., the prescriber no longer wants to be told about patients who have triggered the psychotropics-for-adults QI.
3. For QIs 405 (Multiple prescribers of opioids for adults) and 411 (Multiple prescribers of opioids for older adults), no prescriber was mailed if two prescribers could not be identified. This filter aimed to eliminate false positives where an unknown prescriber is actually the same prescriber.

4. A redundant-QI filter. In the system developed by CMT and CNSC, QIs were ranked according to the severity of the prescribing behaviour. If the same set of prescriptions by a physician could trigger multiple QIs, then only the one of greatest importance would be mailed. These filters were run in error in the Manitoba IMPROVE Program, as there was no redundancy within the set of QIs identified by MHHLS. However, the automatic algorithm used by CMT did identify them and, unfortunately, flagged relevant QI triggers as redundant (QI 138: Long-acting benzodiazepines for older adults; and QI 114: Multiple SSRIs for adults). The result was that educational mailings were not sent when they should have been. The estimated impact of this filter is shown in Table 2.4. An irrelevant QI was identified in the data (number 806 in the table); because it was rated as more severe, it prevented mailing on QI 138 (Long-acting benzodiazepines for older adults). Because QI 806 was not being used in the Manitoba IMPROVE Program, this meant that no mailing was sent when an intervention physician triggered both QI 806 and QI 138. Any bias that may have resulted from this error would be toward finding no difference between the intervention and control physicians for QI 138, and a conservative estimate of the impact of the Manitoba IMPROVE Program.

Figure 2.1: Application of Filters to Educational Mailings for the Intervention Group in the Manitoba IMPROVE Program, 2011–2013

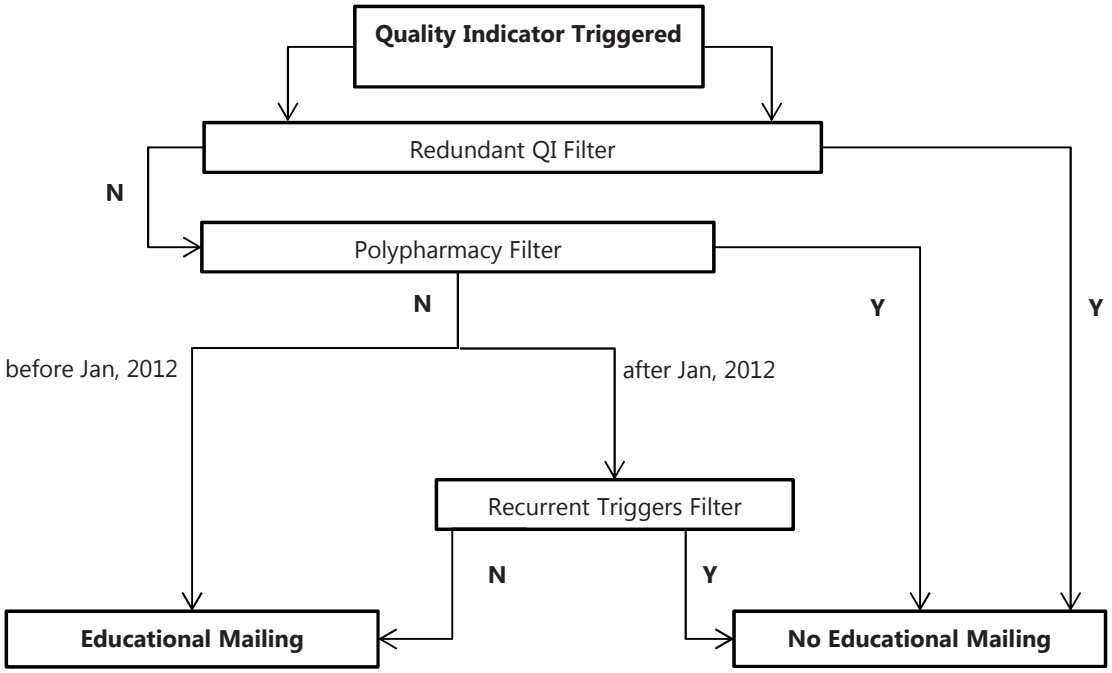


Table 2.4: Impact of Redundant Quality Indicator Filter on Mailing of Educational Packages in the Manitoba IMPRxOVE Program, 2011–2013

QI	Description	Priority	Mail Out	Redundant QI Filter	Anticipated Impact
Primary					
806	Use of long-acting benzodiazepine in elderly for 10 or more days	1	No	No	None
138*	Use of any long-acting benzodiazepine for 30 or more days (65 years or older)	2	Yes	Yes	17% of potential mail outs not completed
Secondary					
116	Use of three or more antidepressants for 60 or more days	1	No	No	None
516	Use of two or more SSRIs at a higher than recommended dose for 60 or more days	2	No	No	None
114*	Use of two or more SSRIs for 60 or more days	3	Yes	Yes	2% of potential mail outs not completed

* indicates quality indicators included in the IMPRxOVE Program; all other QIs are not part of the Program

SSRI: Selective Serotonin Reuptake Inhibitor

The Manitoba IMPRxOVE Program Educational Mailing Package

Physicians in the intervention group could have been sent an educational mailing package following their first qualifying QI trigger. This package includes a considerable amount of information, including with an introductory letter from MHHLS explaining the Manitoba IMPRxOVE Program (Appendix 1). This letter explains the intent of the program, and is signed by the Deputy Minister of Manitoba Health, Healthy Living and Seniors, the Head of the Department of Psychiatry at the University of Manitoba, and the Head of the Department of Family Medicine at the University of Manitoba. In addition, the physician receives a list of patients for whom a QI has been triggered, and for whom this physician was identified as the prescriber; and a list of all the relevant prescriptions that were filled by the patient, with the date and pharmacy location. Along with the particular patient information, an educational page is included for each QI explaining the nature of the QI, the clinical considerations that suggest the prescribing behaviour is potentially inappropriate, and citations from the medical literature regarding the potential consequences of the prescription behaviour. Finally, the package also includes a feedback form for the prescriber.

The prescriber feedback form provides physicians the opportunity to address the program and the QI triggers that have been reported to them. As highlighted above, these QIs only describe behaviours that are *potentially* inappropriate. It is possible for any triggered QI that the prescribing and treatment decisions are appropriate for the patient. If the physician indicates that this is the case, she or he will not receive further mailings for that patient. There are also rare instances in which pharmacy claims data are incorrect, usually due to input errors into the DPIN data. Physicians have the opportunity to provide feedback to CNSC, which may then affect whether or not the physician receives an educational package for future QI triggers. Summary results of this feedback are also forwarded to MHHLS as part of the transfer of data (see Appendix 4). Physicians may opt out of the program entirely, or opt out for specific patients or specific QIs. The feedback form also allows the opportunity to report that an identified prescription was not from the physician, or that the patient who filled the prescription may not be the physician's patient (Appendix 1).

Transfer of Data Between Organizations

Quality-indicator audits were based on analyses of a 90-day period. Monthly updates for the preceding 90-day period were transferred from MHHLS to CNSC facilities. These monthly updates contained completely anonymized data that were only linkable within that particular data transfer, and not between data transfers. That is, the patient and physician identifiers were new, unique random numbers for each 90-day period; these individuals could later

be identified for mailing for that particular dataset. Linkage would not be possible across updates because the algorithm for scrambling the identifiers changed with each monthly update. The data consisted of the patients' age (used to determine the applicable QIs) and all dispensations for any drug listed in the QIs examined by CNSC. No other patient data, either demographic or health-related, were transferred. The data were processed by a secure supercomputer located offsite in Toronto.

After all QI triggers were identified by CNSC, a complete list of these QI triggers was sent back to MHHLS. All prescriptions that did not result in QI triggers were ignored. MHHLS then attached identifying information to the data for triggered QIs. This included the patient for whom a QI was triggered, and the physician who was noted on the DPIN data as responsible for the prescriptions. It is important that even at this point, neither CNSC nor MHHLS were able to tell whether a QI was triggered by a physician belonging to the intervention group or the control group. This was the main source of the data for the evaluation, and both interested parties were blinded to the status of participants.

This new list of QI triggers with identifying information was then transferred back to CNSC. Only at this point was the physician's group assignment identified. Physicians in the control group had the educational mailing package for their respective QI triggers withheld. Physicians in the intervention group were further assessed, as detailed above, to determine whether the educational mailing package would be sent.

A final dataset consisting of each of the monthly QI triggers from CNSC was then prepared for the program evaluation to be conducted at MCHP. This dataset was transferred to MHHLS where the unique person-level identifier was attached, allowing for linkage to the health datasets held in the Population Health Research Data Repository (Repository). This final dataset was analyzed at MCHP.

The Manitoba IMPrOVE Program Dataset

Records in the final **Manitoba IMPrOVE Program Data** included the following:

- A unique identifier for the prescriber (encrypted)
- A unique identifier for the patient (encrypted)
- The QI that was triggered
- The year and month of the audit that identified the QI trigger
- A field to identify whether or not the prescriber was part of the control group
- A "Mail Status" field, in which "mailed" indicated that the educational package was sent to the prescriber. Several other status options are described above in the Mailing Protocol section of this report (e.g., part of control group, redundant-QI filter, multiple-prescriber filter, not mailed by physician request for QI, or QI-patient combination)
- A mailing date was also included when educational mailing packages were actually sent to the physicians.

Also included in the records were free text fields that contained any written responses from physicians to the intervention collected through the prescriber feedback forms. This field could only be populated when the educational mailing package was actually sent to the prescriber.

The Manitoba IMPrOVE Program Dataset was merged with the Repository at MCHP to enable a comprehensive evaluation of the impact and effectiveness of the IMPrOVE Program on physician prescribing behaviours in Manitoba. The merging of the data with the administrative data at MCHP allowed for the inclusion of physician and practice characteristics (e.g., physician age, practice size) in assessing the success of the randomization, and in assessing what physician practice characteristics were associated with the improvement due to the intervention. All management, programming, and analyses of these data were performed using SAS® statistical analysis software, version 9.3.

Creating the Evaluation Dataset

The final, linkable Manitoba IMPROVE Program Dataset was further refined to create the Manitoba IMPROVE Program Evaluation Data for use at MCHP. This final dataset was a subset of the full data from CNSC and MHHLS. It excluded physicians and observations that did not meet a strict set of criteria. Figures 2.2 and 2.3 below describe the flow of data and number of observations, respectively, for the included physicians and QI triggers. Exclusion criteria were applied at both the physician level and at the QI-trigger level.

The primary criterion for QI observations was straightforward: the observation must have an identifiable physician associated as the prescriber. This criterion was applied initially, and any observation without an identifiable physician was eliminated from the dataset. This could happen because the prescriber number was not properly recorded, the prescriber was not a physician (e.g., nurse practitioner), or the prescriber was not a physician in Manitoba (i.e., a prescription was written by a physician in another province).

Two additional criteria operated at the physician level:

1. The physician should appear in the original list of randomized physicians. A large number of physicians present in the Manitoba IMPROVE Program Dataset and associated QI-trigger observations were removed because they did not meet this criterion. The two primary reasons for this is that they were a) not part of the specialty groups that the program targeted, or b) they were new physicians to Manitoba after the randomization. These 656 prescribers not in the original randomization accounted for about 36% of all prescribers in the dataset, but less than 15% of all QI triggers, suggesting that as a group they are far less likely to engage in the potentially inappropriate prescribing behaviours than the targeted group. For new physicians, this could be a result of having less-complex patients.
2. **Quality-indicator trigger rates** (QI trigger rates) for a select group of physicians were disproportionately high. In all cases, the high overall number of QI triggers associated with these physicians was a result of very high numbers on one particular QI. After viewing a histogram of the number of QI triggers per physician, a decision was made to remove these physicians—and their associated QI triggers—if they had triggered any single QI more than 1,000 times over the study period. These were obvious outliers. The prescribing pattern that would result in a number of QI triggers this high is not the target of a general educational mailing program such as IMPROVE, but might benefit from a more targeted and extensive intervention. This exclusion criterion resulted in the removal of 23 physicians, 15 of whom came from the control group and eight from the intervention group. The numbers of QI triggers removed from the dataset were 45,250 from the control group (37.3% of eligible control-group QI triggers) and 13,905 from the intervention group (16.7% of eligible intervention-group QI triggers). These numbers equal an average QI-trigger total of 3,017 per physician in the control group and 1,738 triggers per physician in the intervention group. The full impact that this exclusion had on overall trigger rates for QI 105 is made apparent in analyses presented in Appendix 5.

With the remaining physicians, the sizes of the control and intervention groups were very evenly balanced with 576 intervention physicians and 571control physicians. The numbers of QI triggers were slightly different: 69,224 for the intervention group and 76,148 for the control group. This difference could be expected since the program is intended to reduce QI triggers, and could only do so for the intervention group.

Also noteworthy is the number of QI triggers in the intervention group for which an educational mailing was sent, versus those for which a mailing was withheld. As described above, under Mailing Protocol, there were a number of reasons why some QI triggers would not be mailed to prescribers in the intervention group. These mail filters resulted in about 62% of the intervention mailings being withheld, and 48 physicians who had triggered at least one QI during the study period not receiving any mailing packages at any time.

Figure 2.2: Flowchart of Inclusion and Exclusion of Physicians in the Manitoba IMPRxOVE Program Study Cohort

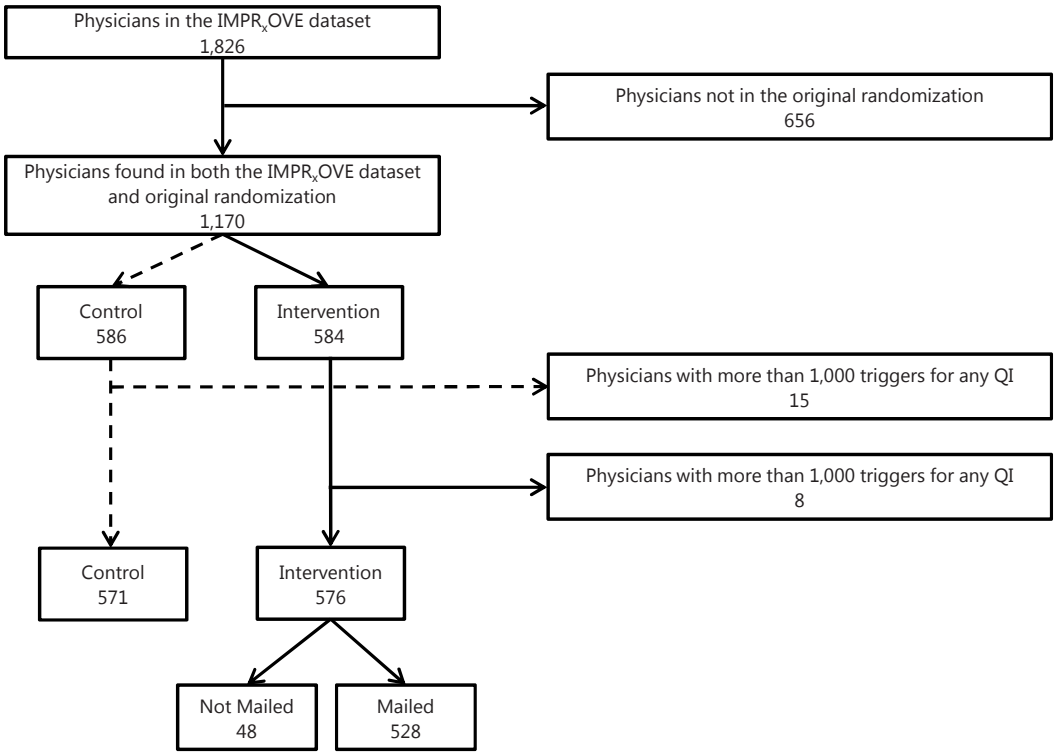
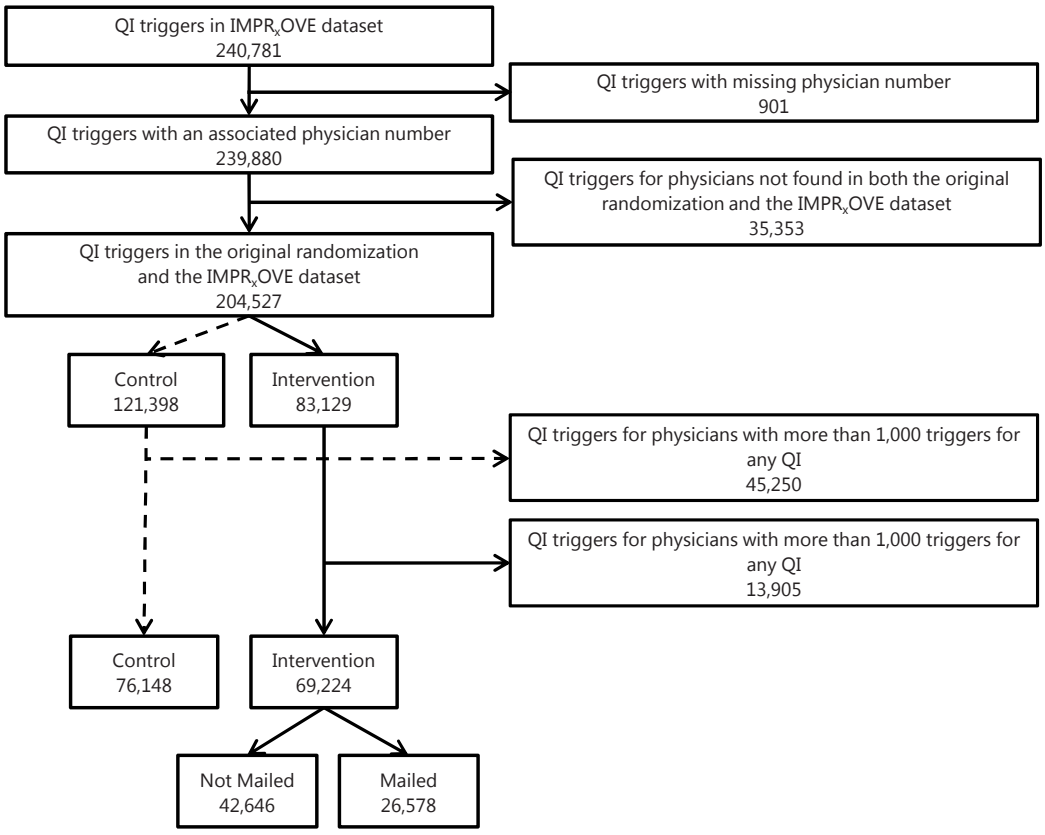


Figure 2.3: Flowchart of Inclusion and Exclusion of QI Triggers in the Manitoba IMPRxOVE Program Study Cohort



Comparing Intervention and Control Group Physicians

Before analyzing the effectiveness of the Manitoba IMPROVE Program, it was necessary to ensure that the randomization process that assigned physicians to groups was effective in creating comparable groups. Because many of the physicians originally randomized did not appear in the dataset, and a few were excluded for being outliers, the balance of physician characteristics may have been compromised. Therefore, we examined the characteristics of the physicians in each group in the final evaluation dataset, and the characteristics of their practices. The following figures and tables compare the intervention and control groups in the evaluation dataset across several factors (described in greater detail below); they also examine the physicians who were randomized but did not appear in the IMPROVE Program dataset, to ensure that there were no systematic reasons for exclusion that could lead to bias in the study's findings.

Tables 2.5 and 2.6 compares the characteristics of the intervention and control groups as identified in the original randomization with the same group restricted to those who also appeared in the Manitoba IMPROVE Program Dataset. Physician characteristics were determined using **Physician Resource Data**, a dataset held in the Repository. In the original randomization, the intervention and control groups were nearly identical for all physician specialties and overall, with no appreciable differences in age, years of practice, or location of training. When restricted to physicians appearing in the Manitoba IMPROVE Program Dataset, the only appreciable difference was for the years of practice among psychiatrists; however, this difference was not statistically significant. Psychiatry is also the specialty for which the greatest percent of physicians were dropped from the original randomization list. Thirty-two psychiatrists were excluded from the intervention group, and 37 were excluded from the control group; only 14 psychiatrists remained in each group. The greatest difference in absolute number of physicians appearing in the evaluation dataset compared to the original randomization list was among urban[2] family physicians where 78 control physicians and 62 intervention physicians were missing in the evaluation dataset. This exclusion did very little to change the characteristics of the group; age, location of training and years of practice were similar for both the original randomization list and the Manitoba IMPROVE Program Dataset. The overall intervention and control groups remained comparable, with equivalent average ages, proportions trained in Canada, and years of practice in Manitoba.

2 located in the cities of Winnipeg or Brandon

Table 2.5: Characteristics of Physicians Randomized for Inclusion in the Manitoba IMPROVE Program

Physician Specialty	Physician Group	Number of Physicians	Average Age (Years)	Proportion of Years Trained in Canada	Years of Practice in Manitoba
Psychiatists	Control	46	47.4	85.0%	13.0
	Intervention	51	47.7	84.0%	13.0
Pediatricians	Control	70	52.3	89.0%	16.2
	Intervention	76	51.3	79.0%	13.4
Urban Family Physicians	Control	375	48.5	63.0%	12.6
	Intervention	369	49.3	62.0%	13.1
Rural Family Physicians	Control	225	46.6	32.0%	8.3
	Intervention	205	47.1	33.0%	8.6
Overall	Control	716	48.2	57.0%	11.6
	Intervention	701	48.8	57.0%	11.8

Table 2.6: Characteristics of Physicians Included in the Manitoba IMPROVE Program

Physician Specialty	Physician Group	Number of Physicians	Average Age (Years)	Proportion of Years Trained in Canada	Years of Practice in Manitoba
Psychiatrists	Control	14	49.6	93.0%	16.9
	Intervention	14	47.4	93.0%	11.9
Pediatricians	Control	56	51.9	91.0%	16.0
	Intervention	65	50.9	82.0%	13.6
Urban Family Physicians	Control	297	48.2	64.0%	13.2
	Intervention	307	49.3	64.0%	13.6
Rural Family Physicians	Control	204	46.4	32.0%	8.3
	Intervention	190	46.4	32.0%	8.7
Overall	Control	571	48.0	56.0%	11.8
	Intervention	576	48.5	56.0%	12.0

Tables 2.7a and 2.7b below show physician numbers by the number of prescriptions filled for which they were identified as the prescriber. The randomized physicians that were included in the evaluation dataset were very likely (~94%) to have had at least 250 prescriptions dispensed in Manitoba for which they were the identified prescriber; over 98% had at least 100 prescriptions dispensed. On the other hand, of the 270 randomized physicians who did not appear in the evaluation dataset, over a third (n = 96) were not identified as the prescriber for even a single drug dispensation. Another 40% of these physicians had 100 or fewer prescriptions dispensed. Very few of these excluded physicians had more than 250 prescriptions dispensed (~15%). These data suggest that the excluded physicians simply were not practicing, or practicing atypically—e.g., as administrators. In the case of psychiatrists, who as a group appear to prescribe at a much lower rate, it is possible that they were operating primarily as counselors or that prescriptions were primarily being handled by primary-care physicians after the patient's care was transferred back, limiting the application of the QIs. This analysis of prescribing numbers suggests that the primary reason for the exclusion of physicians in the Manitoba IMPROVE Program Dataset, for family physicians at least, is due to a severely reduced practice or pseudo-retirement, while maintaining a billing number with MHHLS. As these physicians were not the target of the intervention, they were excluded from the analysis.

Table 2.7a: Number of Physicians by Number of Prescriptions During the Study Period, for Randomized Physicians Found in the Manitoba IMPROVE Program Dataset

Number of Prescriptions	Number of Prescribing Physicians				
	Psychiatrists	Pediatricians	Urban Family Physicians	Rural Family Physicians	Total Number
1–5	s	s	s	0	s
6–50	0	0	15 (s)	s	s
51–100	s	s	12 (67%)	0 (0%)	18
101–250	s	s	38 (75%)	s	51
Over 250	21 (2%)	118 (11%)	550 (51%)	388 (36%)	1,077

s indicates suppressed due to cell counts less than six

Table 2.7b: Number of Physicians by Number of Prescriptions During the Study Period, for Randomized Physicians Not Found in the Manitoba IMPROVE Program Dataset

Number of Prescriptions*	Number of Prescribing Physicians				
	Psychiatrists	Pediatricians	Urban Family Physicians	Rural Family Physicians	Total Number
1–5	10 (29%)	s (s)	20 (57%)	s (s)	35
6–50	22 (38%)	s (s)	26 (45%)	s (s)	58
51–100	s (s)	s (s)	9 (60%)	s (s)	15
101–250	s (s)	s (s)	12 (50%)	s (s)	24
Over 250	18 (43%)	s (s)	16 (38%)	s (s)	42

* 96 physicians had no prescriptions (not shown in table)

s indicates suppressed due to cell counts less than six

We also examined whether the practice characteristics for the two groups of physicians were similar. This analysis was not limited to the patients that appeared in the Manitoba IMPrOVE Program Dataset, but examined the entire practice of a physician. To get an impression of the patient population of a physician's entire practice, all residents in Manitoba were assigned to the physician who provided the majority of their care (i.e., majority of physician visits) using a standard MCHP **patient-allocation** algorithm. Using the **Medical Services Data** (i.e., physician billings) in the Repository, this algorithm looks at the pattern of visits of every Manitoban over a set period of time, determines which physician provided the majority of care—a minimum of three visits—and assigns the patient to that physician. Patient assignment was not restricted to physicians in the study, nor to particular practice types; patients could be allocated to a specialist of any sort, such as an oncologist or a hematologist. After this was done, a physician's practice could be described according to the patients they treat predominantly, on characteristics such as the average patient age, proportions that are female or male, etc.

The control and intervention groups showed no appreciable differences in the patient population and practice characteristics that were examined (age distribution, proportions of female versus male patients, and total prescribing and visit volume; see figures 2.4–2.7). There were slight differences in the distribution by sex—56.2% vs. 57.1% female—and in the number of visits, where the control physicians appeared to have a slightly higher number of visits over the study period. The control group also had a slightly higher number of younger patients allocated to their practices. Nevertheless, the pattern across these figures is very similar for both groups, which indicates that their practices were not substantially different and not likely to influence the evaluation.

Figure 2.4: Sex Distribution of Patients Rostered to Physicians in the Intervention and Control Groups, for the Study Cohort, 2011–2013

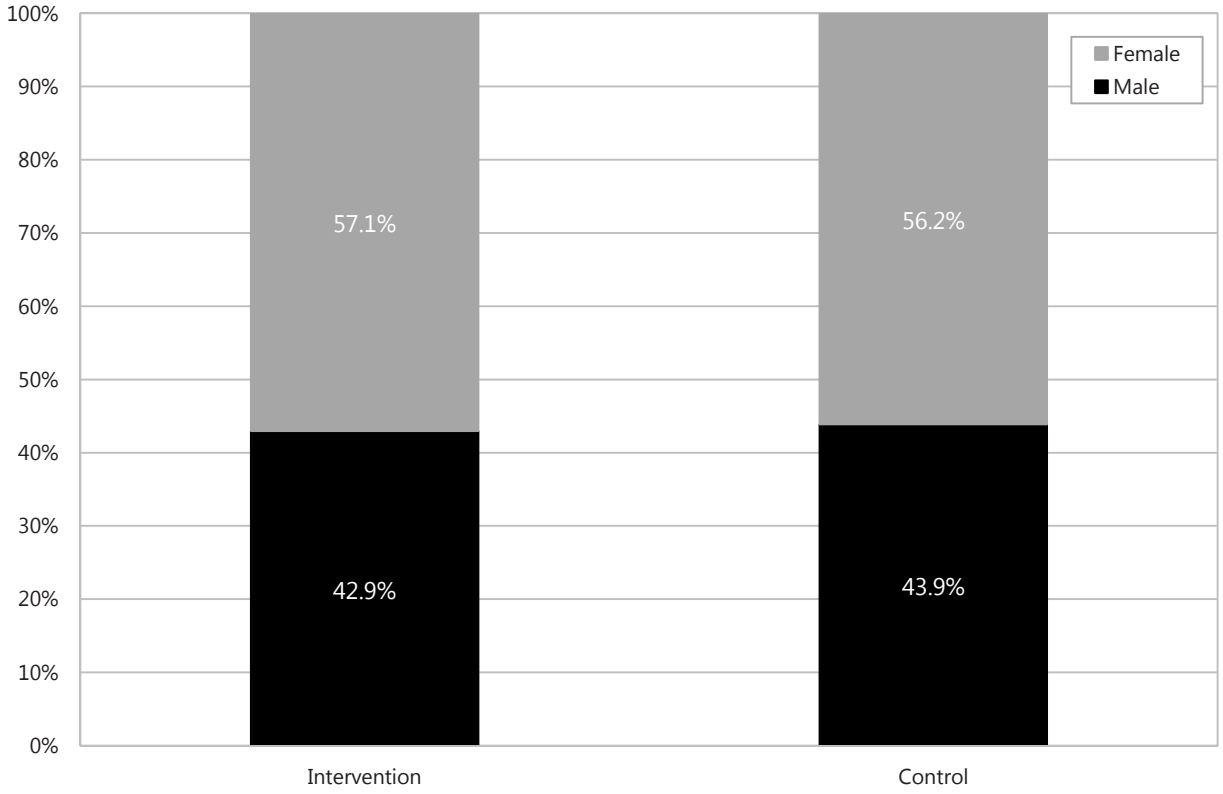


Figure 2.5: Age Distribution of Patients Assigned to Physicians in the Intervention and Control Groups, for the Study Cohort, 2011–2013

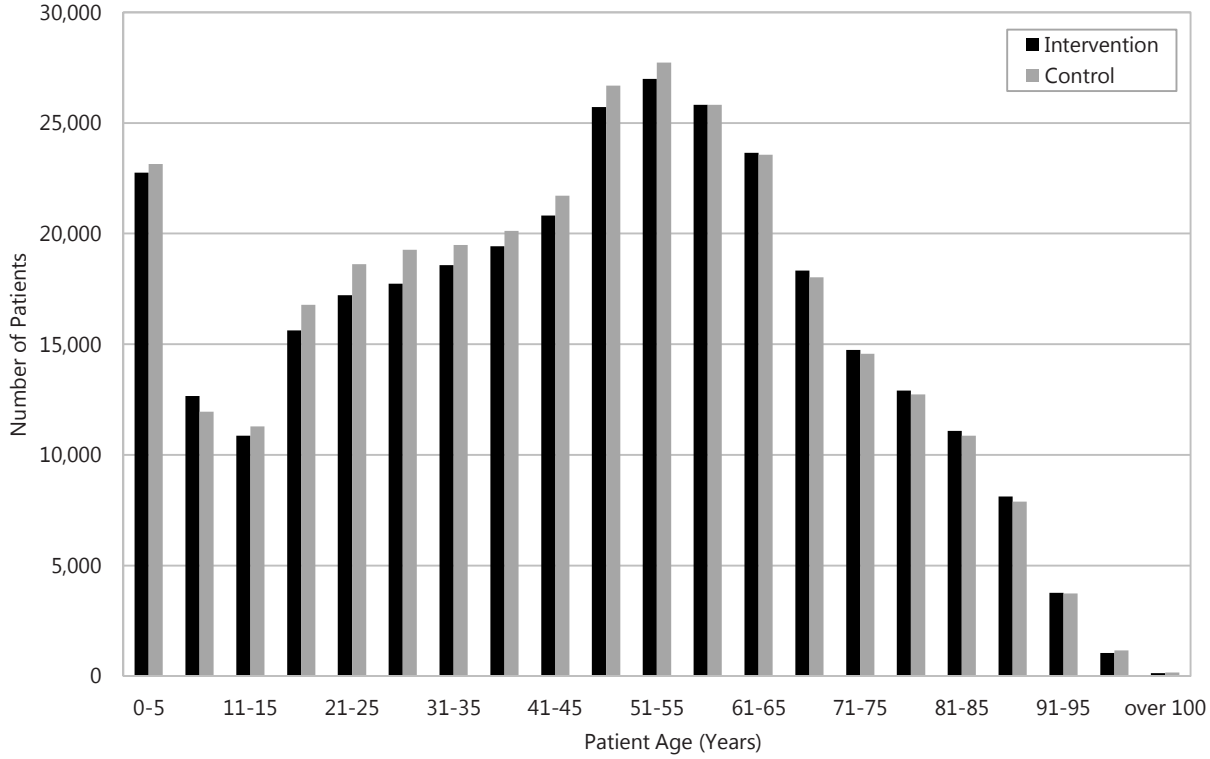


Figure 2.6: Distribution of Prescription Claims of Physicians in the Intervention and Control Groups, for the Study Cohort, 2011–2013

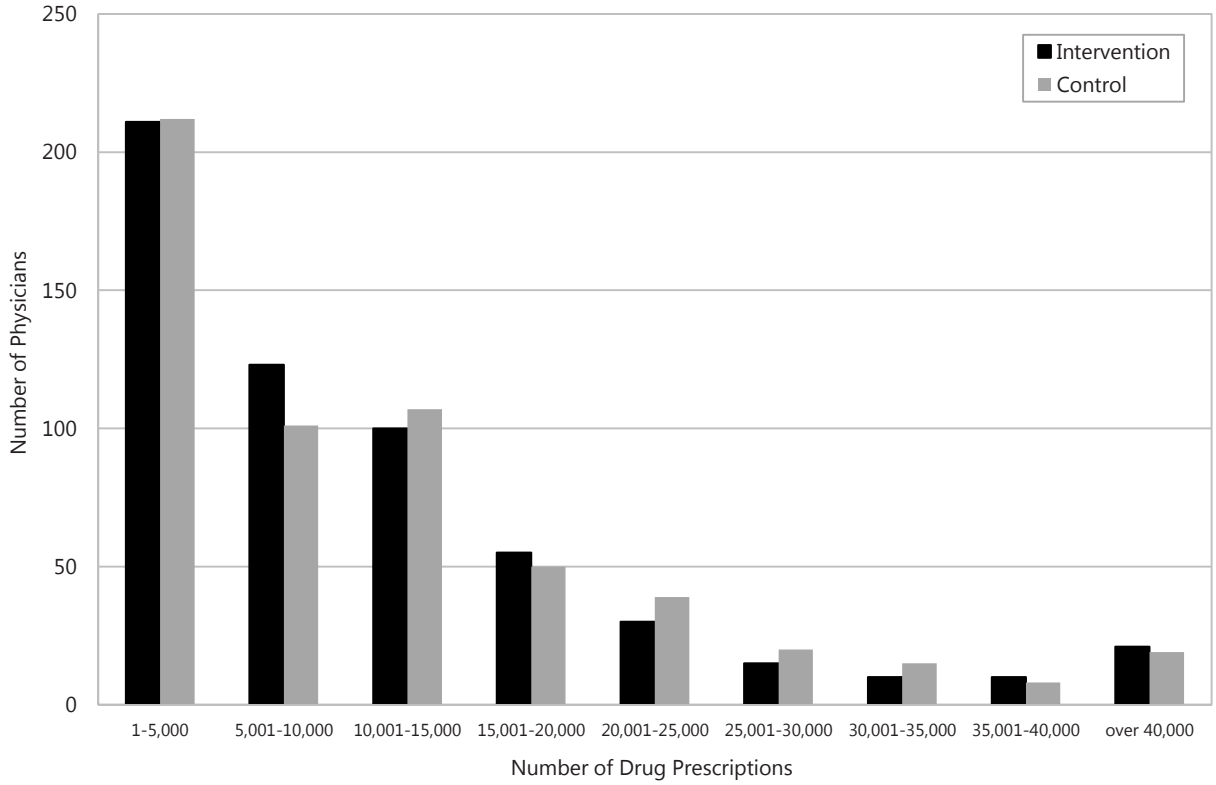
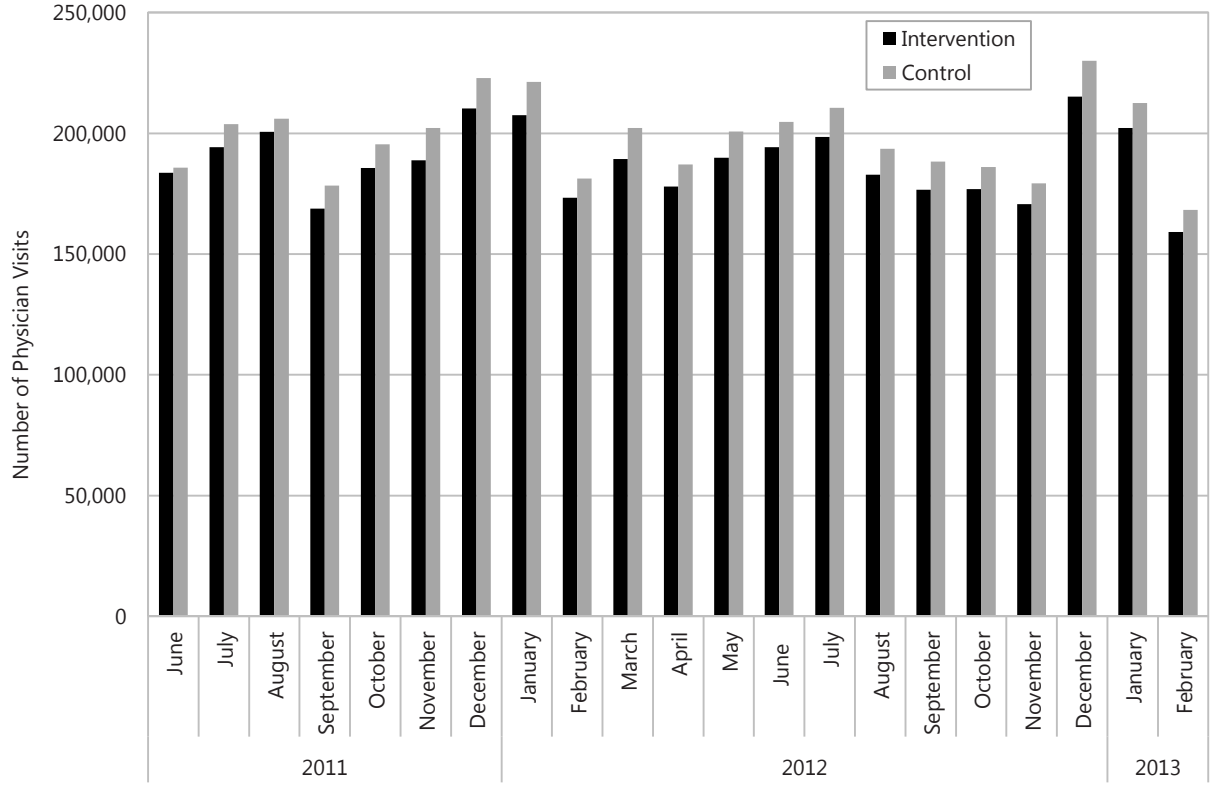


Figure 2.7: Distribution of Physician Visits in the Intervention and Control Groups, for the Study Cohort, 2011–2013



CHAPTER 3: THE MANITOBA IMPROVE PROGRAM QUALITY INDICATOR TRIGGERS DATA

This chapter takes a first look at the Manitoba IMPROVE Program Evaluation Data, and gives basic descriptive statistics of QI triggers. This is a bird's-eye view that summarizes numbers for the entire study period. As a baseline for more detailed analyses, we also look closely at the physicians included in the program to see how many times they triggered a QI, and how many different patients triggered a QI for each physician. We also conducted an analysis to determine whether any of the physician and practice characteristics presented in Chapter Two (e.g., physician age) contribute to the likelihood of a QI being triggered. This analysis was limited to QIs triggered in the first month—July 2011 for primary QIs and January, 2012 for secondary QIs—in order to get a picture of what drives QI triggering, independent of the effect of IMPROVE.

Frequency of Physician and Patient Quality Indicator Triggers

Table 3.1 below presents the total number of triggers for each QI over the course of the entire study period. In the end, some QIs could not be evaluated because they were triggered so rarely. Nevertheless, these QIs are still important. They could reflect considerable suffering and costs for the patient, family, and the healthcare system. However, without sufficient data a statistical analysis could not be completed. The two pediatric QIs (160: Benzodiazepines for youth; and 542: High-dose benzodiazepines for youth) had fewer than 200 instances across all physicians in both randomization groups. This also meant the entire group of pediatricians is effectively excluded from any additional analyses presented in this report. Quality indicators 114 (Multiple SSRIs for adults) and 144 (Multiple SSRIs for older adults) also had very few triggers and were not analyzed. The very low frequencies of these potentially inappropriate prescribing behaviours are good-news stories for Manitoba.

Several QIs were triggered between 700 and 10,000 times over the study period. Quality indicators with fewer triggers (QI 405: Multiple prescribers of opioids for adults; QI 512: High-dose benzodiazepines for adults; and QI 411: Multiple prescribers of opioids for older adults) would have a much lower statistical power to detect an effect of the program. Also, the much lower numbers could indicate that most physicians are aware of the issues related to the prescribing patterns targeted by these QIs and only engage in the behaviour when a patient's course of treatment demands it. If this were the case, we would expect that the intervention would have little effect, because it is intended to address *potentially inappropriate* prescribing behaviours. Quality indicators 105 (Benzodiazepines for adults) and 138 (Long-acting benzodiazepines for older adults) were the most frequently triggered with over 30,000 each. The next-highest number was for QI 602 (Failure to refill a new antidepressant prescription), which had about 23,000 triggers. These occur so frequently that any significant effect of the program should be detectable.

In contrast to the considerable variability in total QI triggers for the different QIs, there is much less variability in the numbers of physicians who triggered a QI at least one time over the study period. Table 3.2 shows these numbers for the QIs that had the minimum total QI triggers (i.e., excluding 114: Multiple SSRIs for adults; 160: Benzodiazepines for youth; and 542: High-dose benzodiazepines for youth). Quality indicator 606 (Failure to refill antipsychotics) had only 712 total QI triggers, which were distributed evenly between 385 different physicians in the control and intervention groups. The lowest total number of physicians triggering a QI was for QI 411 (Multiple prescribers of opioids for older adults), with only 315 physicians. The highest number was for QI 602 (Failure to refill antidepressants), with almost 1,000 physicians triggering the QI. This was despite the fact that QI 105 (Benzodiazepines for adults) and QI 138 (Long-acting benzodiazepines for older adults) had about four times as many total QI triggers. Together, these tables show a large difference in the number of triggers per physician between the various QIs, rather than a difference in the number of physicians triggering QIs. In other words, all of the QIs are applicable to a large portion of practicing physicians.

Table 3.1: Total Number of Quality Indicator Triggers in the Manitoba IMPROVE Program, 2011–2013

Quality Indicators		Number of QI Triggers		
		Control	Intervention	Total
Primary				
160	Benzodiazepines for youth	36	65	101
105	Benzodiazepines for adults	15,313	20,519	35,832
145	Benzodiazepines for older adults	4,414	5,800	10,214
138	Long-acting benzodiazepines for older adults	29,708	38,579	68,287
542	High-dose benzodiazepines for youth	24	58	82
512	High-dose benzodiazepines for adults	806	1,212	2,018
211	Anti-insomnia agents for adults	5,767	7,333	13,100
156	Anti-insomnia agents for older adults	3,537	4,079	7,616
Secondary				
206	Psychotropics for adults	4,956	7,982	12,938
114	Multiple SSRIs for adults	298	465	763
144	Multiple SSRIs for older adults	61	126	187
405	Multiple prescribers of opioids for adults	1,234	2,386	3,620
411	Multiple prescribers of opioids for older adults	457	983	1,440
602	Failure to refill antidepressants	10,690	12,678	23,368
606	Failure to refill antipsychotics	435	724	1,159

SSRI: Selective Serotonin Reuptake Inhibitor

Table 3.2: Number of Physicians Who Triggered a Quality Indicator at Least Once, 2011–2013

Quality Indicators		Number of Physicians with QI Triggers		
		Control	Intervention	Total
Primary				
160	Benzodiazepines for youth	11	14	25
105	Benzodiazepines for adults	399	404	803
145	Benzodiazepines for older adults	275	256	531
138	Long-acting benzodiazepines for older adults	462	435	897
542	High-dose benzodiazepines for youth	9	7	16
512	High-dose benzodiazepines for adults	68	75	143
211	Anti-insomnia agents for adults	326	313	639
156	Anti-insomnia agents for older adults	213	210	423
Secondary				
206	Psychotropics for adults	301	319	620
114	Multiple SSRIs for adults	58	56	114
144	Multiple SSRIs for older adults	18	16	34
405	Multiple prescribers of opioids for adults	242	257	499
411	Multiple prescribers of opioids for older adults	152	163	315
602	Failure to refill antidepressants	500	483	983
606	Failure to refill antipsychotics	198	187	385

SSRI: Selective Serotonin Reuptake Inhibitor

Of additional interest was how the number of triggers might vary by physician. Are there a few physicians with many triggers and other physicians with very few triggers? Or are they evenly dispersed across the physicians? There is another related and important issue. It is possible that a physician could trigger a QI ten times in total, but all for the same patient. Another physician might also trigger the QI ten times, but for ten different patients. The following sets of figures begin to address these possibilities. For each QI, the number of physicians by total numbers of QI triggers is presented, separating physicians by "bins"—one to five triggers, six to 50, 51–100, etc. The same type of analysis is presented in a second table for each QI, but with total number of unique patients for whom a QI was triggered, rather than total number of triggers.

Figures 3.1 and 3.2 below show these two analyses for QI 105 (Benzodiazepines for adults). We can see here that the largest group is for physicians who triggered the QI between six and 50 times. There was a small group of physicians who triggered QI 105 over 250 times over the course of the study period. However, few physicians had more than five unique patients for whom they had triggered the QI. This suggests that many patients triggered the QI repeatedly over the study period. There were more control-group physicians in the two highest categories of patients triggering QIs (11–25, 26 and older). This should not be surprising given that control-group physicians did not receive any educational mailing packages and might be more likely to perform this potentially inappropriate prescribing behaviour during the study period. An intervention physician should be less likely to trigger the QI if the packages have any effect on physician prescribing behaviours.

With many fewer QI triggers overall, the pattern for QI 145 (Benzodiazepines for older adults) is very different (see Figures 3.3 and 3.4). Most physicians had 50 or fewer total triggers over the entire study period, and very few physicians had more than five different patients trigger the QI.

The results for QI 138 (Long-acting benzodiazepines for older adults) more closely resemble those for QI 105 (Benzodiazepines for adults), perhaps because they were both very frequently triggered QIs. The majority of physicians triggered QI 138 between six and 50 times. Compared to QI 105 (Benzodiazepines for adults), however, there is a higher proportion of physicians triggering QI 138 with even greater frequency (51–100, 101–250). The figure for the number of patients also shows a similar overall trend to QI 105 (Benzodiazepines for adults), but with a greater proportion of physicians who had six or more unique patients for whom the QI was triggered. This shift to even higher numbers than those found for QI 105 (Benzodiazepines for adults) is not surprising, given that this was the most frequently triggered QI of all.

Figure 3.1: Number of Physicians Triggering Quality Indicator 105, by Total Number of QI Triggers

Use of two or more benzodiazepines for 60 or more days, patients aged 18–64

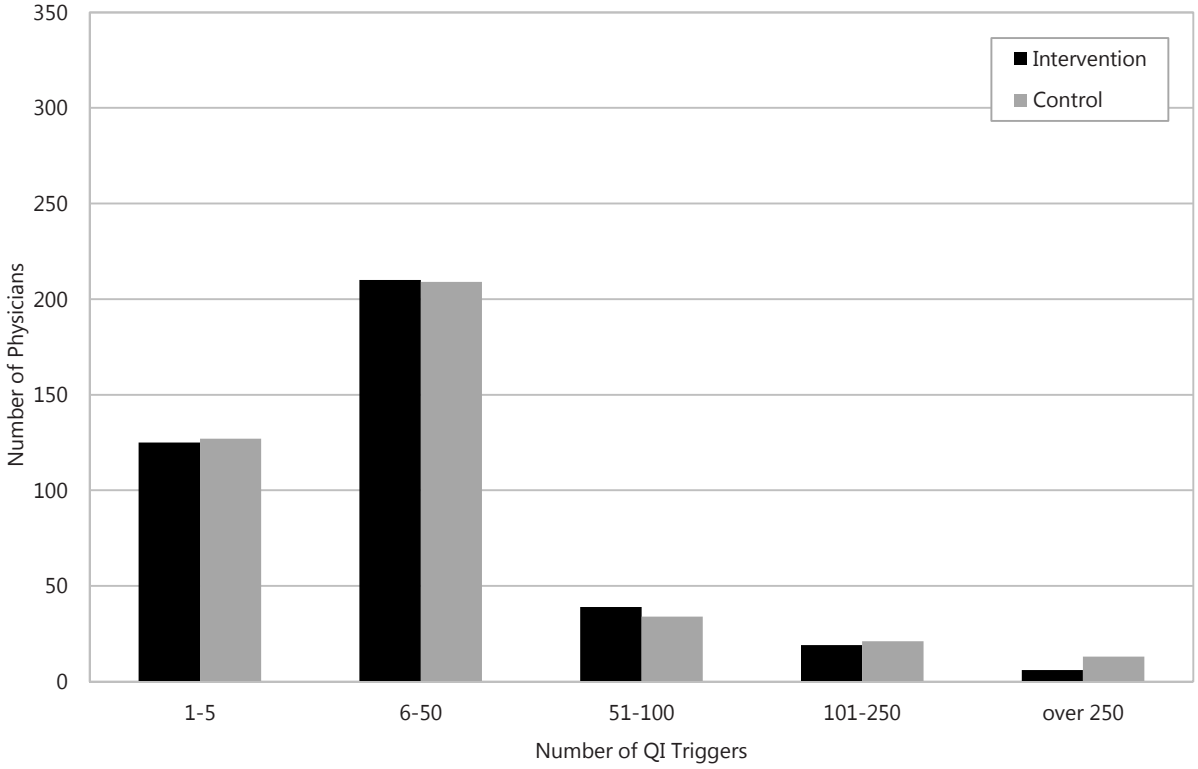


Figure 3.2: Number of Physicians Triggering Quality Indicator 105, by Total Number of Patients Triggering the QI

Use of two or more benzodiazepines for 60 or more days, patients aged 18–64

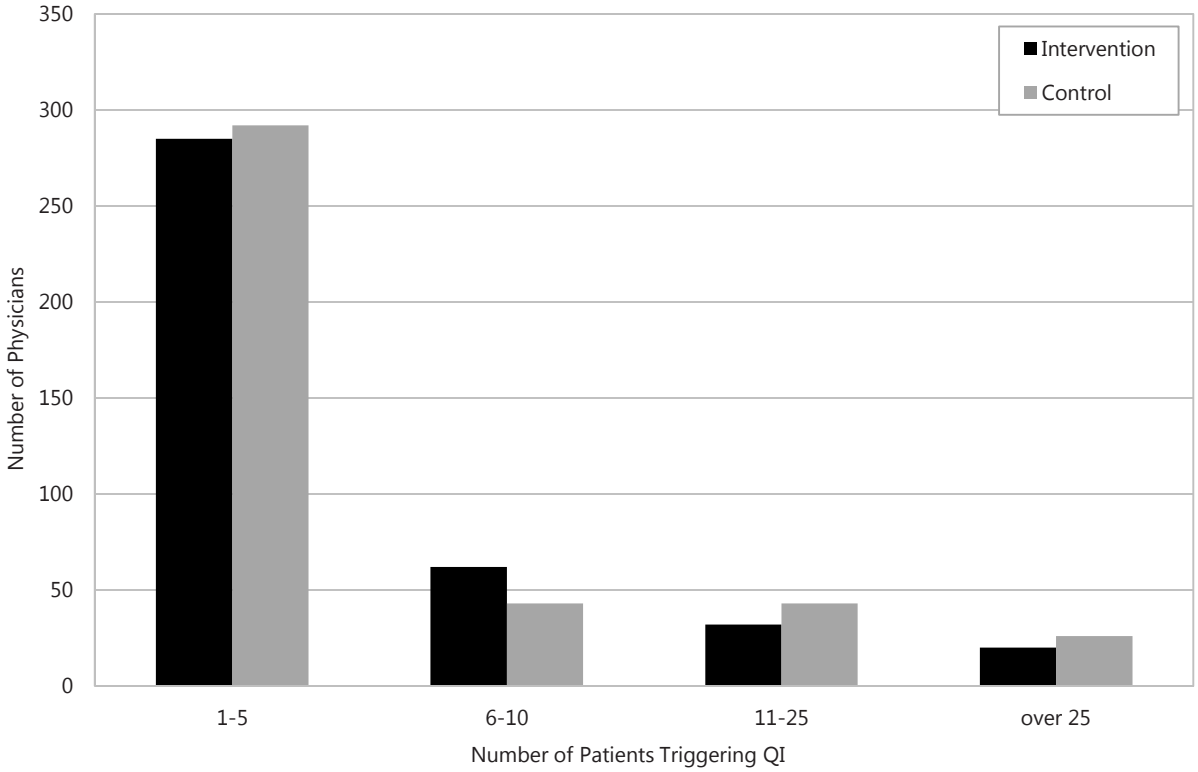


Figure 3.3: Number of Physicians Triggering Quality Indicator 145, by Total Number of QI Triggers

Use of two or more benzodiazepines for 45 or more days, patients aged 65 and older

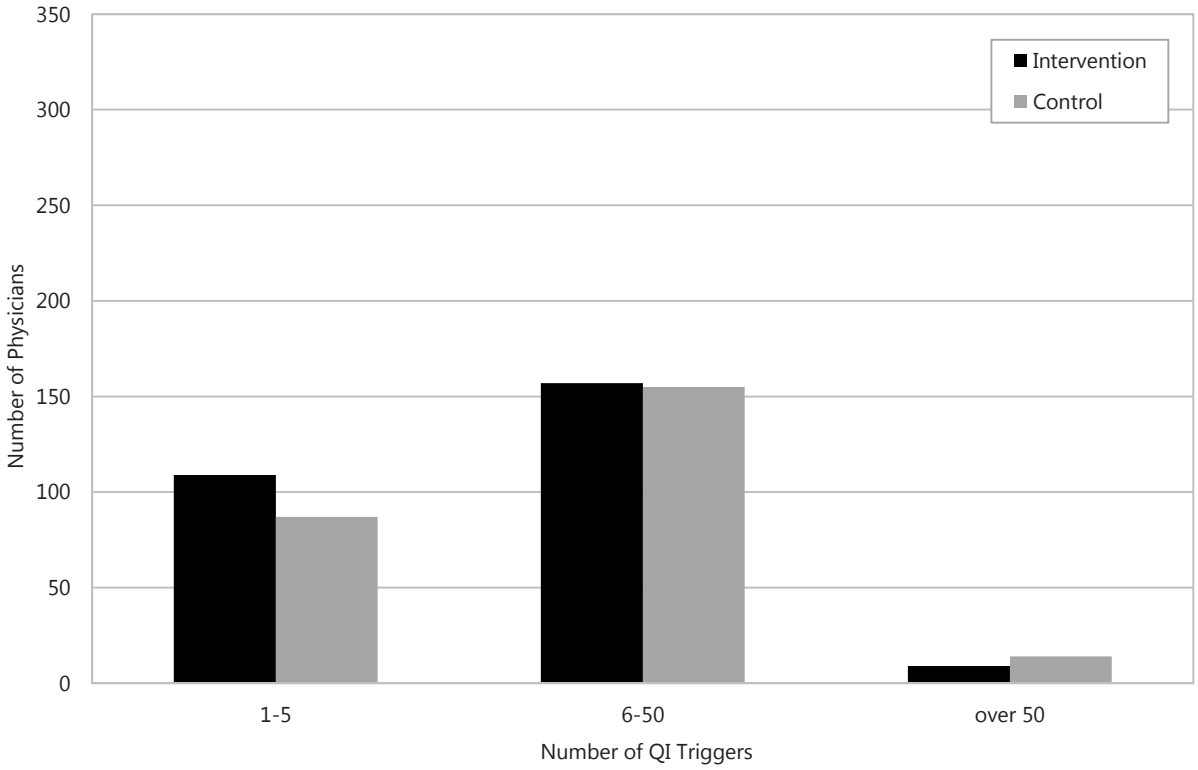


Figure 3.4: Number of Physicians Triggering Quality Indicator 145, by Total Number of Patients Triggering the QI

Use of two or more benzodiazepines for 45 or more days, patients aged 65 and older

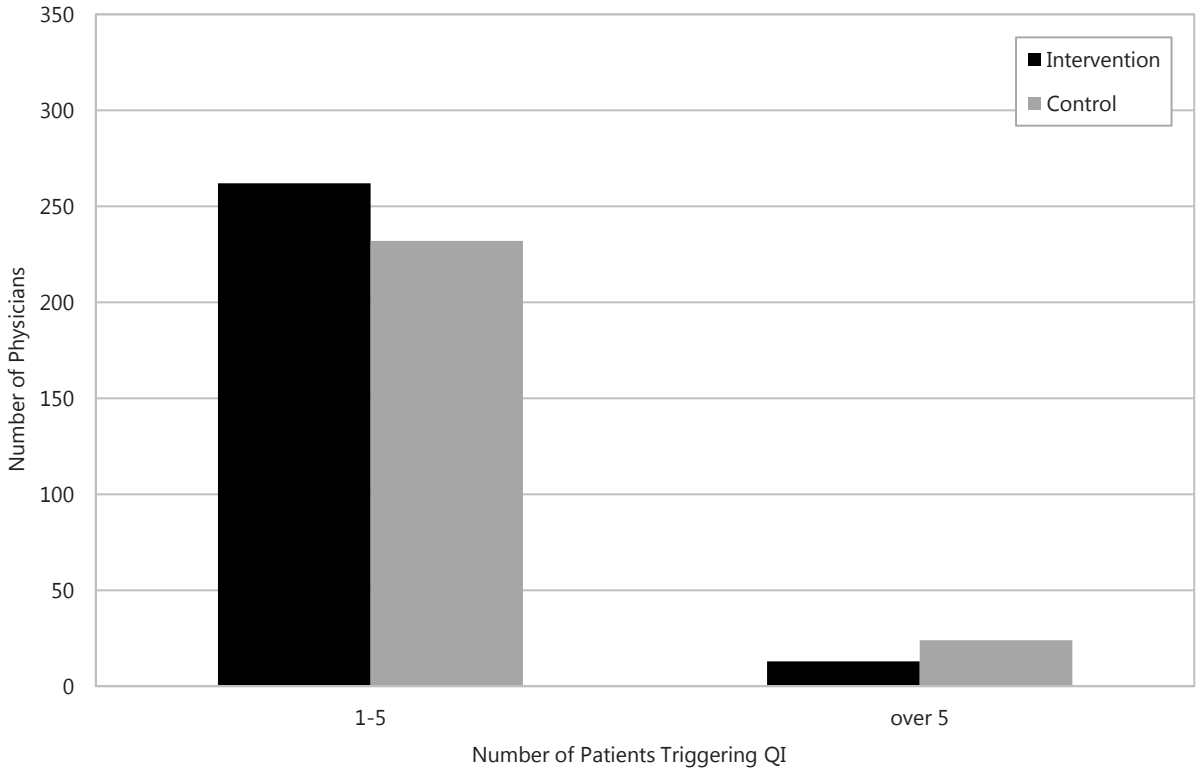


Figure 3.5: Number of Physicians Triggering Quality Indicator 138, by Total Number of QI Triggers

Use of any long-acting benzodiazepine for 30 or more days, patients aged 65 and older

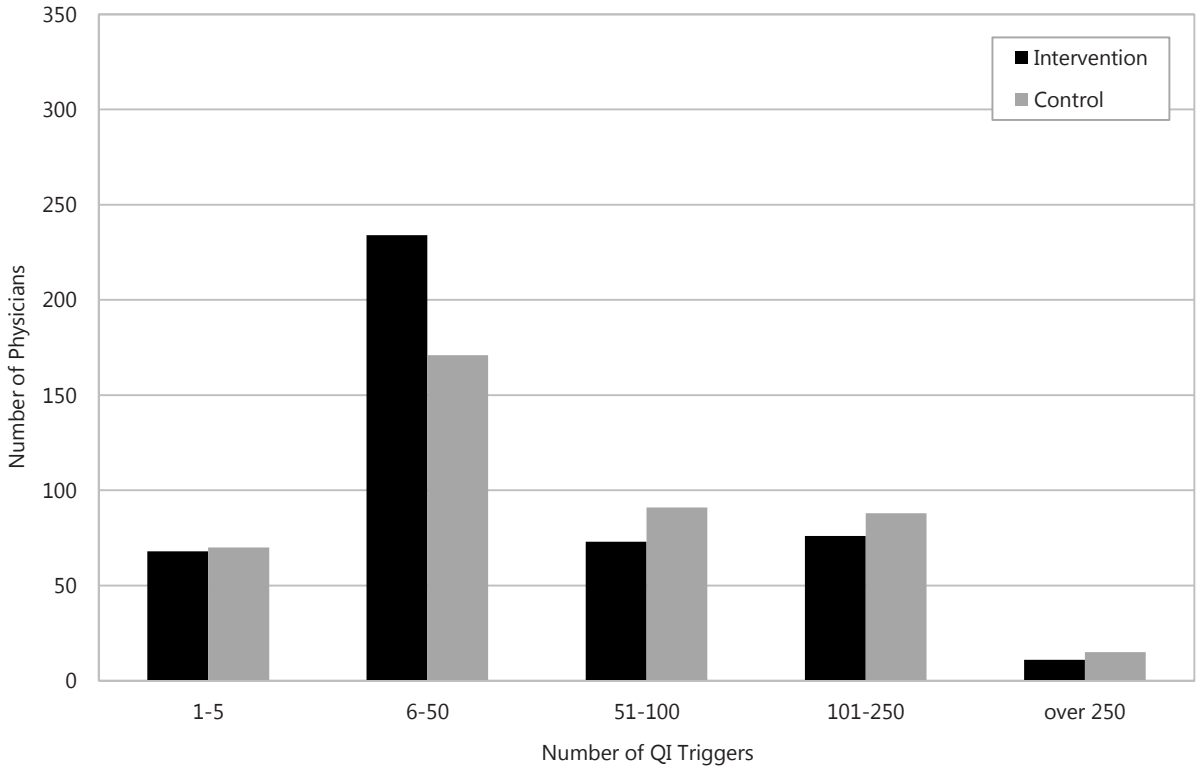
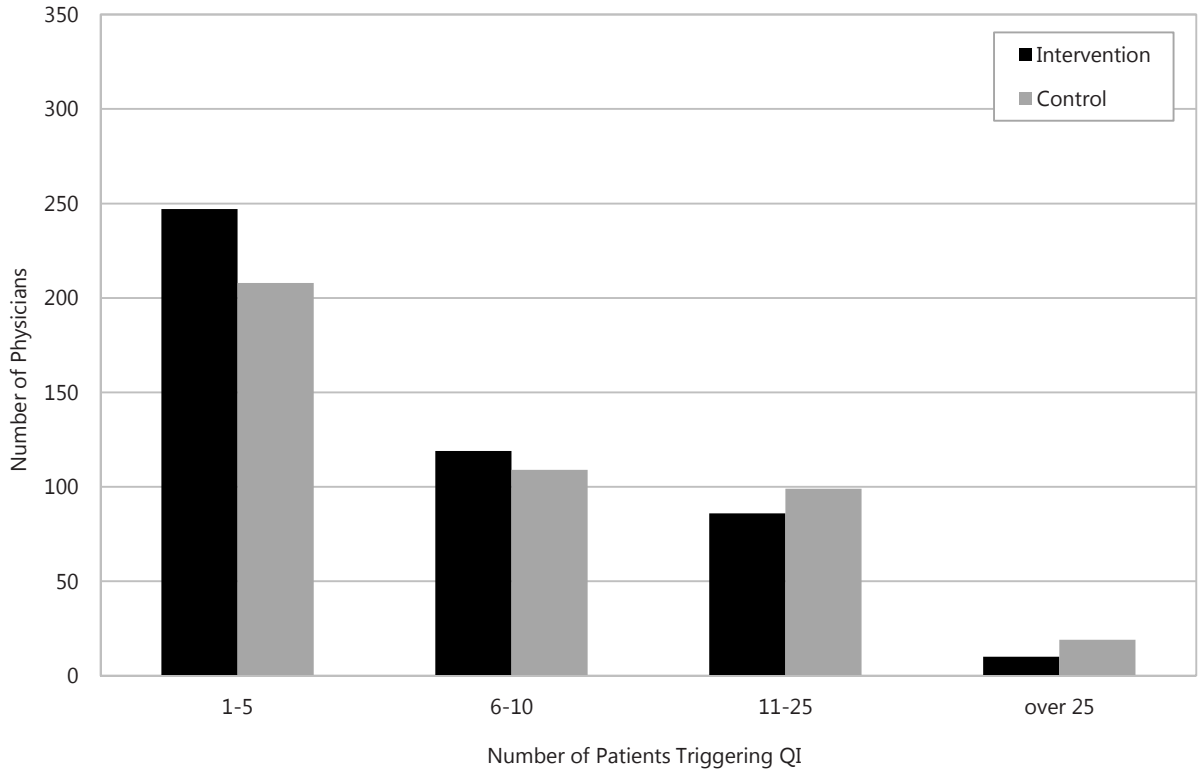


Figure 3.6: Number of Physicians Triggering Quality Indicator 138, by Total Number of Patients Triggering the QI

Use of any long-acting benzodiazepine for 30 or more days, patients aged 65 and older

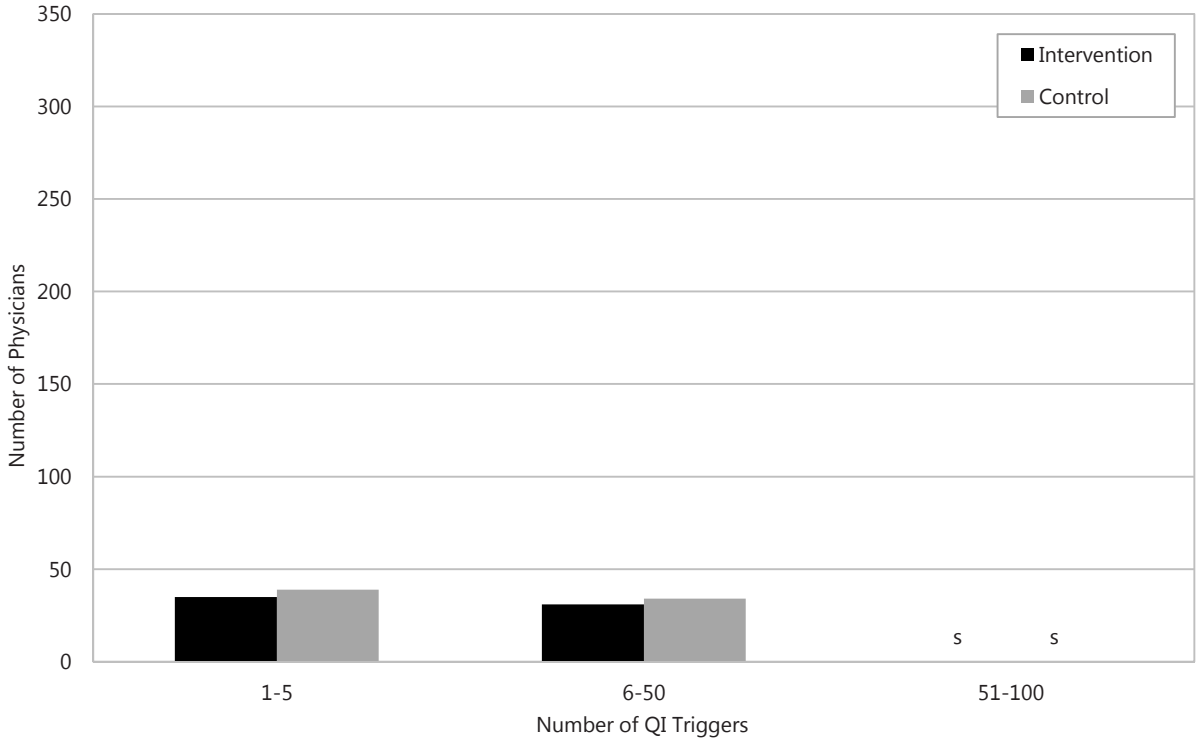


The results for QI 211 (anti-insomnia agents for adults) and most of the remaining QIs are fairly similar to those for QI 105 (Benzodiazepines for adults), but with lower numbers. The majority of physicians have a total number of triggers between six and 50, and most physicians have only had five or fewer unique patients for whom the QI was triggered. Figures 3.5–3.22 indicate that, for the most part, physicians triggered the QIs infrequently, and had even fewer total unique patients affected by the potentially inappropriate prescribing behaviour.

The one striking exception to this general trend was the QI that addressed patients failing to refill newly dispensed antidepressant prescriptions (QI 602: Failure to refill antidepressants). Most physicians have *more* than five patients triggering the QI, with a large proportion of physicians having more than 25 patients (Figure 3.19). For this QI, it appears that each instance was much more likely to be a unique patient, rather than occurring multiple times per patient. That is, most patients failed to refill an antidepressant only once.

Figure 3.7: Number of Physicians Triggering Quality Indicator 512, by Total Number of QI Triggers

Use of benzodiazepines at a higher than recommended dose for 60 or more days, ages 18–64



s indicates data suppression due to small numbers

Figure 3.8: Number of Physicians Triggering Quality Indicator 512, by Total Number of Patients Triggering the QI

Use of benzodiazepines at a higher than recommended dose for 60 or more days, ages 18–64

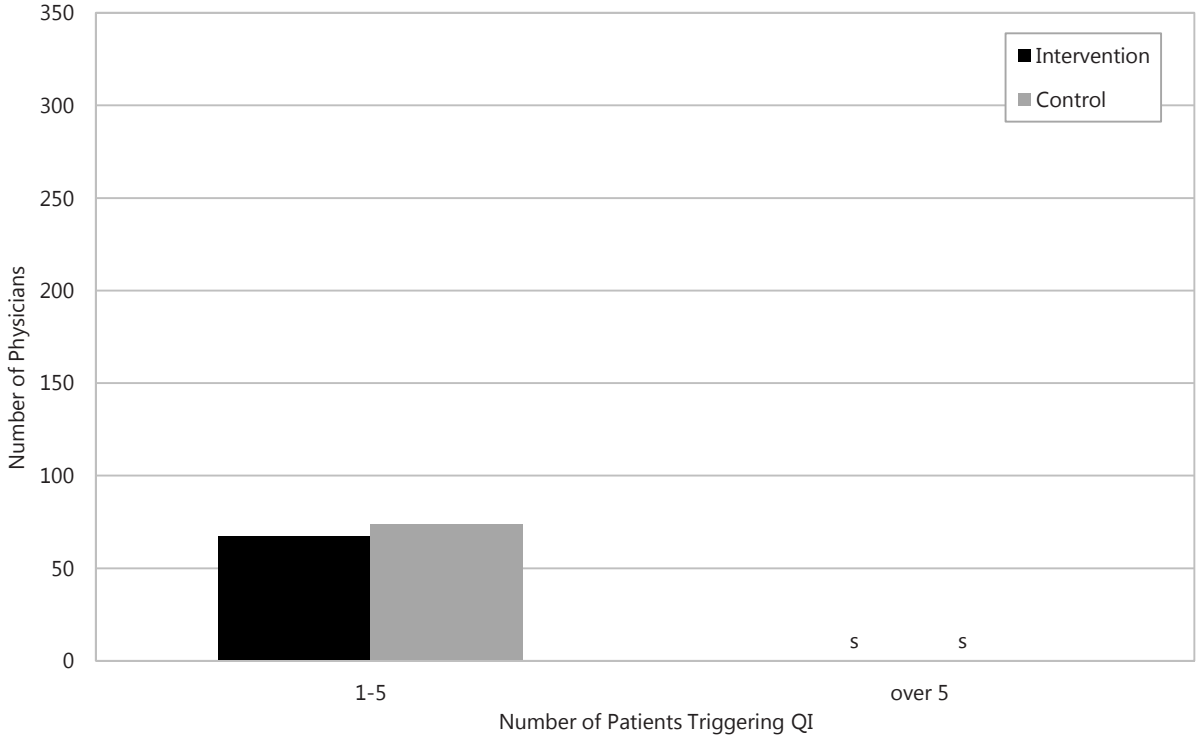


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Figure 3.9: Number of Physicians Triggering Quality Indicator 211, by Total Number of QI Triggers

Use of two or more insomnia agents for 60 or more days, patients aged 18–64

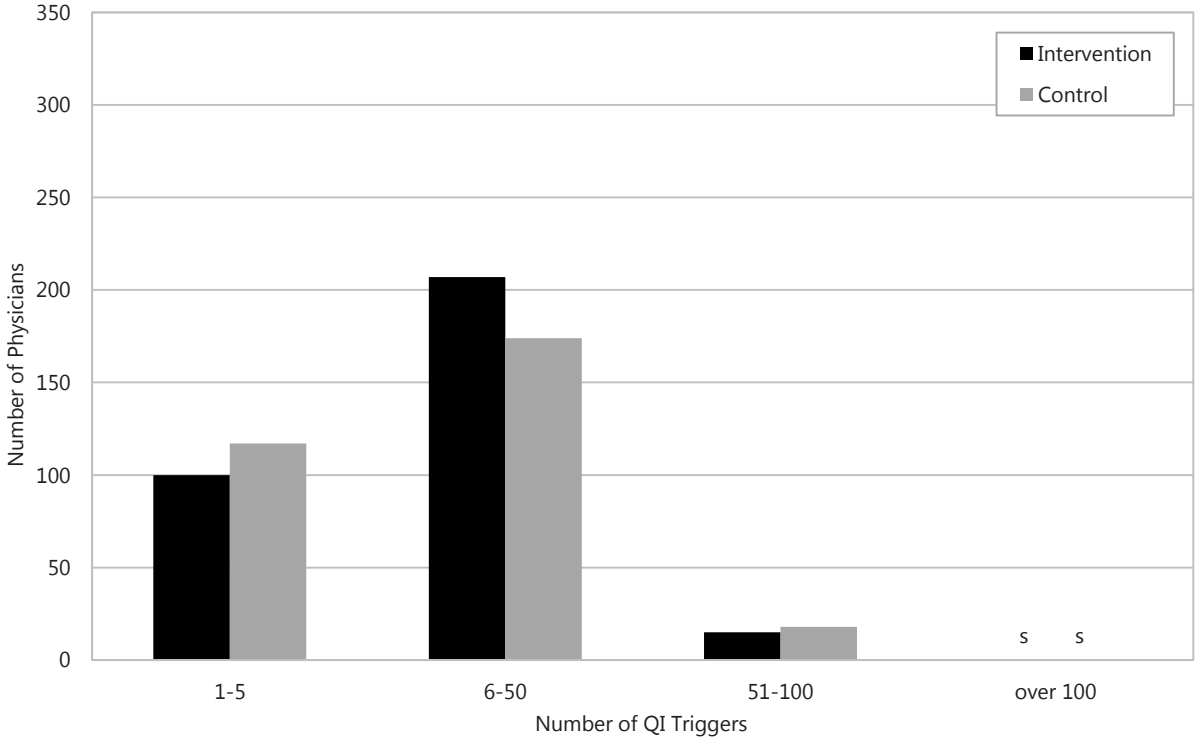

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Figure 3.10: Number of Physicians Triggering Quality Indicator 211, by Total Number of Patients Triggering the QI

Use of two or more insomnia agents for 60 or more days, patients aged 18–64

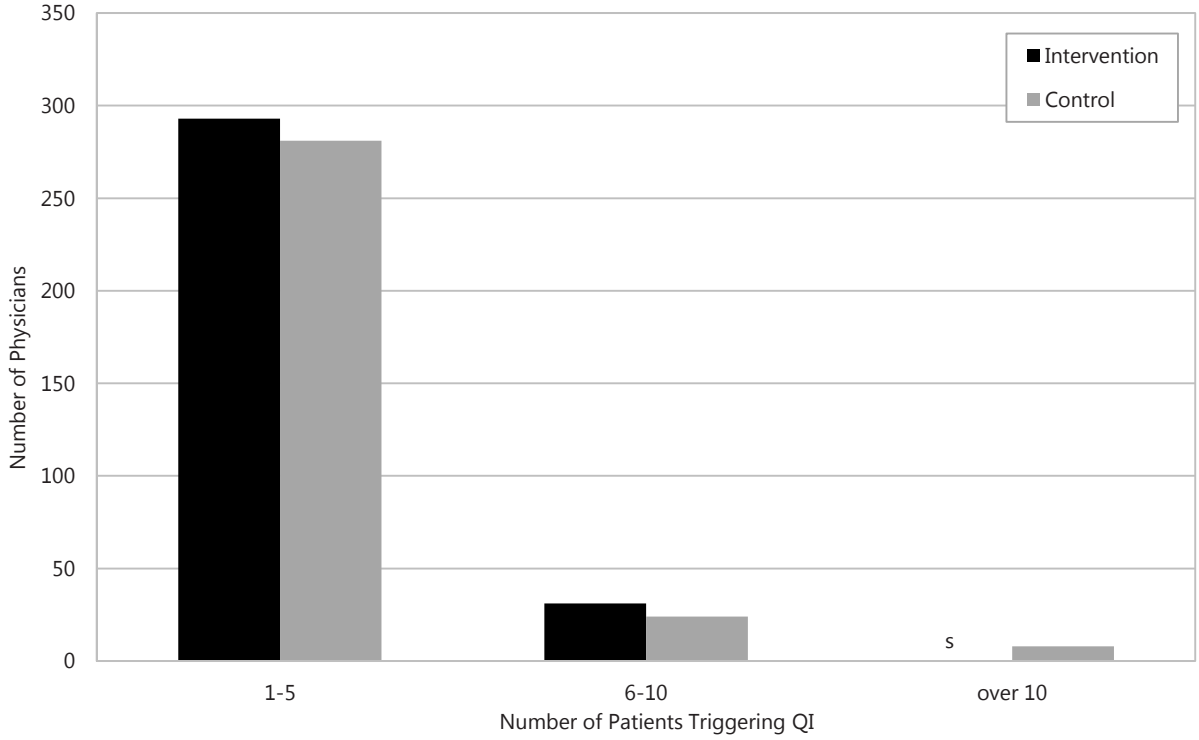

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Figure 3.11: Number of Physicians Triggering Quality Indicator 156, by Total Number of QI Triggers

Use of two or more insomnia agents for 60 or more days, patients aged 65 and older

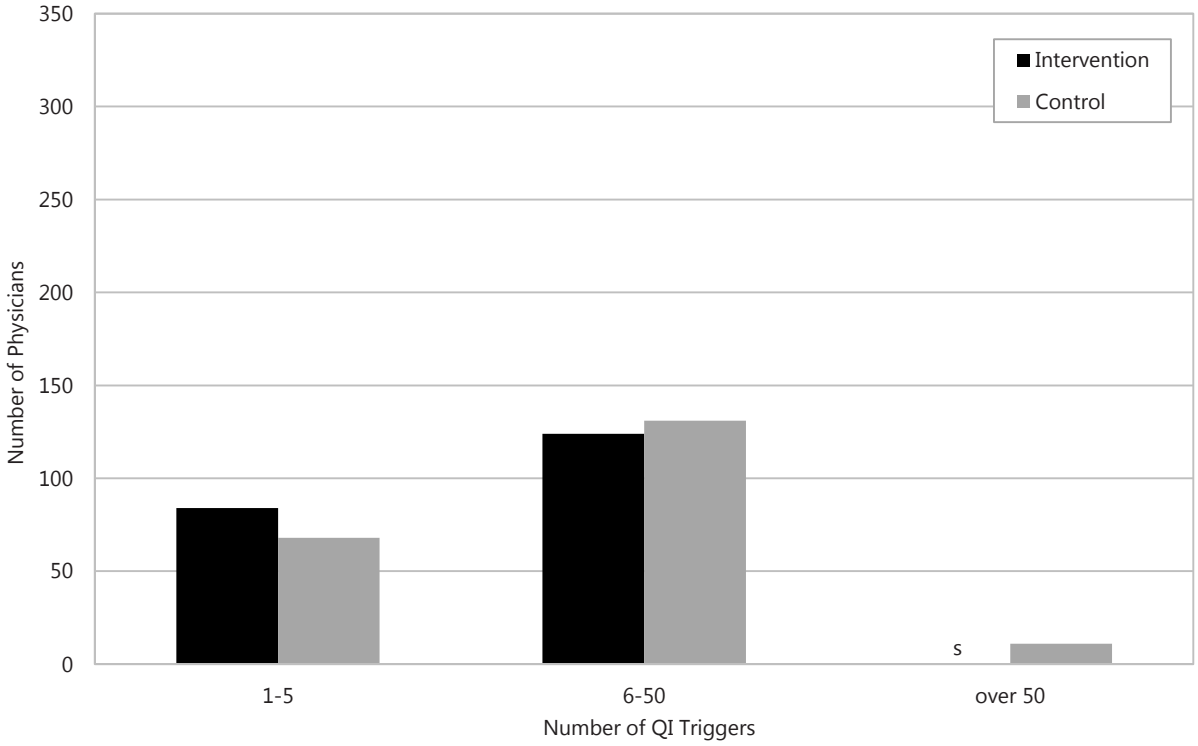

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Figure 3.12: Number of Physicians Triggering Quality Indicator 156, by Total Number of Patients Triggering the QI

Use of two or more insomnia agents for 60 or more days, patients aged 65 and older

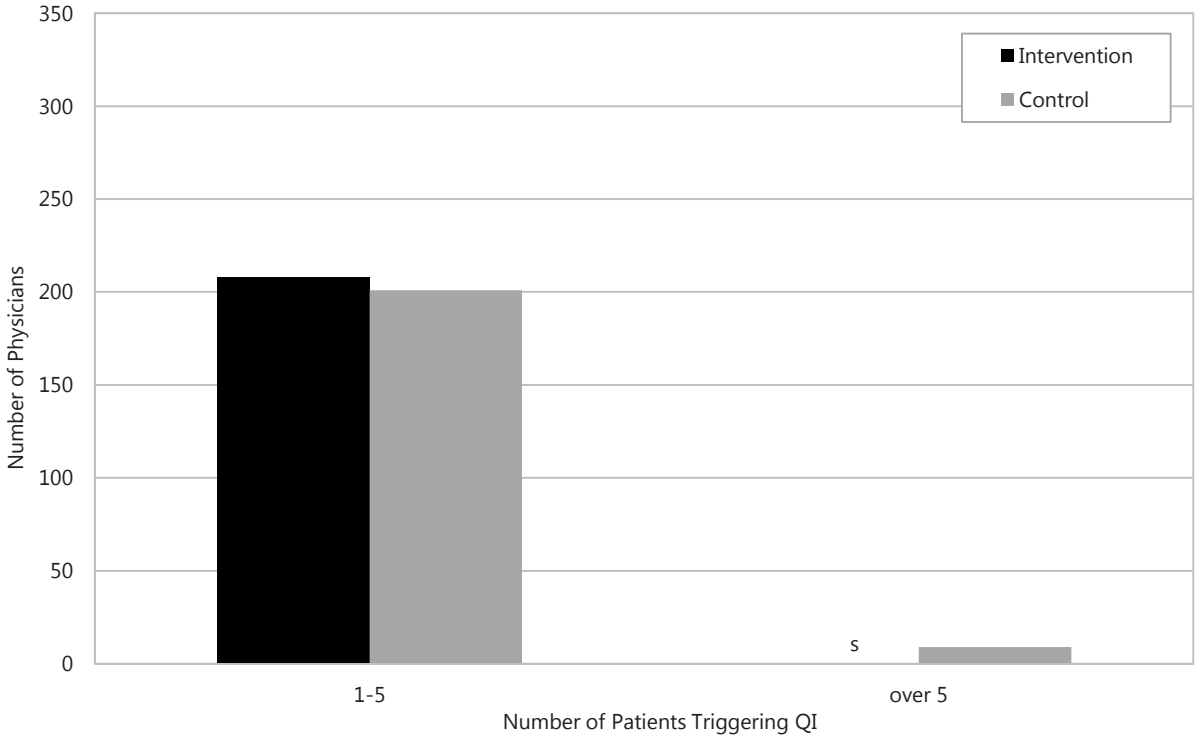

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Figure 3.13: Number of Physicians Triggering Quality Indicator 206, by Total Number of QI Triggers

Use of five or more psychotropics for 60 or more days, patients aged 18–64

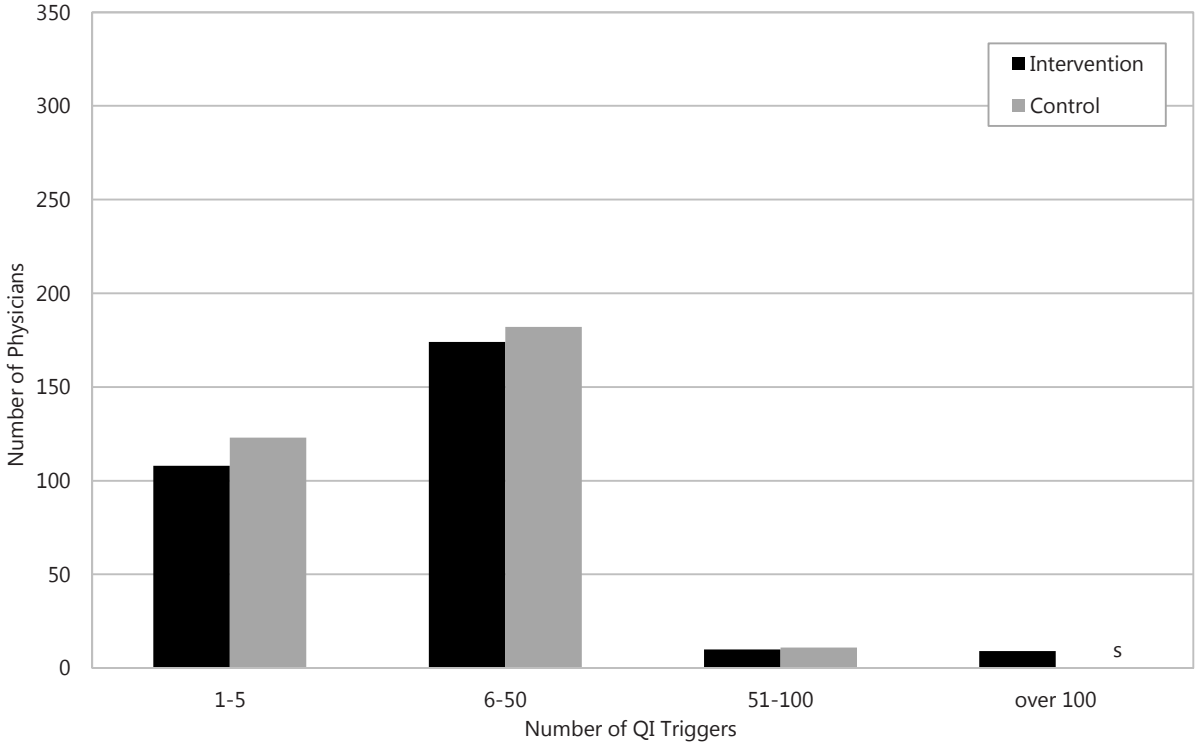

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Figure 3.14: Number of Physicians Triggering Quality Indicator 206, by Total Number of Patients Triggering the QI

Use of five or more psychotropics for 60 or more days, patients aged 18–64

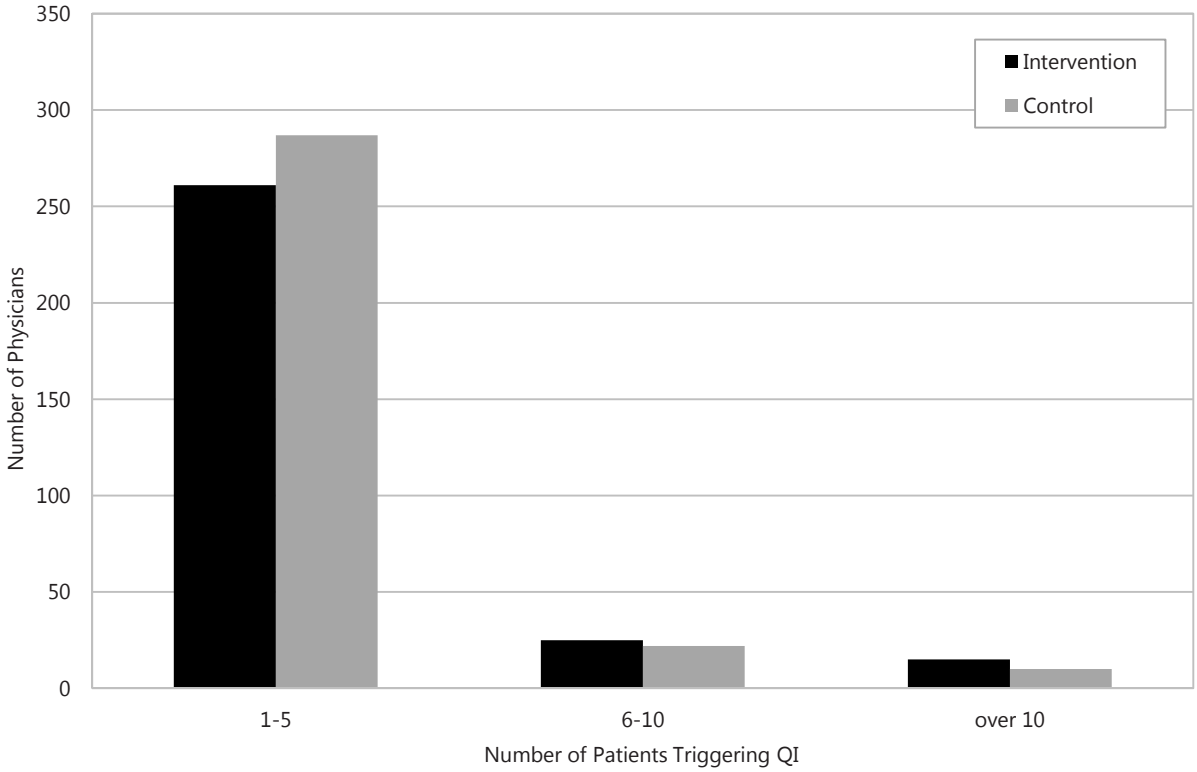

Figure 3.15: Number of Physicians Triggering Quality Indicator 405, by Total Number of QI Triggers

Multiple prescribers of one or more opioids for 30 or more days, patients aged 18–64

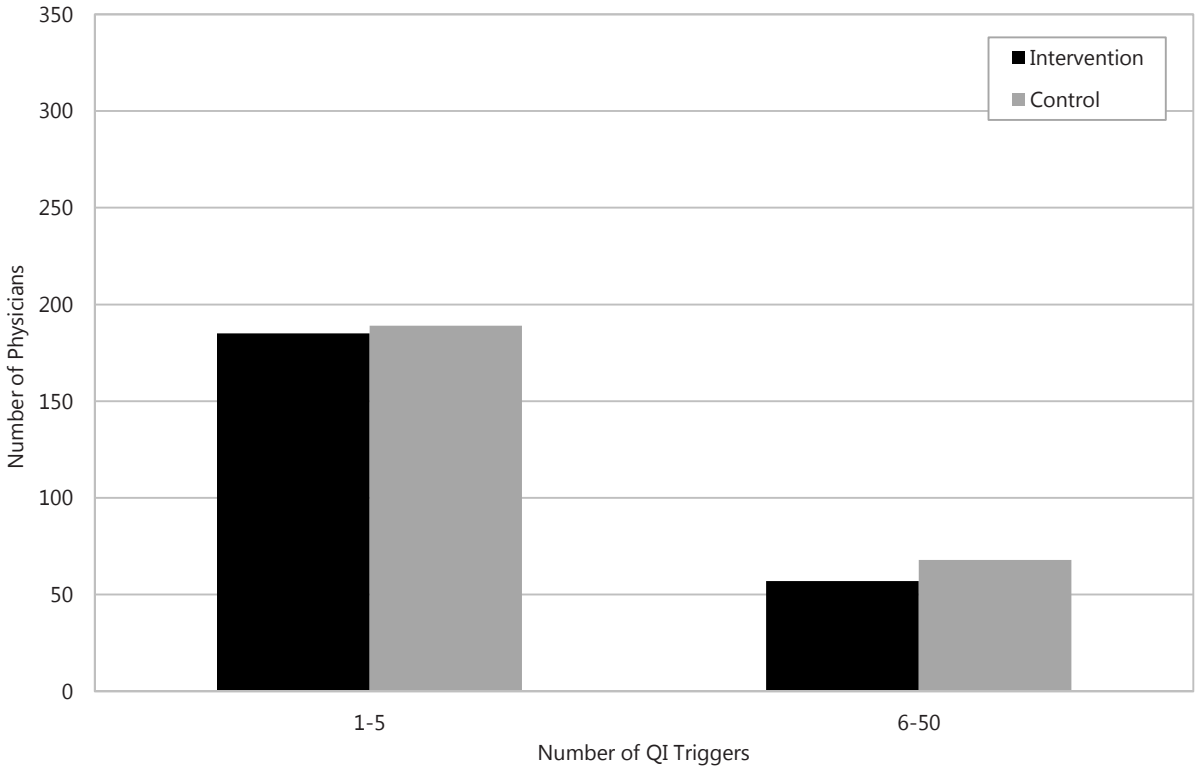

Figure 3.16: Number of Physicians Triggering Quality Indicator 405, by Total Number of Patients Triggering the QI

Multiple prescribers of one or more opioids for 30 or more days, patients aged 18–64

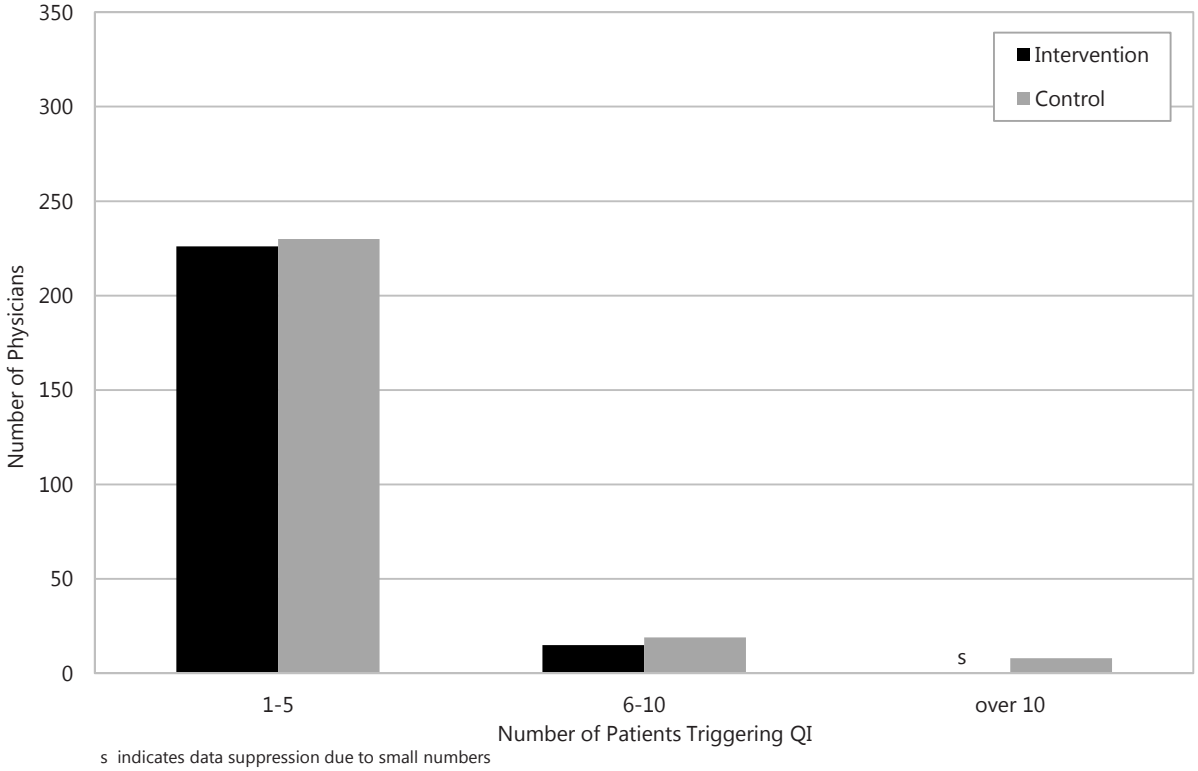

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Figure 3.17: Number of Physicians Triggering Quality Indicator 411, by Total Number of QI Triggers

Multiple prescribers of one or more opioids for 30 or more days, patients aged 65 and older

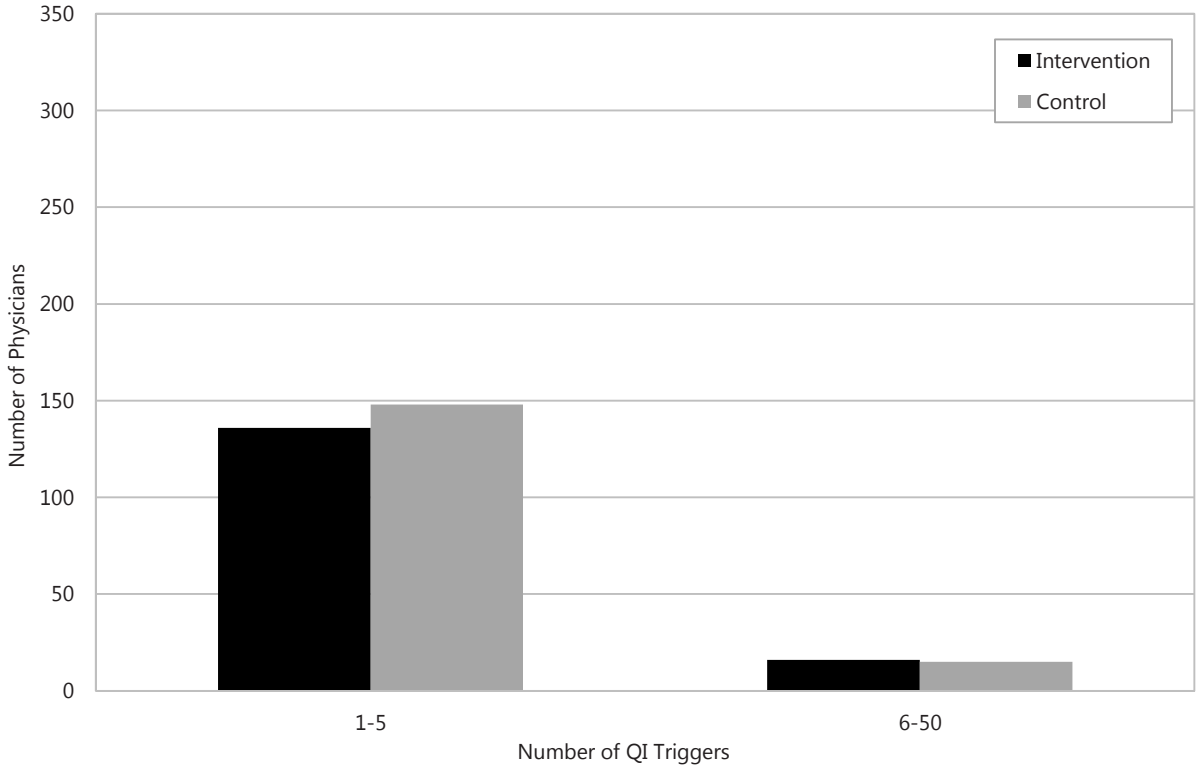

Figure 3.18: Number of Physicians Triggering Quality Indicator 411, by Total Number of Patients Triggering the QI

Multiple prescribers of one or more opioids for 30 or more days, patients aged 65 and older

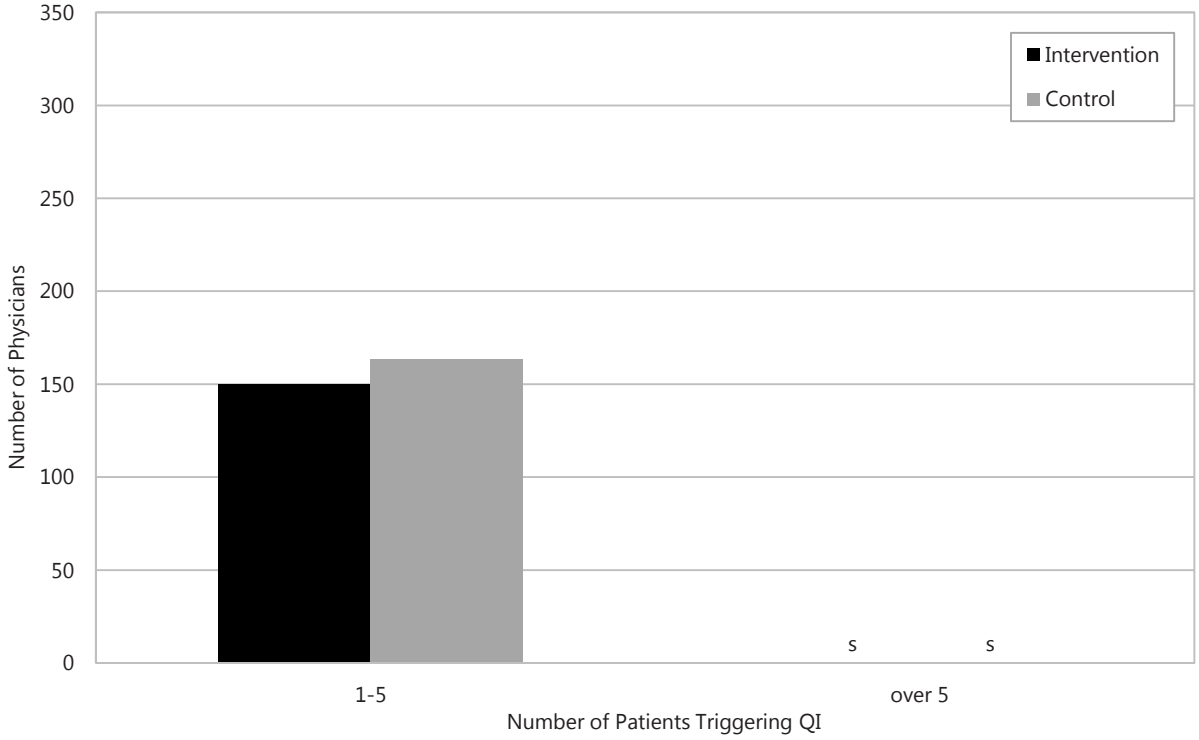

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Figure 3.19: Number of Physicians Triggering Quality Indicator 602, by Total Number of QI Triggers

Patient failed to refill newly prescribed antidepressant within 30 days of prescription ending, patients aged 18–64

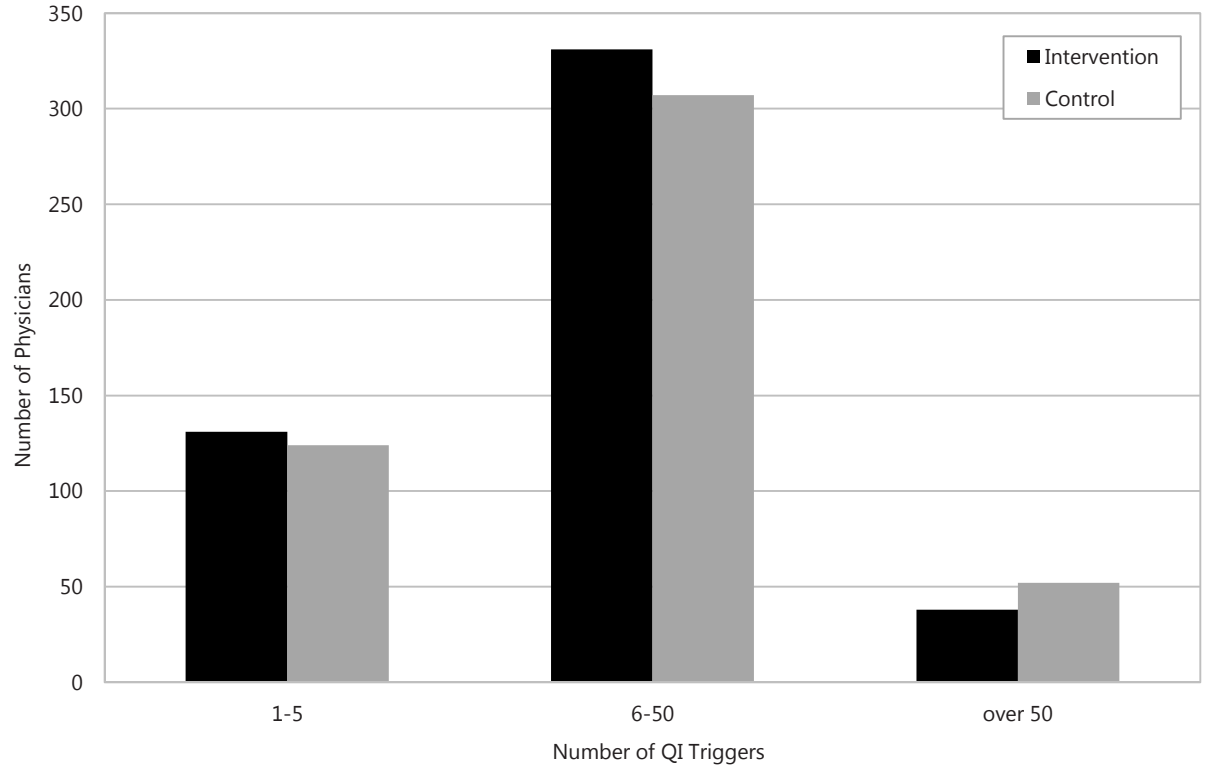


Figure 3.20: Number of Physicians Triggering Quality Indicator 602, by Total Number of Patients Triggering the QI

Patient failed to refill newly prescribed antidepressant within 30 days of prescription ending, patients aged 18–64

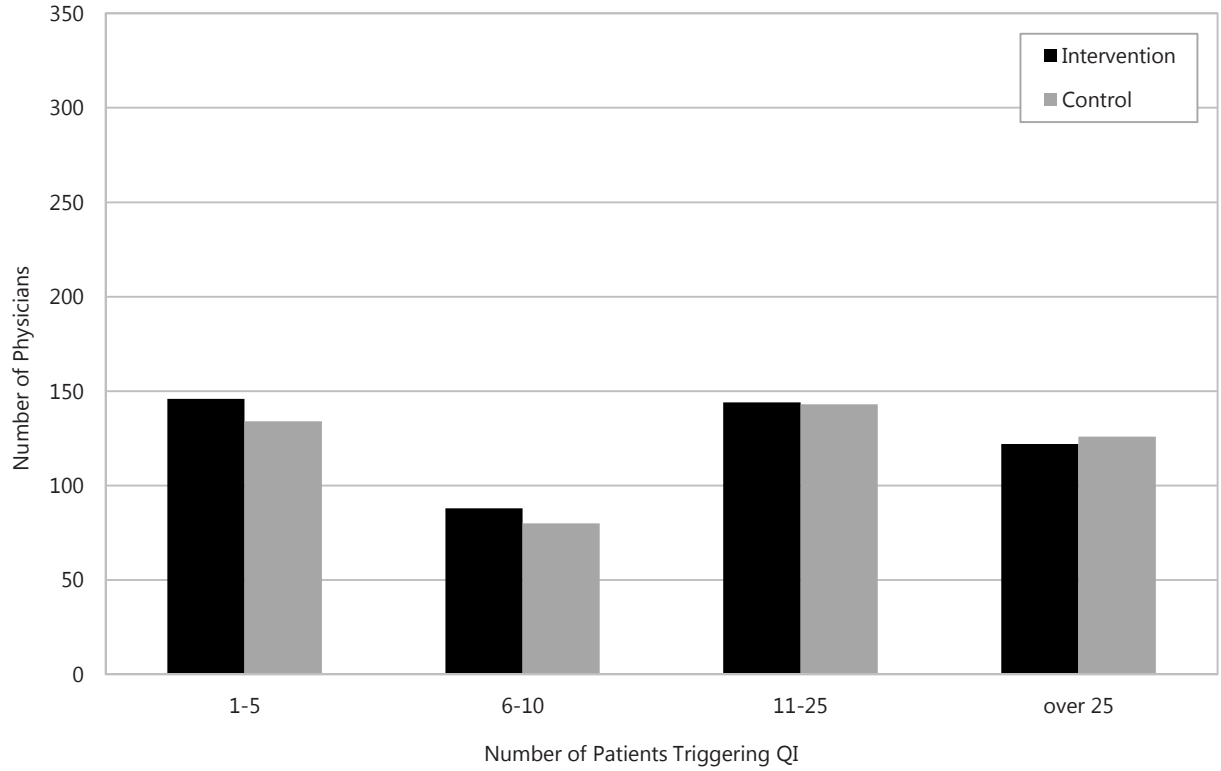


Figure 3.21: Number of Physicians Triggering Quality Indicator 606, by Total Number of QI Triggers

Patient failed to refill an antipsychotic within 30 days of prescription ending, patients aged 65 and older

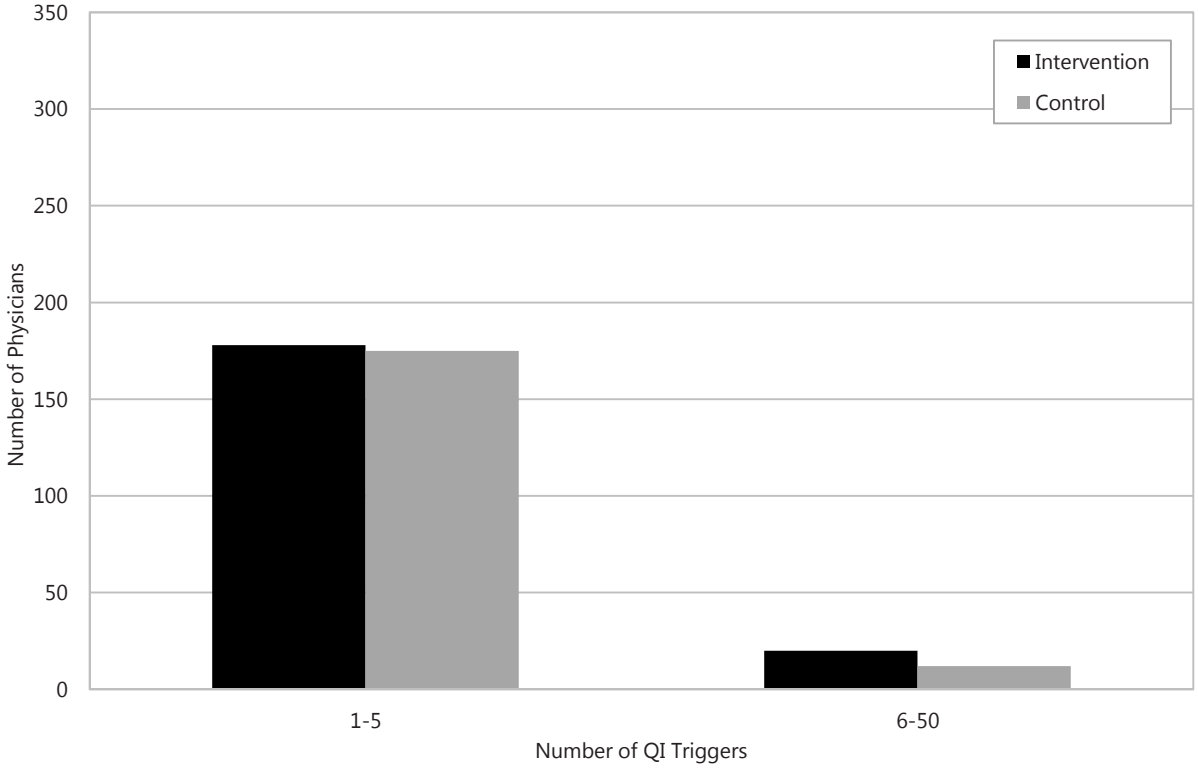
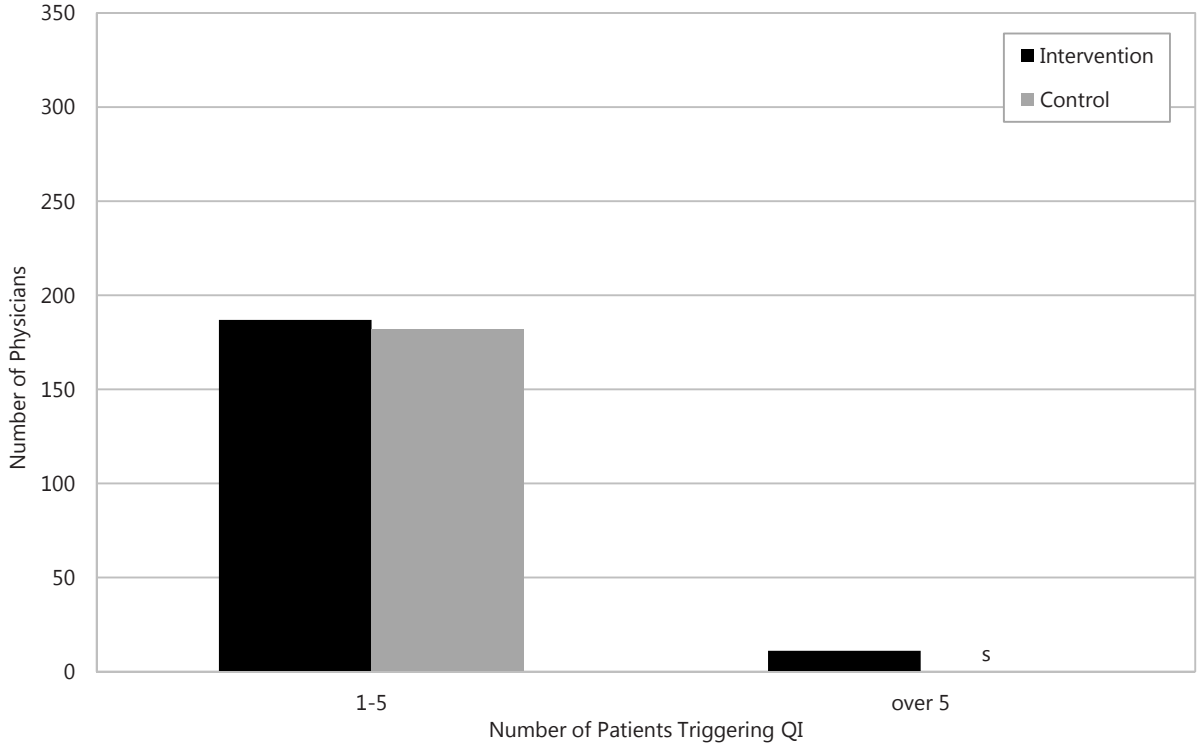


Figure 3.22: Number of Physicians Triggering Quality Indicator 606, by Total Number of Patients Triggering the QI

Patient failed to refill an antipsychotic within 30 days of prescription ending, patients aged 65 and older



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Factors Associated with Triggering Quality Indicators

Before conducting the evaluation analysis, we examined practice and physician characteristics that may be associated with triggering the various QIs, independent of the influence of the Manitoba IMPROVE Program. These characteristics include those described previously: physician age and sex, location of training, years of practice in Manitoba, total prescriptions written by the physician over the study period, and age profile of the physician's allocated patients (percent of patients aged 65 and older). Prescriptions, rather than visits, were used in this analysis to represent the volume of practice that a physician engaged in because some salaried physicians did not provide complete shadow billing (i.e., mock billing claims intended to record services, rather than required for payment). To isolate the effect of these characteristics from any influence or effect of IMPROVE, only the first month of triggers for each QI was used for the analysis. During this time no change in behaviour could have yet occurred. This analysis was only conducted on the QIs that met the minimum number of triggered instances to be analyzed, leaving out QI 114 (Multiple SSRIs for adults), 144 (Multiple SSRIs for older adults), 160 (Benzodiazepines for youth), and 542 (High-dose benzodiazepines for youth). These analyses were conducted with **logistic regression** models, which predict the likelihood of an event—in this case, QI trigger. The output of these models is an **odds ratio**, where numbers greater than one indicate increased likelihood of the QI trigger, and numbers between zero and one indicating decreased likelihood.

There were few consistent effects across the set of QIs (see Table 3.3). Practice volume (number of prescriptions) was the only variable that was a significant predictor for all QIs. A higher volume increased the likelihood of triggering a QI. The relationship was particularly strong for several of the benzodiazepine-related QIs (105: Benzodiazepines for adults; 138: Long-acting benzodiazepines for older adults; 512: High-dose benzodiazepines for adults). A busy doctor has more opportunities to trigger a QI, and this greater number of opportunities did, in fact, lead to more QI triggers.

Having an older practice—defined by the proportion of allocated patients aged 65 years and older—also increased the likelihood of triggering most of the QIs that targeted prescribing to older adults. The effects of the other practice and physician characteristics were not consistent across the QIs. For example, physicians trained in Canada were more likely to trigger QI 512 but less likely to trigger QI 405 (Multiple prescribers of opioids for adults). Male physicians were more likely to trigger QI 512 and QI 606 (Failure to refill antipsychotics) and less likely to trigger QI 602 (Failure to refill antidepressant), while older physicians were more likely to trigger QI 105 (Benzodiazepines for adults) and 206 (Psychotropics for adults). The longer a physician had been practicing in Manitoba the less likely they were to trigger QI 105, QI 206 (Psychotropics for adults), and QI 405.

Randomization group (control versus intervention) was also included as a variable in the models. If significant, this variable would indicate that there were some unidentified differences between intervention and control physicians before the Manitoba IMPROVE Program began. However, it was not a significant predictor for triggering any of the QIs, a result that shows the randomization's effectiveness.

Table 3.3: Factors Associated with Triggering Quality Indicators at Baseline

Quality Indicators		Odds Ratios by Factor Average (95% Confidence Interval)						
		Randomization Status	Canadian Graduate	Physician Sex (Male)	Physician Aged 50+	Years of Practice in Manitoba	Number of Prescriptions*	Percent of Patients Aged 65+
Primary								
105	Benzodiazepines for adults	ns	ns	ns	1.36 (1.00-1.85)	0.98 (0.96-1.00)	1.65 (1.48-1.84)	ns
145	Benzodiazepines for older adults	ns	ns	ns	ns	ns	1.30 (1.19-1.41)	1.03 (1.01-1.05)
138	Long-acting benzodiazepines for older adults	ns	ns	ns	ns	ns	1.95 (1.68-2.27)	1.09 (1.06-1.13)
512	High-dose benzodiazepines for adults	ns	1.99 (1.16-3.40)	2.03 (1.12-3.69)	ns	ns	1.34 (1.21-1.48)	ns
211	Anti-insomnia agents for adults	ns	ns	ns	ns	ns	1.57 (1.43-1.73)	ns
156	Anti-insomnia agents for older adults	ns	ns	ns	ns	ns	1.32 (1.21-1.45)	1.04 (1.02-1.06)
Secondary								
206	Psychotropics for adults	ns	ns	ns	1.62 (1.18-2.22)	0.98 (0.96-1.00)	1.52 (1.38-1.67)	ns
405	Multiple prescribers of opioids for adults	ns	ns	ns	ns	0.98 (0.95-1.00)	1.28 (1.17-1.39)	ns
411	Multiple prescribers of opioids for older adults	ns	ns	1.88 (1.04-3.41)	ns	ns	1.19 (1.07-1.33)	ns
602	Failure to refill antidepressants	ns	ns	0.61 (0.46-0.80)	ns	ns	1.55 (1.38-1.75)	1.05 (1.03-1.08)
606	Failure to refill antipsychotics	ns	ns	1.78 (1.09-2.91)	ns	ns	1.11 (1.00-1.22)	1.02 (1.00-1.04)

* odds ratio per 10,000 prescriptions

ns indicates factor effect not significant at $p<0.05$

CHAPTER 4: IMPACT OF THE MANITOBA IMP℞OVE PROGRAM ON PHYSICIAN PRESCRIBING PATTERNS

The primary goal of the program is to influence the prescribing patterns of the physicians who receive the intervention. If the program has had an effect, the pattern of prescriptions over time for this group should be different from the pattern of prescriptions for the physicians who did not receive the intervention. This chapter presents three analyses of the program's effect. We first concentrate on an **intention-to-treat analysis** of QI trigger rates, which is the most appropriate for testing the effectiveness of an intervention. In this analysis, all physicians in the evaluation dataset assigned to the intervention and control groups are included in the impact assessment, including the intervention physicians who did not receive an educational package. As mentioned in Chapter Two, physicians working together in shared office spaces could not always be identified in administrative data, and therefore were not identified in the randomization process. This could lead to some contamination of effect, whereby control physicians would be exposed unintentionally to the educational mailings, leading to an underestimate of the intervention's true effect. However, as seen in the results of the analyses below, QI trigger rates for control physicians did not appear to change over time, indicating little to no effect of this potential limitation of the randomization process.

Two other descriptive analyses are also presented. The first analysis examined the number of prescribers triggering a QI, which differs from the QI trigger rate. A QI trigger rate might change because most physicians trigger a QI less frequently, or alternatively, because a subset of physicians stops triggering the QI at all (or some combination of these two possibilities). This analysis was done to test the degree to which the program may have resulted in fewer physicians triggering a QI even a single time—i.e., complete cessation of the potentially inappropriate prescribing behaviour.

The second descriptive analysis compares the educational mailing rates to the QI trigger rates. As noted above, there were several reasons that physicians may not actually receive a mailing for a QI trigger (see Chapter Two, Mailing Protocol). The effect of these "mail filters" on the different QIs is described and compared to the QI trigger rates for the same QI. Also, there was a significant change to the mailing protocol in January 2012 that affected the number of educational packages being mailed (mailings only for new patients triggering a QI). This analysis gives a sense of how frequently a triggered QI actually resulted in active intervention—i.e., a mailed educational package.

Intention-to-Treat Analysis

In an intention-to-treat analysis, physicians satisfying the criteria for inclusion in the study are included regardless of the application of the intervention. In this analysis, intervention physicians who did not receive a mailing for a particular QI are still included in the analysis for that indicator (i.e., some physicians may not have triggered a particular QI, or may not have received the educational mailing package, but are included regardless). This is the accepted method for analysing data from RCTs; it provides unbiased estimates of an intervention. It is also more policy-relevant because it provides a measure of change for the entire intended target group, and not just those who triggered a QI or received the intervention.

To test for a statistically significant effect of the Manitoba IMP℞OVE Program, we look for an interaction between time and group (intervention vs. control). If the interaction is statistically significant, we can be confident that the change over time for the intervention group is different from the change, or lack of change, over time for the control group. If the change over time in QI trigger rates is equivalent between the two groups—if the interaction is not statistically significant—we would conclude that IMP℞OVE did not affect physician prescribing patterns. In addition to looking for a significant interaction between time and group, direct comparisons between the

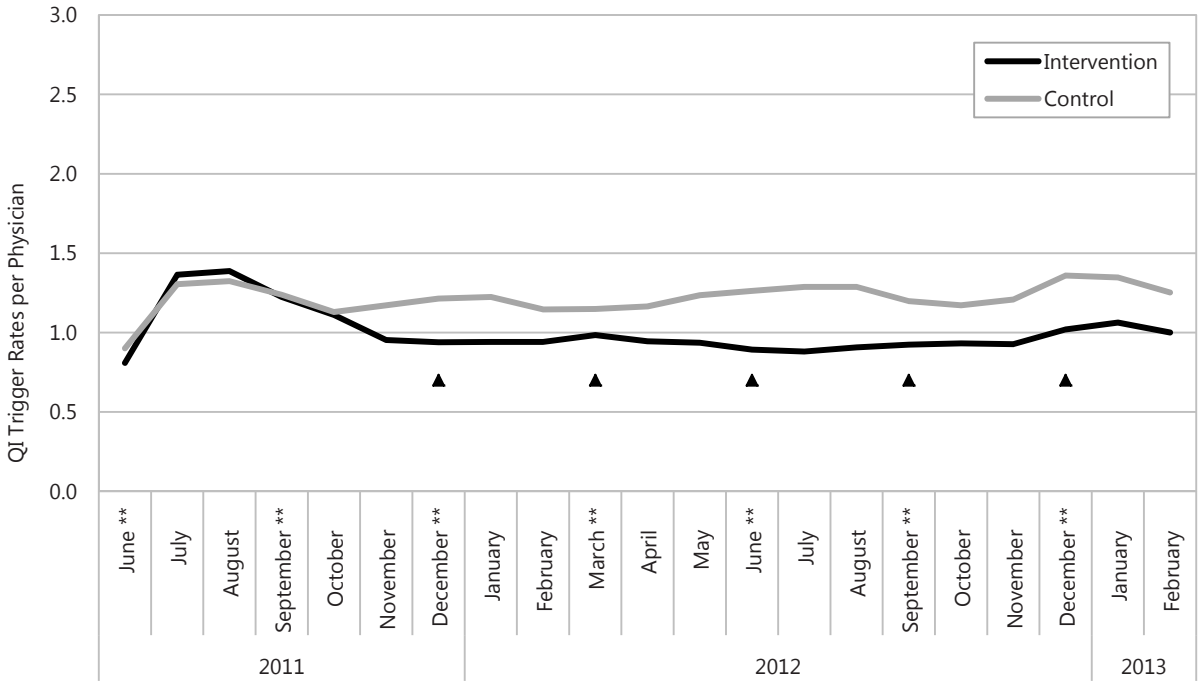
intervention and control groups were made every three months during the study period. In the figures below, these are indicated by a double asterisk on the horizontal axis. If the two groups were significantly different at any of the tested times, a triangle symbol appears in the figure. Analyses of the primary set of QIs, applied at the beginning of the intervention, are presented first, followed by the secondary QIs.

Primary Quality Indicators

Monitoring of the primary QIs began in June 2011. The intention-to-treat analysis suggests that the Manitoba IMPROVE Program had an effect on the rate of QI triggers. Ignoring the low QI trigger rates at the program's initiation (June 2011), there was a marked decline between three months and six months after the program started. The program's first month had a lower QI trigger rate across all of the QIs; it is an anomaly, or outlier, among the trends seen in the following analyses. For three QIs related to benzodiazepines (105: Benzodiazepines for adults, 138: Long-acting benzodiazepines for older adults, and 145: Benzodiazepines for older adults), there were significant interactions between group and time, indicating that the decline in the QI trigger rates can be attributed to the intervention (figures 4.1–4.3). The most dramatic effect is seen in QI 105. Shortly after the mailings began, intervention-group trigger rates fell significantly below the control-group trigger rates and remained lower through the end of the study period. The lower rate of approximately 0.2 to 0.3 QI triggers per month for QI 105 in the intervention physicians equalled about 115 to 170 fewer QI triggers every month. For QI 145 (Benzodiazepines for older adults), this is about 55 fewer QI triggers per month (rate difference of ~0.1 QI triggers per month); for QI 138 (Long-acting benzodiazepines for older adults), there are about 225 fewer QI triggers per month (rate difference of ~0.4). For QI 512 (High-dose benzodiazepines for adults), however, there was no effect of IMPROVE (Figure 4.4). At no point did the intervention group's QI trigger rate differ from the control group's trigger rate. The marked decline in the rate for both groups in January 2012 can be ascribed to a change in the high-dose definition for lorazepam from 4 mg/d to 8 mg/d and for alprazolam from 4 mg/d to 6 mg/d (see Appendix 2).This was done to move the required dosage closer to the recommended maximum daily dose in order to avoid flagging of clinically appropriate cases. Increasing the required dose labeled as "high-dose" led to a sizeable drop in the number of prescribing patterns for patients satisfying the criterion.

Figure 4.1: Intention-To-Treat Analysis of Trigger Rates for Quality Indicator 105

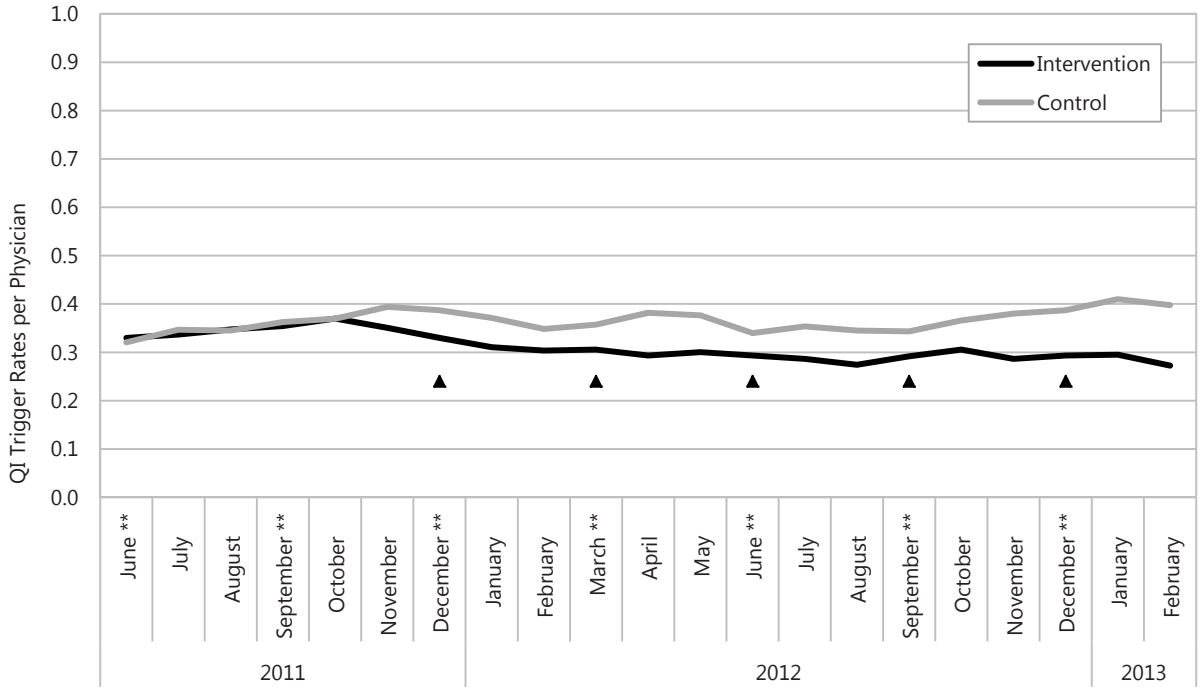
Use of two or more benzodiazepines for 60 or more days, patients aged 18–64



▲ indicates a significant difference (p<0.01) between control and intervention at specified time point
There is a statistically significant interaction overall: p=0.0059
** indicates that group differences were tested at these time points

Figure 4.2: Intention-To-Treat Analysis of Trigger Rates for Quality Indicator 145

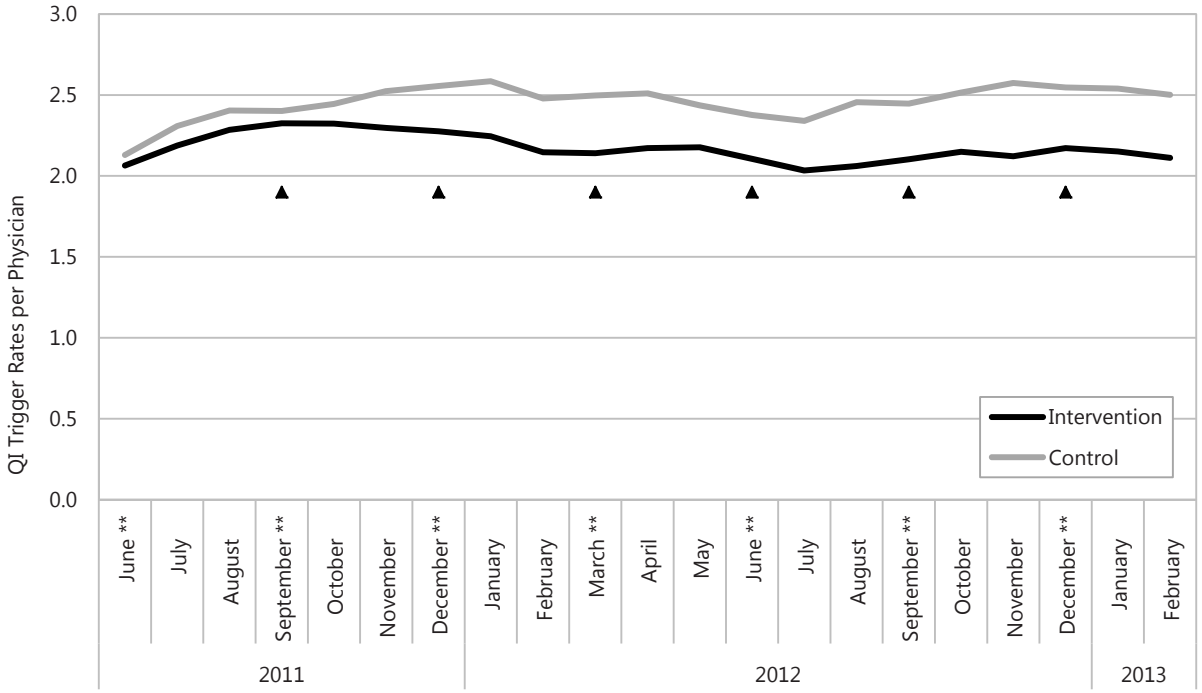
Use of two or more benzodiazepines for 45 or more days, patients aged 65 and older



▲ indicates a significant difference (p<0.01) between control and intervention at specified time point
There is a statistically significant interaction overall: p<0.0001
** indicates that group differences were tested at these time points

Figure 4.3: Intention-To-Treat Analysis of Trigger Rates for Quality Indicator 138

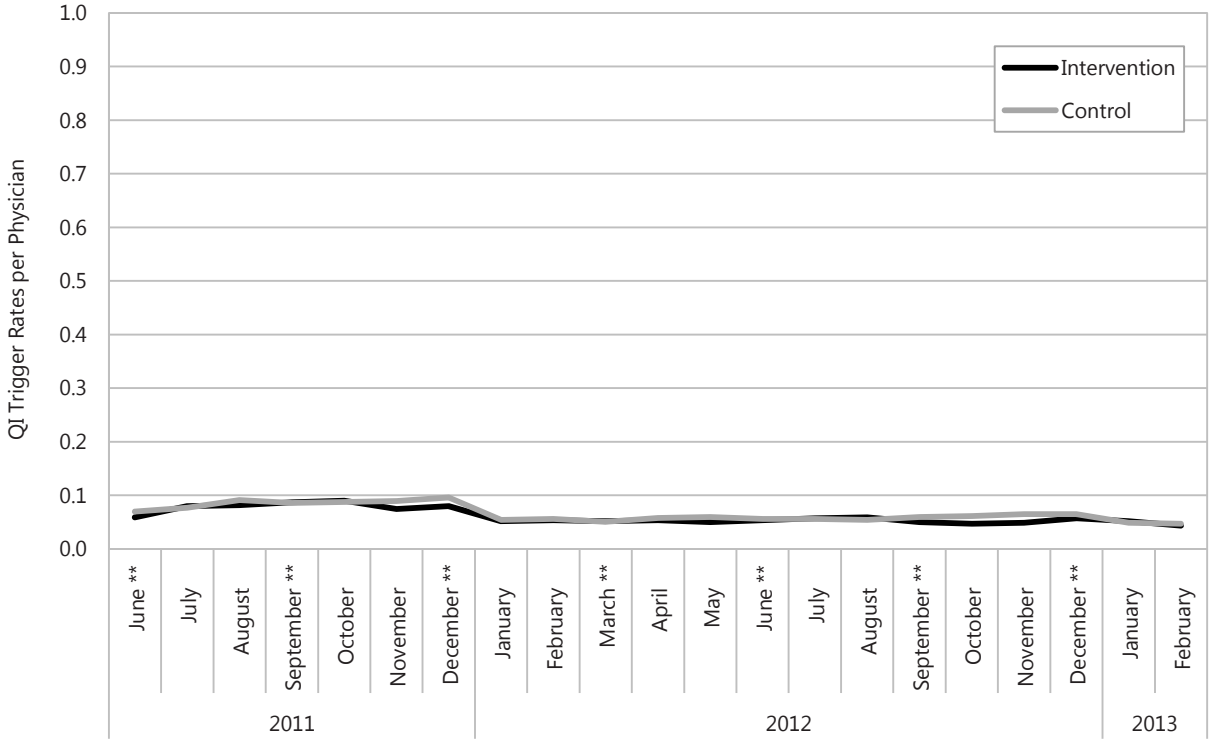
Use of any long-acting benzodiazepine for 30 or more days, patients aged 65 and older



▲ indicates a significant difference ($p<0.01$) between control and intervention at specified time point
There is a statistically significant interaction overall: $p=0.0003$
** indicates that group differences were tested at these time points

Figure 4.4: Intention-To-Treat Analysis of Trigger Rates for Quality Indicator 512

Use of any high-dose benzodiazepine for 30 or more days, patients aged 18–64

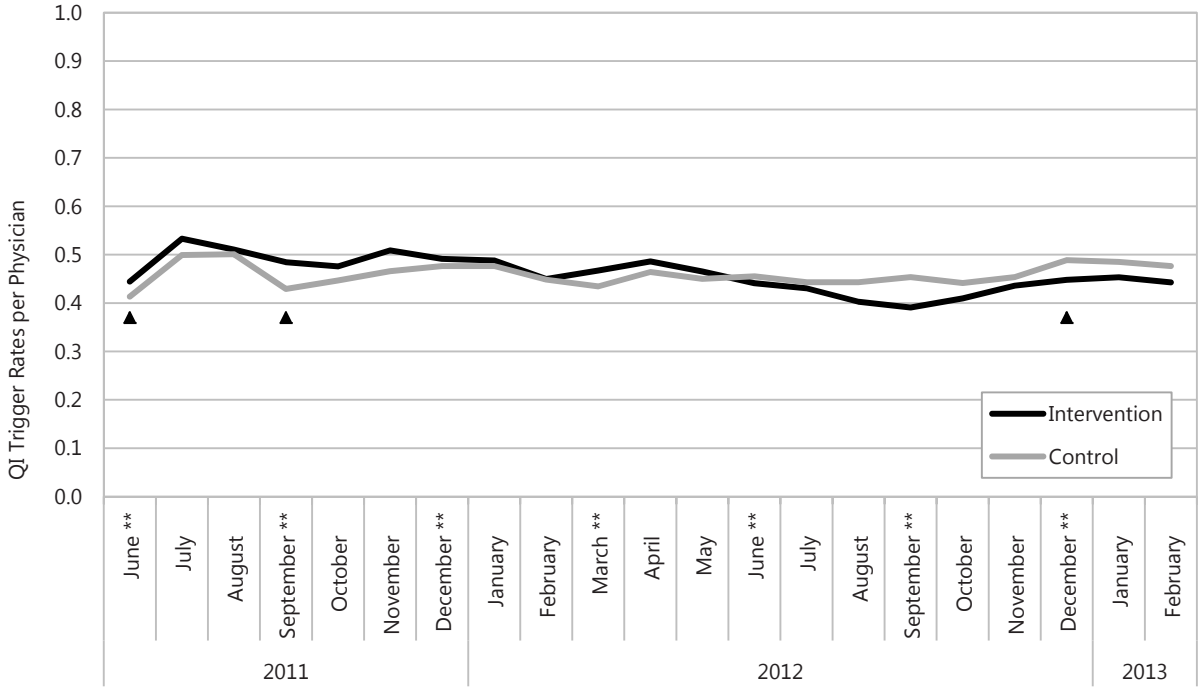


** indicates that group differences were tested at these time points

The analysis of QIs for prescriptions of multiple anti-insomnia drugs also showed a significant effect of the Manitoba IMPROVE Program. For both QI 211 (Anti-insomnia agents for adults) and QI 156 (Anti-insomnia agents for older adults) there was a significant interaction between group and time; this indicates that the program affected the QI trigger rates for the intervention group. This can be seen clearly in QI 156, where the control and intervention groups trigger rates are not different in June and September 2011, but subsequently diverge and remain significantly different for the rest of the study period (Figure 4.5). The effect is a little less clear for QI 211 (Anti-insomnia agents for adults), which includes the same drug prescriptions but for adults aged 18–64. The intervention group's QI trigger rate starts higher than the control group's rate and then declines significantly (Figure 4.6). At the end of the study period, the intervention group's trigger rate was significantly lower.

Figure 4.5: Intention-To-Treat Analysis of Trigger Rates for Quality Indicator 211

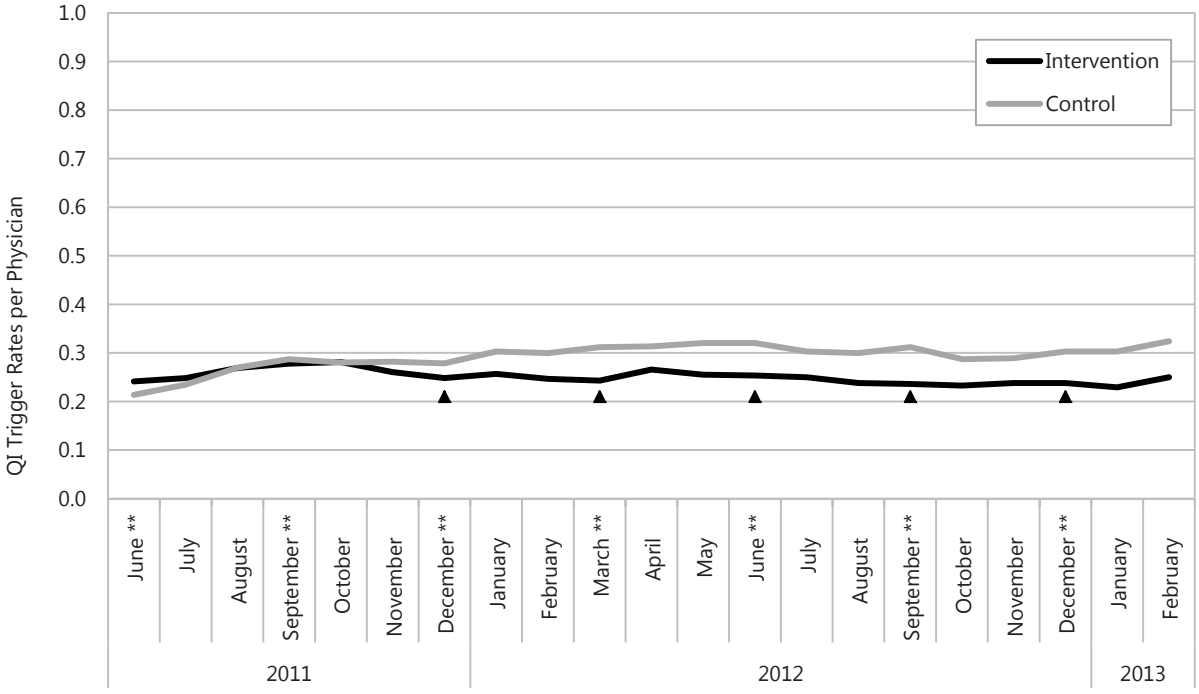
Use of two or more insomnia agents for 60 or more days, patients aged 18–64



▲ indicates a significant difference (p<0.01) between control and intervention at specified time point
There is a statistically significant interaction overall: p=0.0007
** indicates that group differences were tested at these time points

Figure 4.6: Intention-To-Treat Analysis of Trigger Rates for Quality Indicator 156

Use of two or more insomnia agents for 60 or more days, patients aged 65 and older



▲ indicates a significant difference (p<0.01) between control and intervention at specified time point
There is a statistically significant interaction overall: p<0.001
** indicates that group differences were tested at these time points

Secondary Quality Indicators

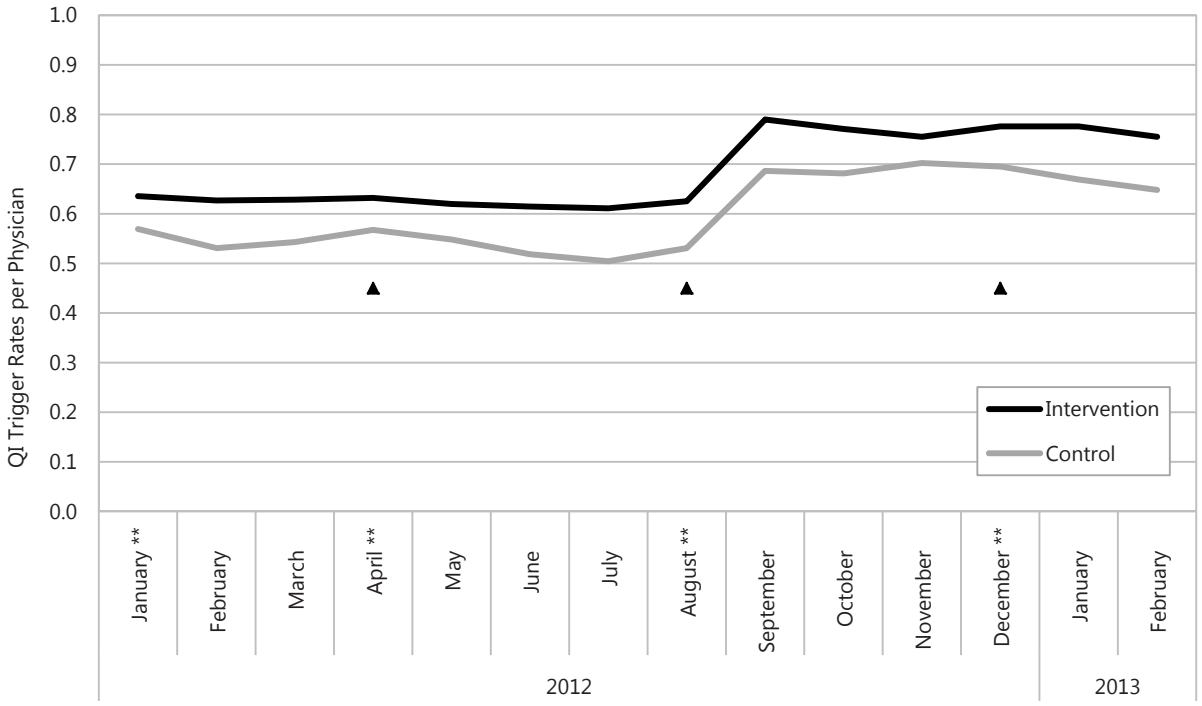
Figures 4.7–4.11 below present the results of the intention-to-treat analysis for the five QIs that were not initiated until January 2012. The effect of the Manitoba IMPROVE Program was very different for these QIs than for the primary set of QIs. No significant interaction between time and group was found for any of these QIs, which shows that IMPROVE had no discernible effect on physician prescribing behaviours. As discussed earlier, these indicators are very different from the primary set of indicators. While the primary indicators were directed at reducing prescriptions for a single type of drug from a single prescriber (benzodiazepines or anti-insomnia agents), the secondary indicators dealt with double-doctoring of a drug (opioids), patients failing to refill prescriptions, or patients on many different drugs. Quality indicator 206 addresses patients using five or more psychotropics, which could be for any number of reasons or conditions. This is unlike the case with benzodiazepines or anti-insomnia agents, where the medications are more likely prescribed for the same underlying condition. Two of the secondary indicators were related to double-doctoring of prescription opioids (405: Multiple prescribers of opioids for adults, 411: Multiple prescribers of opioids for older adults). These QI trigger rates were quite low for adults aged 18–64 and very low for those aged 65 and older. The two remaining secondary QIs were for situations where patients failed to refill a prescription for a medication that in most cases should be refilled at least once (antidepressants and antipsychotics).

The in-program changes made to the drug list had a significant effect on the rate of QI triggers for QI 206 (Psychotropics for adults). The addition of new drugs in September 2013 led to a spike in the QI trigger rate of approximately 25%, from an average rate across both groups of 0.58 QI triggers per physician to a rate of 0.73 QI triggers per physician. Changes to the drug list also had an effect on the QI trigger rate for QI 405 (Multiple prescribers of opioids for adults). In this case, however, the spike in QI trigger rates for both groups of physicians appears to decline over time. As noted above, a list of the notable new drugs added is given in Appendix 2.

Other than the impact of drug-list modifications, there are some additional observations to be made for the secondary QIs. For QI 206 (Psychotropics for adults), the intervention group appeared to have a consistently higher rate of QI triggers across the entire study period, and on occasion this difference was statistically significant. On the other hand, for QI 405 (Multiple prescribers of opioids for adults), the control group was consistently higher than the intervention group, although this was only significant at a single time point. There were no other significant differences between the control and intervention physicians, at any point, for any of the remaining QIs. Finally, the trigger rate for QI 602 (Failure to refill antidepressants) is quite high compared to most other QIs that were examined. This high rate is not unusual, given that it is consistent with past findings (Lewis, Marcus, Olfson, Druss, & Pincus, 2004; Tierney, Melfi, Signa, & Croghan, 2000; van Geffen et al., 2009).

Figure 4.7: Intention-To-Treat Analysis of Trigger Rates for Quality Indicator 206

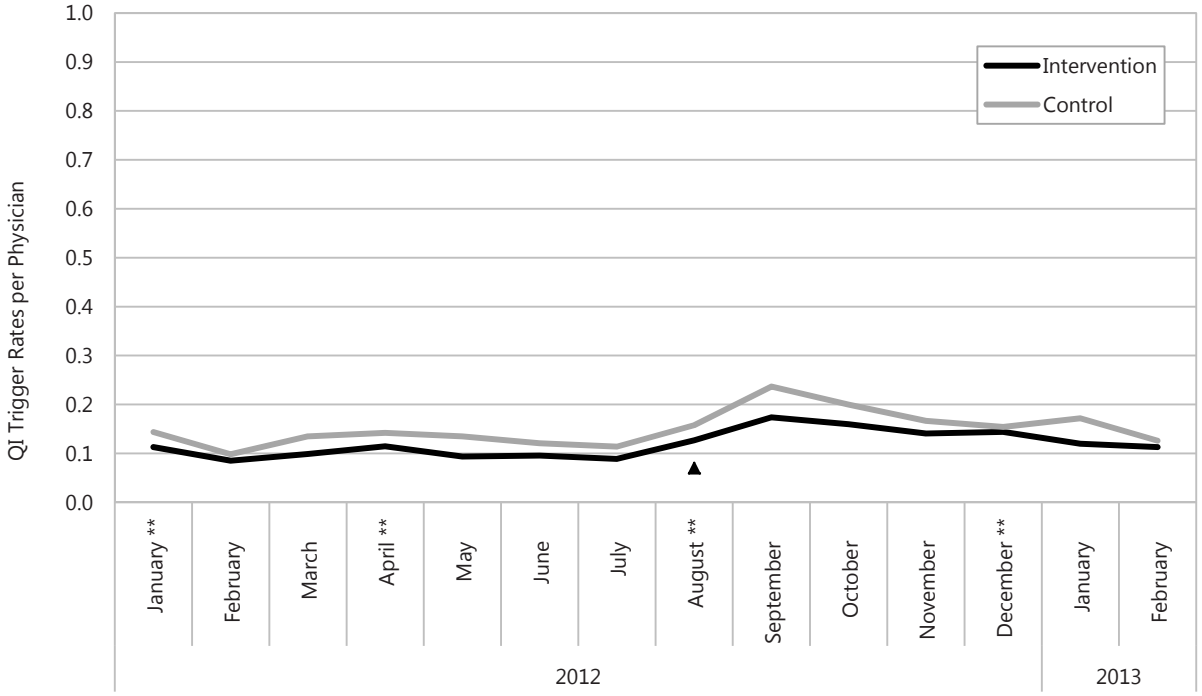
Use of five or more psychotropics for 60 or more days, patients aged 18–64



▲ indicates a statistically significant difference ($p<0.01$) between control and intervention at specified time point
** indicates that group differences were tested at these time points

Figure 4.8: Intention-To-Treat Analysis of Trigger Rates for Quality Indicator 405

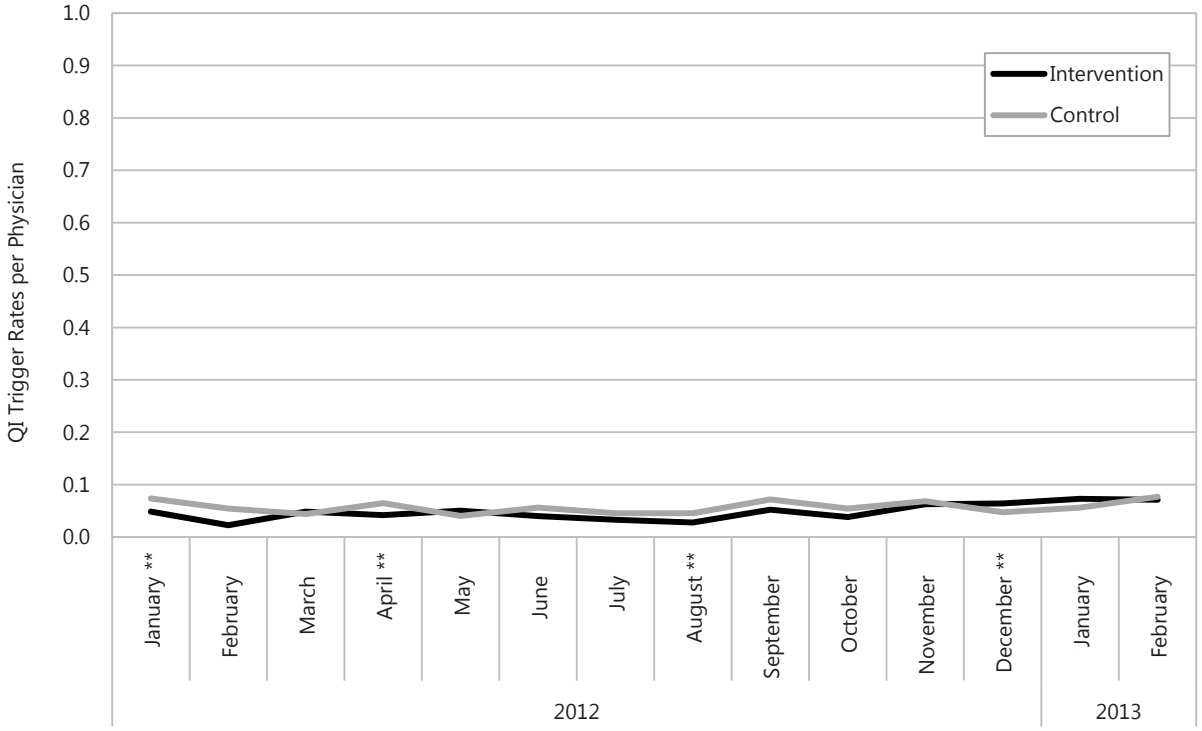
Multiple prescribers of one or more opioids for 30 or more days, patients aged 18–64



▲ indicates a statistically significant difference ($p<0.01$) between control and intervention at specified time point
** indicates that group differences were tested at these time points

Figure 4.9: Intention-To-Treat Analysis of Trigger Rates for Quality Indicator 411

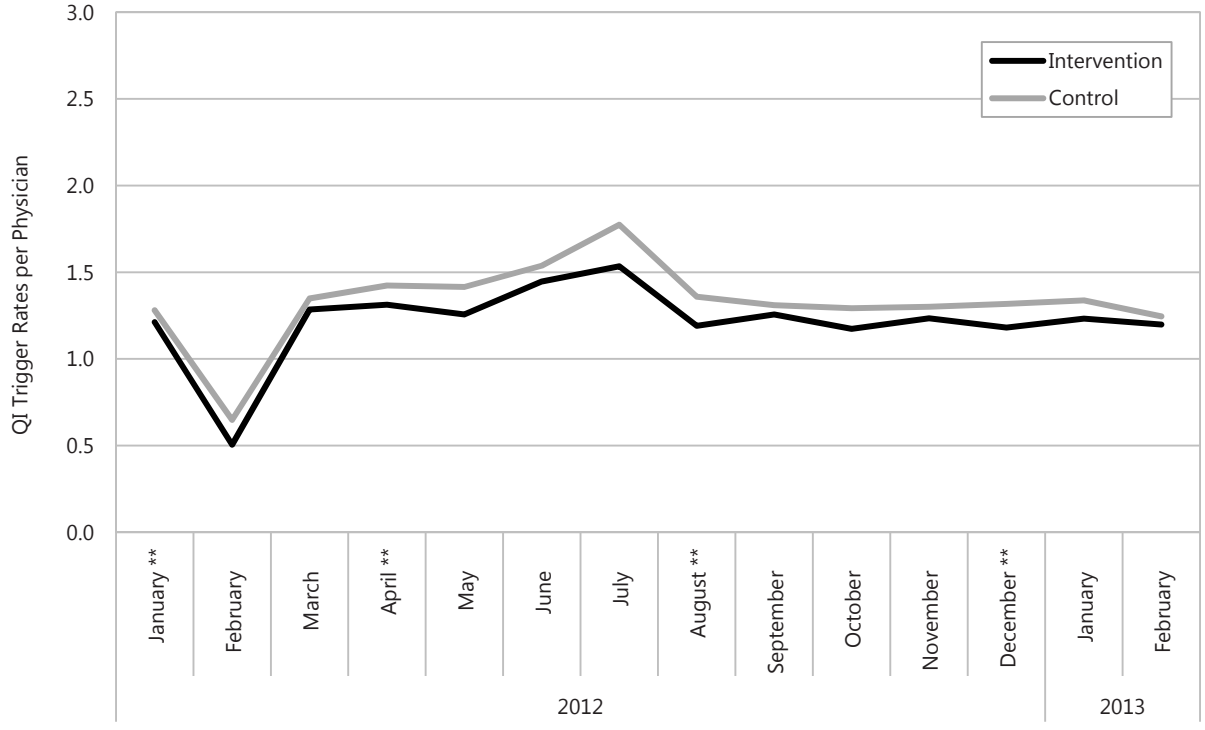
Multiple prescribers of one or more opioids for 30 or more days, patients aged 65 and older



** indicates that group differences were tested at these time points

Figure 4.10: Intention-To-Treat Analysis of Trigger Rates for Quality Indicator 602

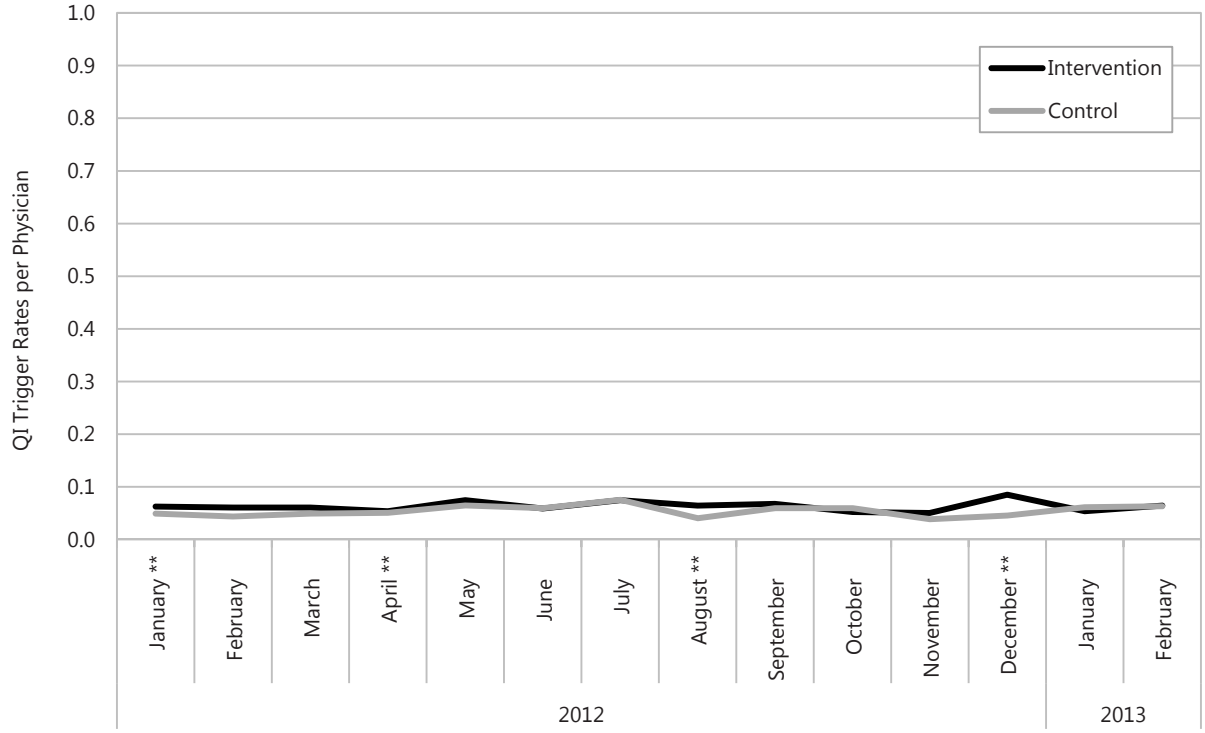
Patient failed to refill newly prescribed antidepressant within 30 days of prescription ending, patients aged 18–64



** indicates that group differences were tested at these time points

Figure 4.11: Intention-To-Treat Analysis of Trigger Rates for Quality Indicator 606

Patient failed to refill an antipsychotic within 30 days of prescription ending, patients aged 65 and older



** indicates that group differences were tested at these time points

Physician Numbers Analysis

There are two possible explanations for how the Manitoba IMPROVE Program could affect QI trigger rates. The first is that physicians who trigger QIs could trigger the QIs fewer times. The second is that a physician who has triggered a particular QI could stop triggering the QI altogether. The program could operate in both ways, reducing the number of times a physician triggers a QI or encourage a physician to cease the prescribing behaviour completely. The following set of figures shows the number of different physicians in the intervention and control groups that triggered QIs. If the program operated primarily by encouraging physicians to reduce the behaviour, we might not see a decline in the number of different physicians triggering a QI, even if the program had a significant impact on the overall QI trigger rate. On the other hand, if the program affected whether or not physicians engaged in the prescribing behaviour with any patients, then we could expect a drop in the number of different physicians that triggered a QI.

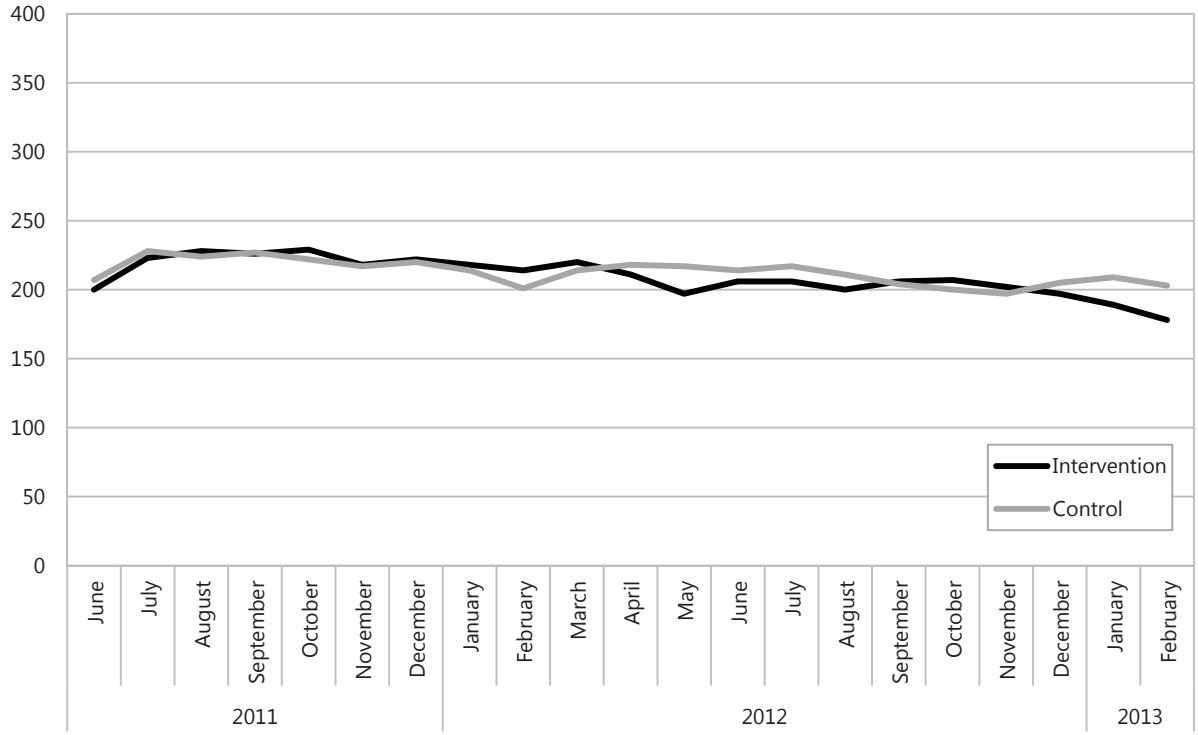
The first thing to note is the large number of physicians who trigger the different QIs (figures 4.12 – 4.17). There is some variation, however, from lows of around 20 to 30 for QI 606 (Failure to refill antipsychotics) and 512 (High-dose benzodiazepines for adults), to over 300 for QI 138 (Long-acting benzodiazepines for older adults). For each QI the number of physicians triggering is only a portion of the total physicians in the group; however, there are still enough to warrant the program's universal application.

Primary Quality Indicators

Where the Manitoba IMPROVE Program had a statistically significant impact according to the intention-to-treat analysis, there does appear to be a decline in the number of different physicians triggering QIs. This is particularly evident for QI 145 (Benzodiazepines for older adults), QI 211 (Anti-insomnia agents for adults) and QI 156 (Anti-insomnia agents for older adults), where a decline is seen among intervention physicians that is not seen for control physicians. However, for one QI with a high trigger rate (QI 105: Benzodiazepines for adults) there is a different pattern. Here, it does appear that the number of intervention physicians triggering the QI declines, but this pattern is consistent with the pattern for the control physician group. That is, both groups show a similar decline over time in the number of individual physicians triggering the QI. Therefore, we conclude that the physicians triggering the QI among the intervention group are triggering fewer instances. It is likely that the program operates in both manners, reducing the number of QI triggers among some physicians, and entirely eliminating QI triggers among others. For QI 512 (High-dose benzodiazepines for adults), where there was a change to the drug inclusions during the course of the study period, the same changes that were seen in trigger rates presented above were seen in the physician numbers. A large drop in number of physicians triggering was seen in January 2012, but these numbers were the same for both control and intervention physicians.

Figure 4.12: Number of Physicians Who Triggered Quality Indicator 105

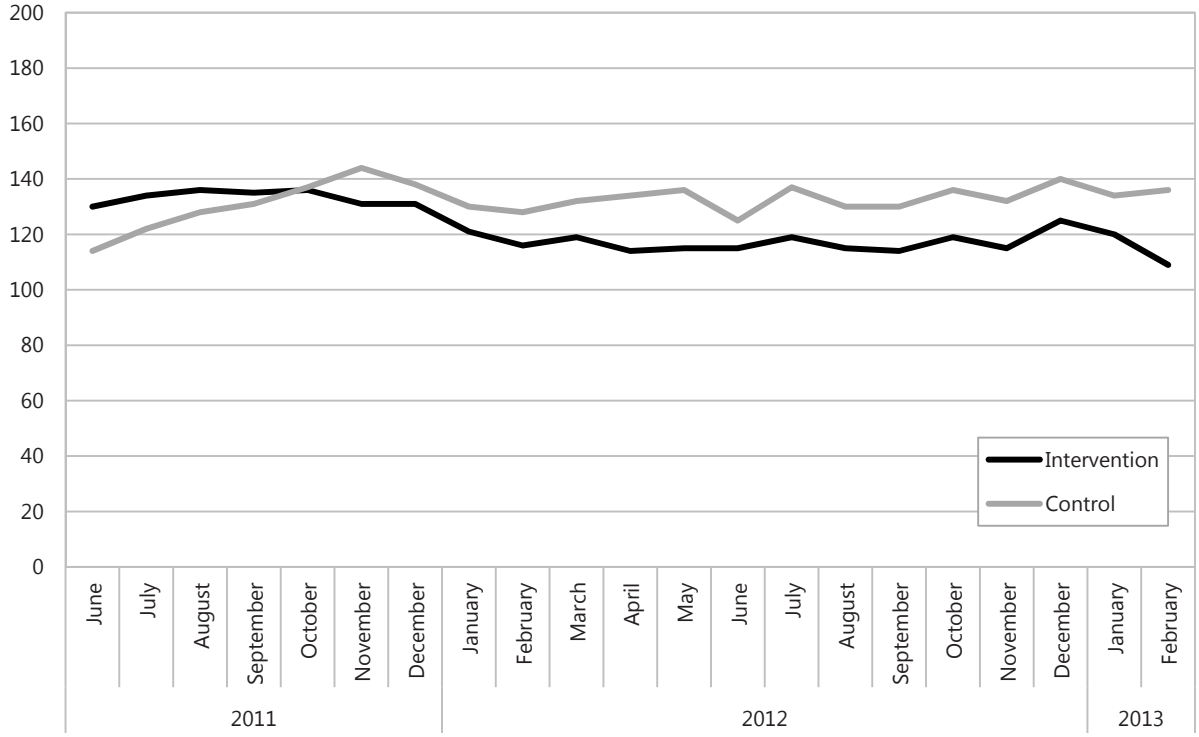
Use of two or more benzodiazepines for 60 or more days, patients aged 18–64



A statistically significant impact of the Manitoba IMPR$_x$OVE Program was found for this quality indicator

Figure 4.13: Number of Physicians Who Triggered Quality Indicator 145

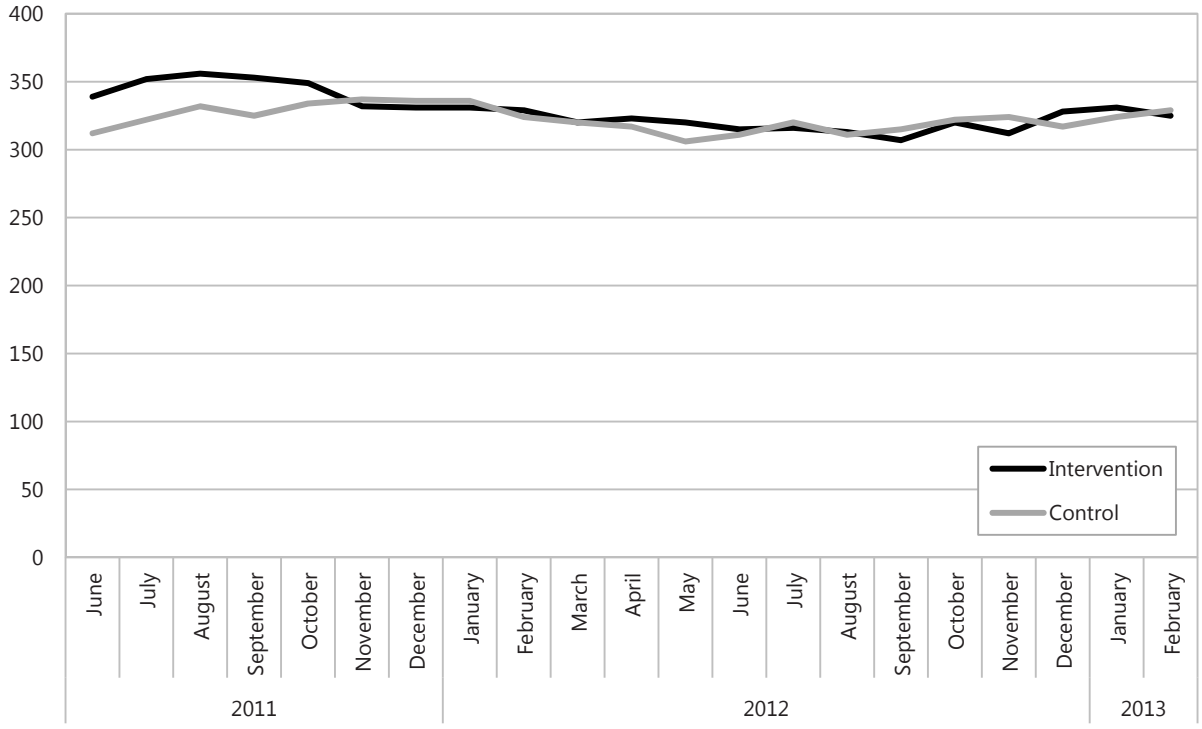
Use of two or more benzodiazepines for 45 or more days, patients aged 65 or older



A statistically significant impact of the Manitoba IMPR$_x$OVE Program was found for this quality indicator

Figure 4.14: Number of Physicians Who Triggered Quality Indicator 138

Use of any long-acting benzodiazepine for 30 or more days, patients aged 65 or older



A statistically significant impact of the Manitoba IMPR$_x$OVE Program was found for this quality indicator

Figure 4.15: Number of Physicians Who Triggered Quality Indicator 512

Use of any high dose benzodiazepine for 30 or more days, patients aged 65 or older

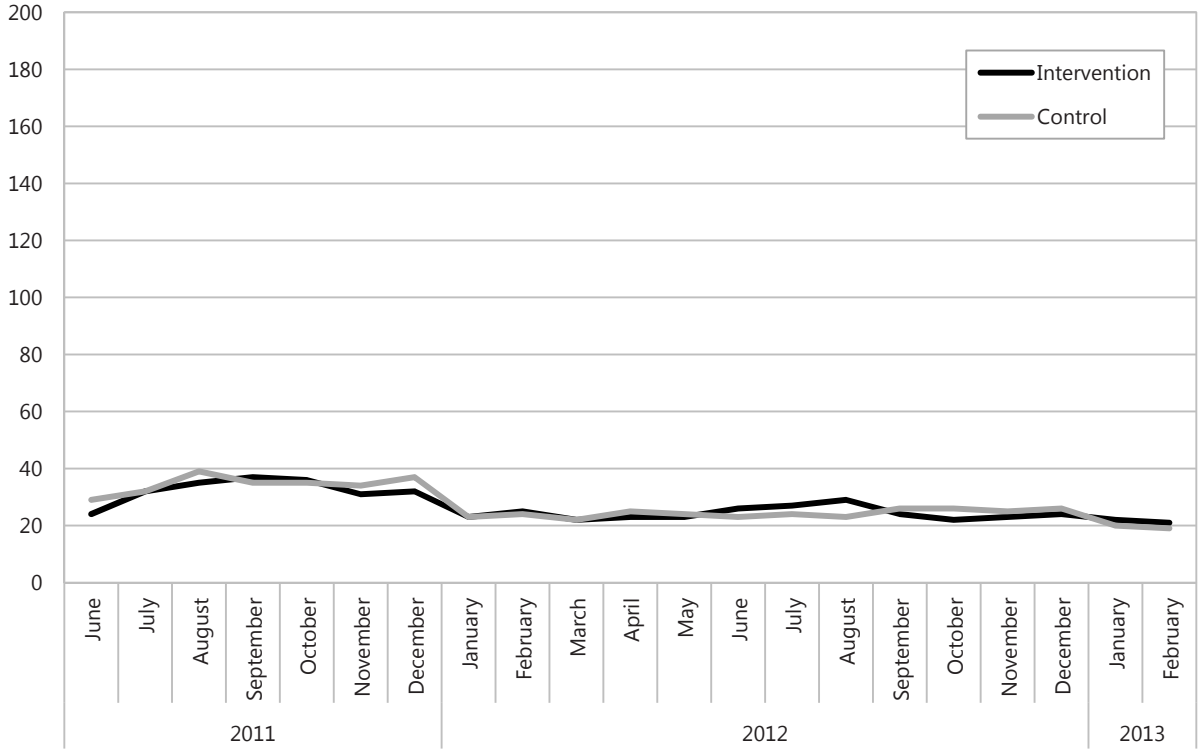
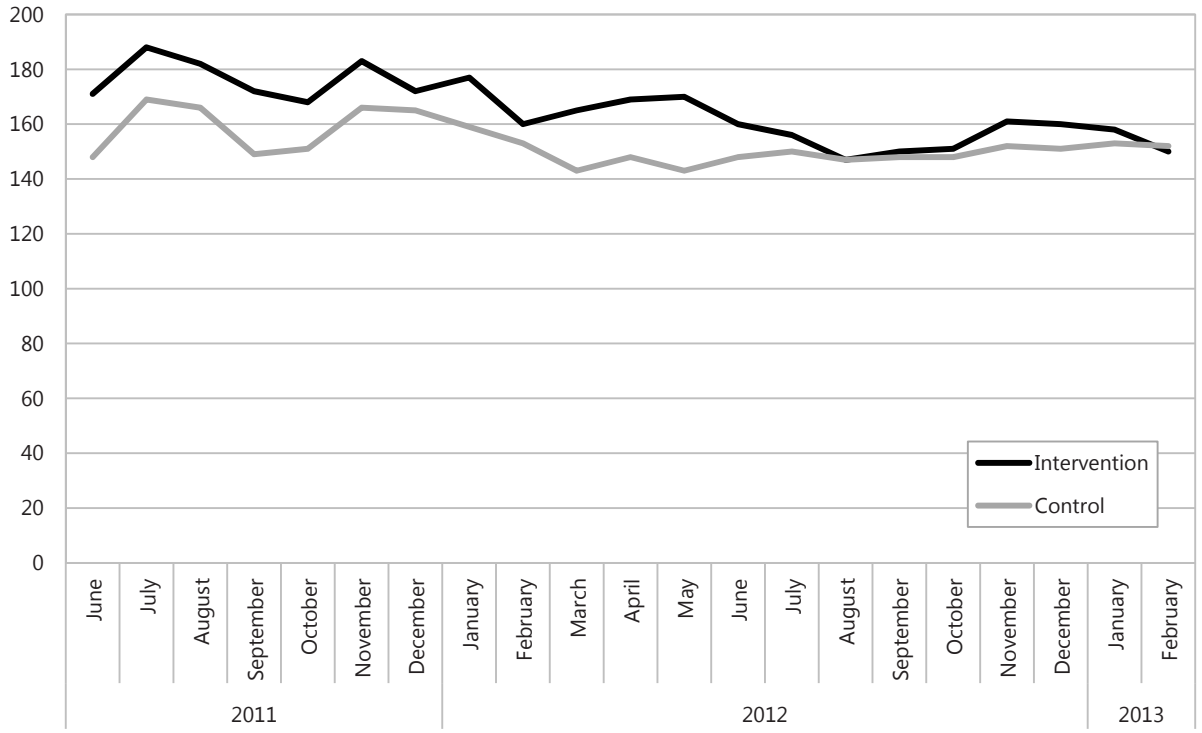


Figure 4.16: Number of Physicians Who Triggered Quality Indicator 211

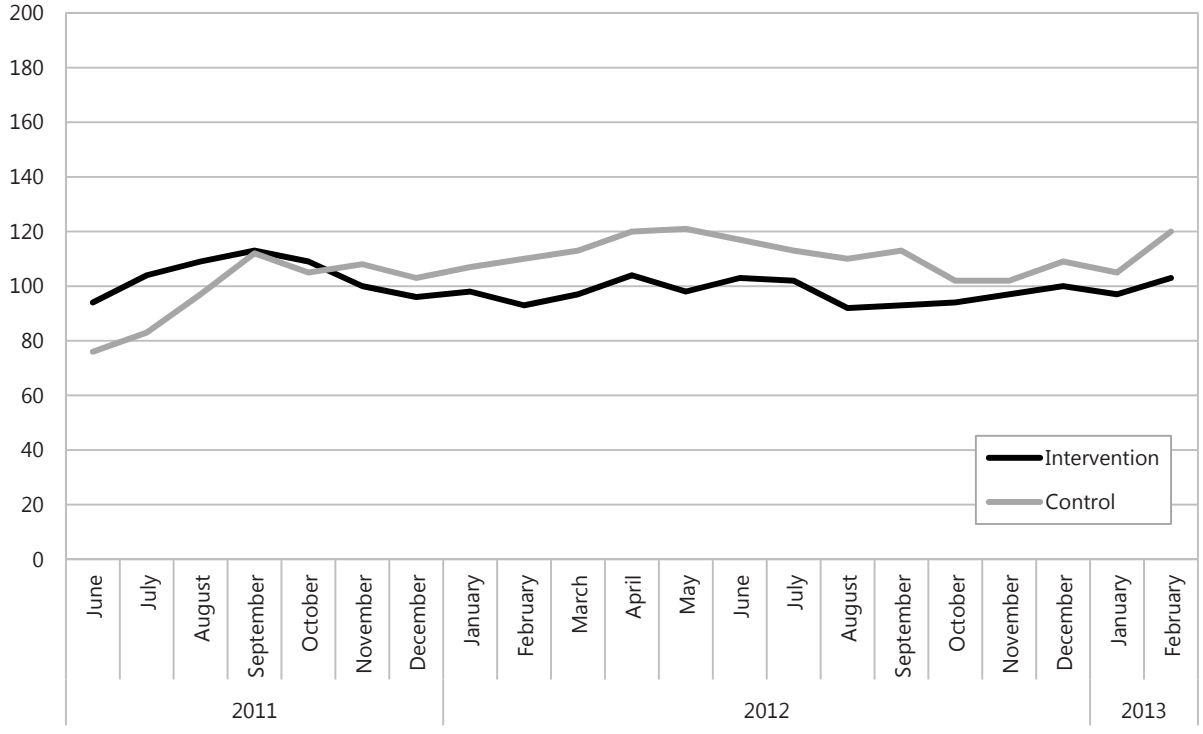
Use of two or more anti-insomnia agents for 60 or more days, patients aged 18–64



A statistically significant impact of the Manitoba IMPR$_x$OVE Program was found for this quality indicator

Figure 4.17: Number of Physicians Who Triggered Quality Indicator 156

Use of two or more anti-insomnia agents for 60 or more days, patients aged 65 or older



A statistically significant impact of the Manitoba IMPR$_x$OVE Program was found for this quality indicator

Secondary Quality Indicators

There were no apparent differences between the control and intervention groups in the number of physicians triggering the secondary QIs (figures 4.19 – 4.22). This is not surprising, given that none of these QIs showed a significant effect of the Manitoba IMPROVE Program in the intention-to-treat analysis. For QI 206 (Psychotropics for adults) and QI 405 (Multiple prescribers opioids for adults), where there was a change to the drug inclusions during the course of the study period, a small bump in the number of physicians triggering the QI can be seen in September 2012.

Figure 4.18: Number of Physicians Who Triggered Quality Indicator 206

Use of five or more psychotropics for 60 or more days, patients aged 18–64

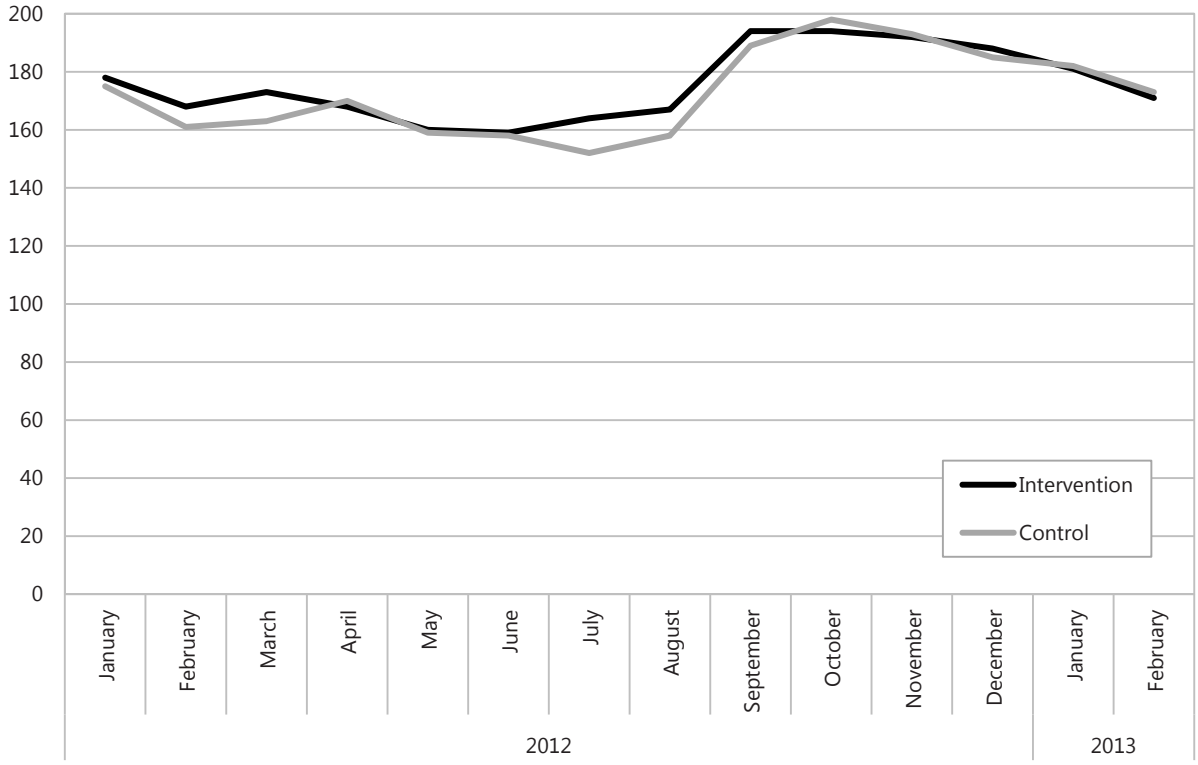


Figure 4.19: Number of Physicians Who Triggered Quality Indicator 405

Multiple prescribers of one or more opioids for 30 or more days, patients aged 18–64

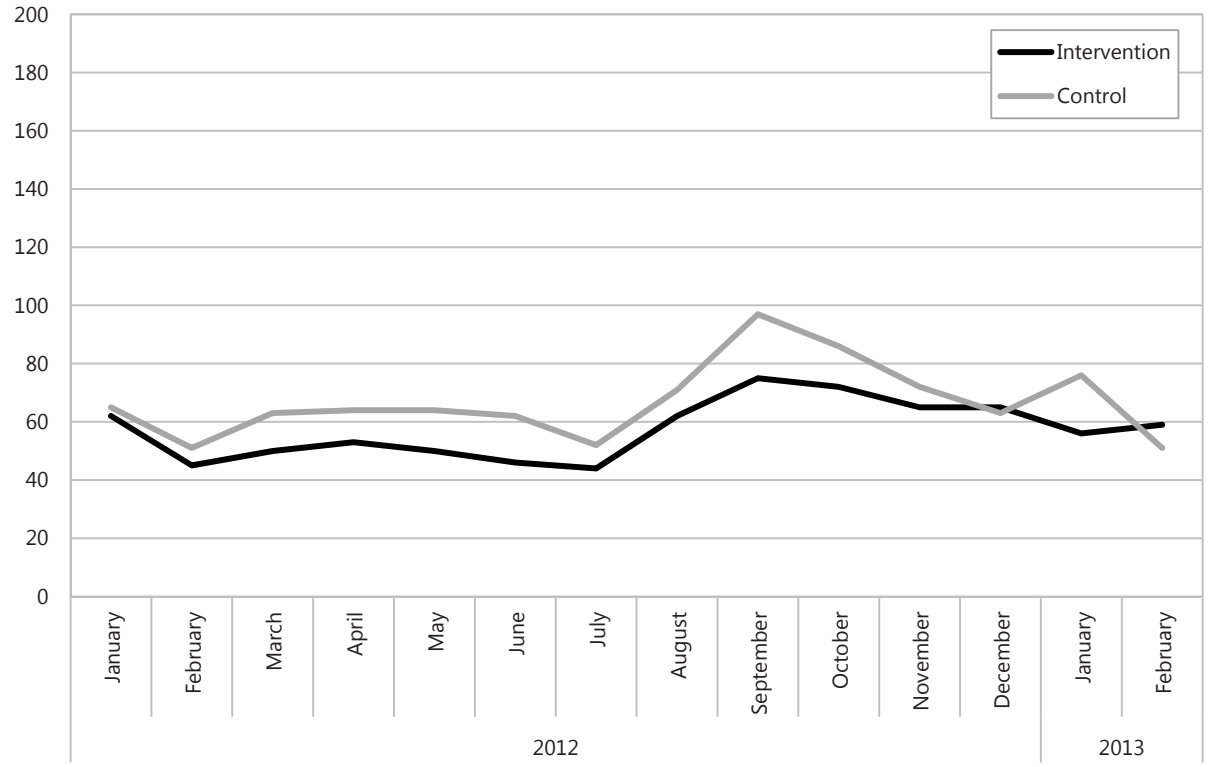


Figure 4.20: Number of Physicians Who Triggered Quality Indicator 411

Multiple prescribers of one or more opioids for 30 or more days, patients aged 65 or older

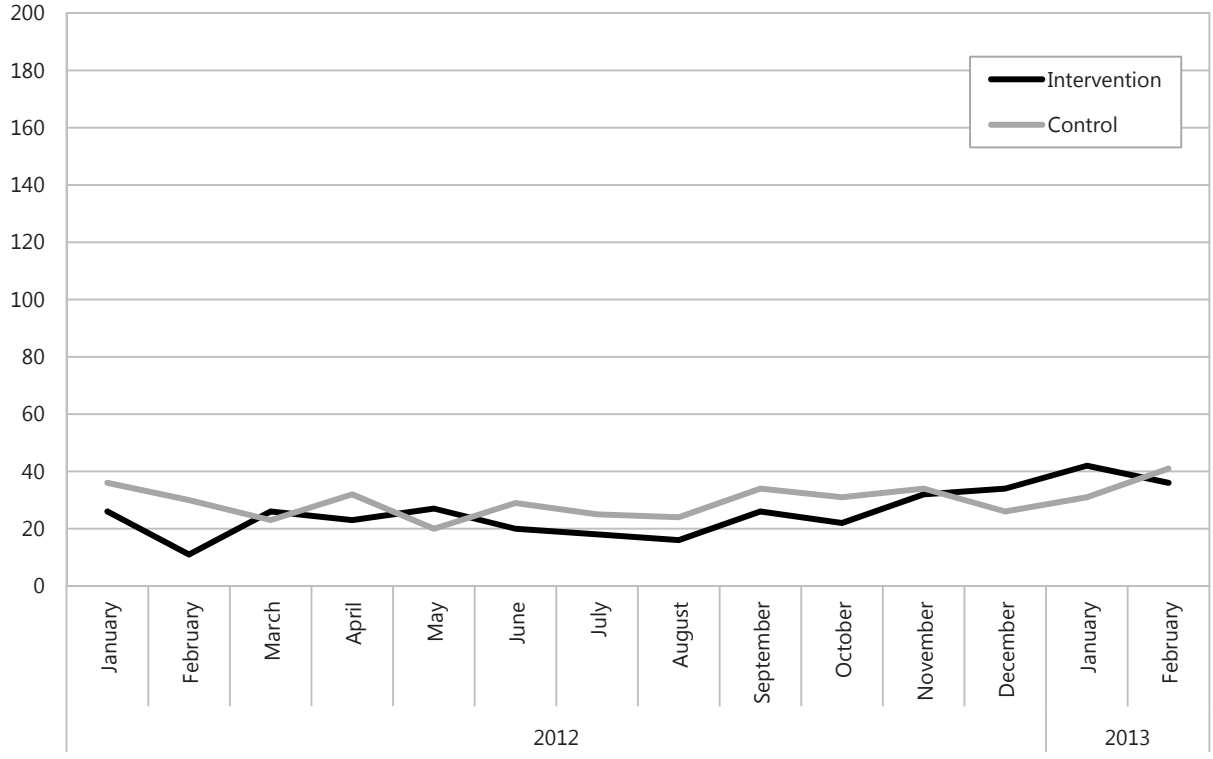


Figure 4.21: Number of Physicians Who Triggered Quality Indicator 602

Patient failed to refill newly prescribed antidepressant within 30 days of prescription ending, patients aged 18–64

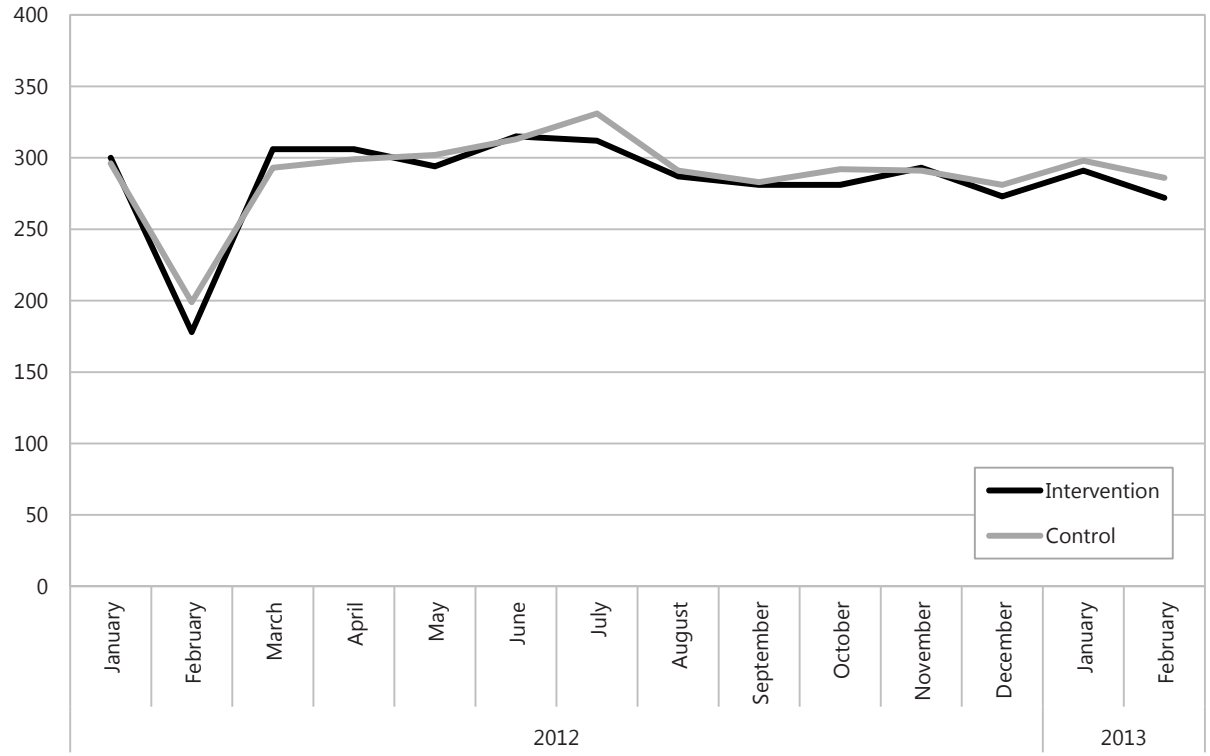
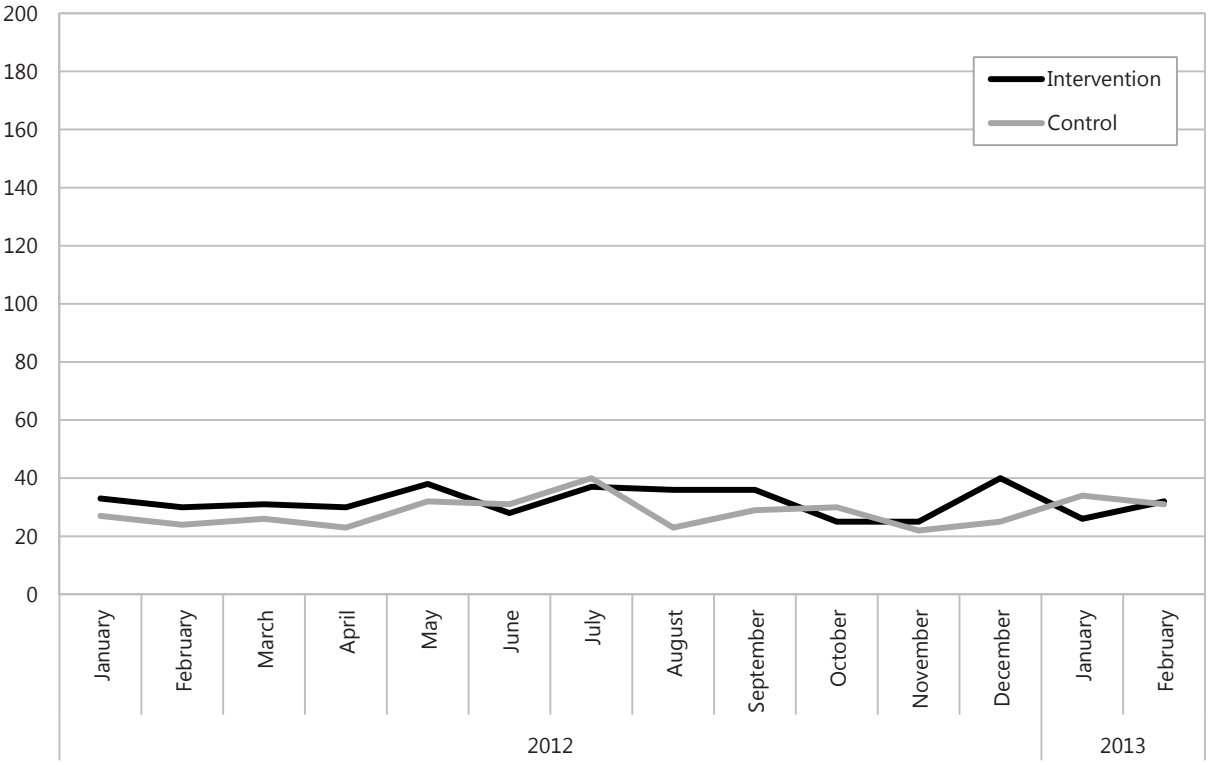


Figure 4.22: Number of Physicians Who Triggered Quality Indicator 606

Patient failed to refill an antipsychotic within 30 days of prescription ending, patients aged 65 or older



Mailed Educational Package Analysis

As described in Chapter Two, there were many reasons for a QI to be excluded from the monthly mailings to the intervention group. The following set of figures (4.23 – 4.28) show the rate of QI triggers per physician (with at least one QI trigger on or before that month), and the rate of mailed interventions (**educational mailing package rate**) for the same set of QIs and physicians. If every QI trigger resulted in an educational mailing package being sent to the prescriber, these lines would overlap perfectly.

Primary Quality Indicators

There are two major observations to take away from these data:

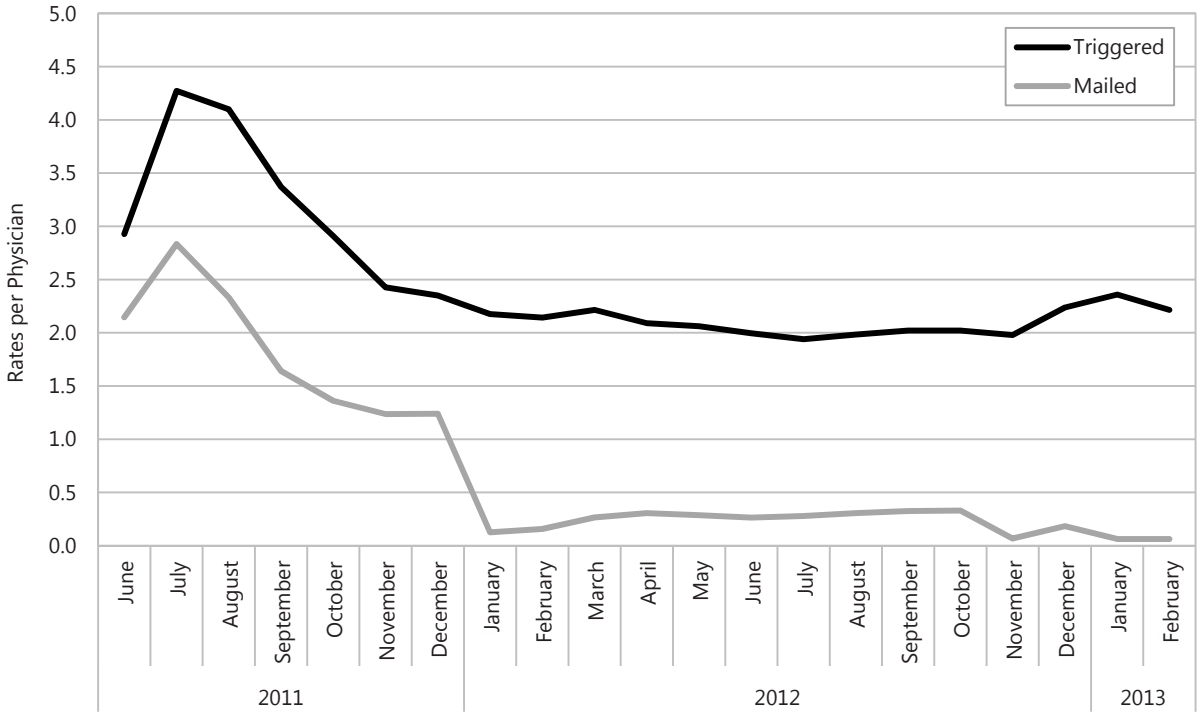
1. The precipitous drop, in January 2012, in the proportion of QIs triggers that resulted in a mailing was due to a procedural change described in Chapter Two: triggers for patients already associated with a QI trigger were excluded, and physicians were only mailed packages for new patients. The introduction of the recurrent-trigger mail filter is quite evident for the primary set of QIs. The conclusion drawn from the figures is that a high proportion of QI triggers were for patients already associated with a previous mailing.

2. For several QIs (105: Benzodiazepines for adults; 145: Benzodiazepines for older adults; 138: Long-acting benzodiazepines for older adults; and 211: Anti-insomnia agents for adults), the mailed rate is substantially lower than QI trigger rate even before the recurrent-trigger filter was applied. This is primarily due to the multiple-prescriber filter and the redundant-QI filter described in Chapter Two. For the multiple-prescriber filter, if the reason for a QI trigger could not be attributed to just one physician, none of the physicians involved in the QI trigger was sent a mailing. This has the largest effect on QIs involving multiple drug dispensations (i.e., multiple benzodiazepines, multiple anti-insomnia), but little effect on single-drug QIs (e.g., QI 512, High-dose benzodiazepines). The multiple-prescriber filter was not applied to the multiple-prescriber QIs (405: Multiple prescribers of opioids for adults and 411: Multiple prescribers of opioids for older adults), because this is precisely what the QIs are targeting.

We can see that the effects of the intervention on QI trigger rates plateau for almost all indicators immediately after the recurrent-trigger mail filter was introduced. However, the rate of change in QI triggers had already begun to slow down, so it is impossible to attribute any change in the program effect to the change in the protocol. And yet it does suggest that repeat mailings may be beneficial, and the change in mailing protocol, or application of the recurrent-trigger filter, may be worth revisiting.

Figure 4.23: Rates of Triggers and Mailed Educational Packages for Quality Indicator 105

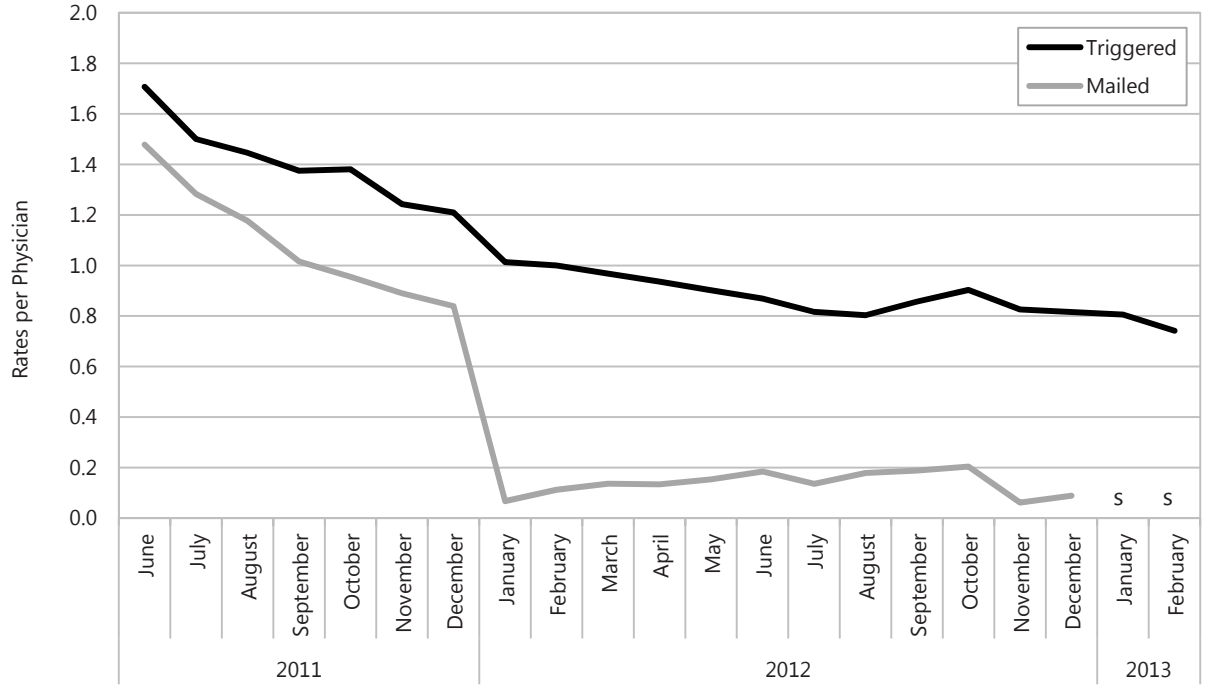
Use of two or more benzodiazepines for 60 or more days, patients aged 18–64



There is a statistically significant trend over time for the mailed interventions: $p<0.0001$
A statistically significant impact of the Manitoba IMPR$_x$OVE Program was found for this quality indicator

Figure 4.24: Rates of Triggers and Mailed Educational Packages for Quality Indicator 145

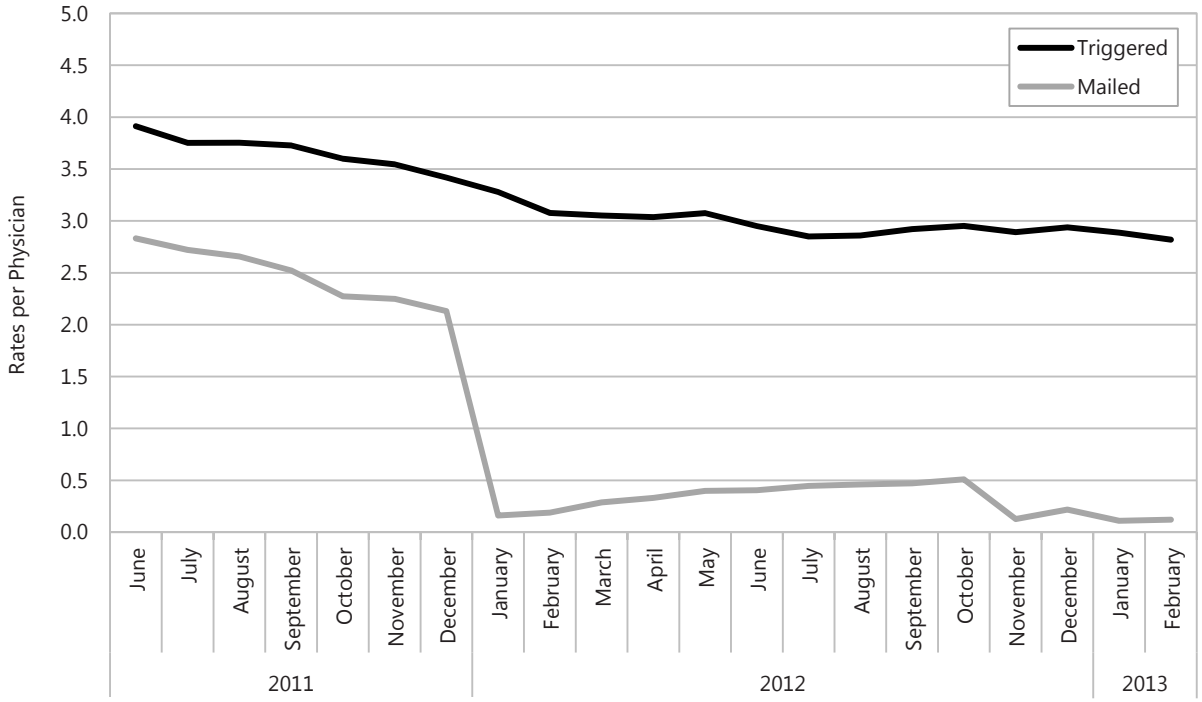
Use of two or more benzodiazepines for 45 or more days, patients aged 65 or older



s indicates data suppressed due to small numbers
There is a statistically significant trend over time for the mailed interventions: $p<0.001$
A statistically significant impact of the Manitoba IMPR$_x$OVE Program was found for this quality indicator

Figure 4.25: Rates of Triggers and Mailed Educational Packages for Quality Indicator 138

Use of any long-acting benzodiazepine for 30 or more days, patients aged 65 or older

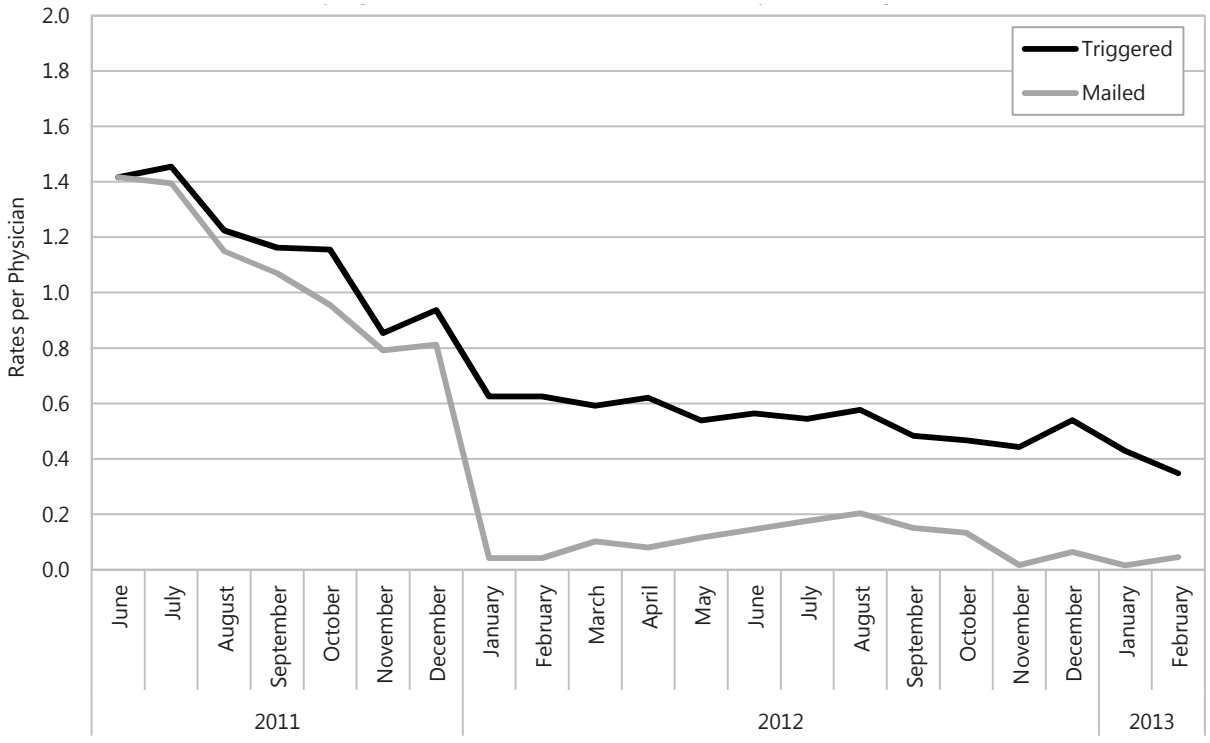


There is a statistically significant trend over time for the mailed interventions: $p<0.001$

A statistically significant impact of the Manitoba IMPR$_x$OVE Program was found for this quality indicator

Figure 4.26: Rates of Triggers and Mailed Educational Packages for Quality Indicator 512

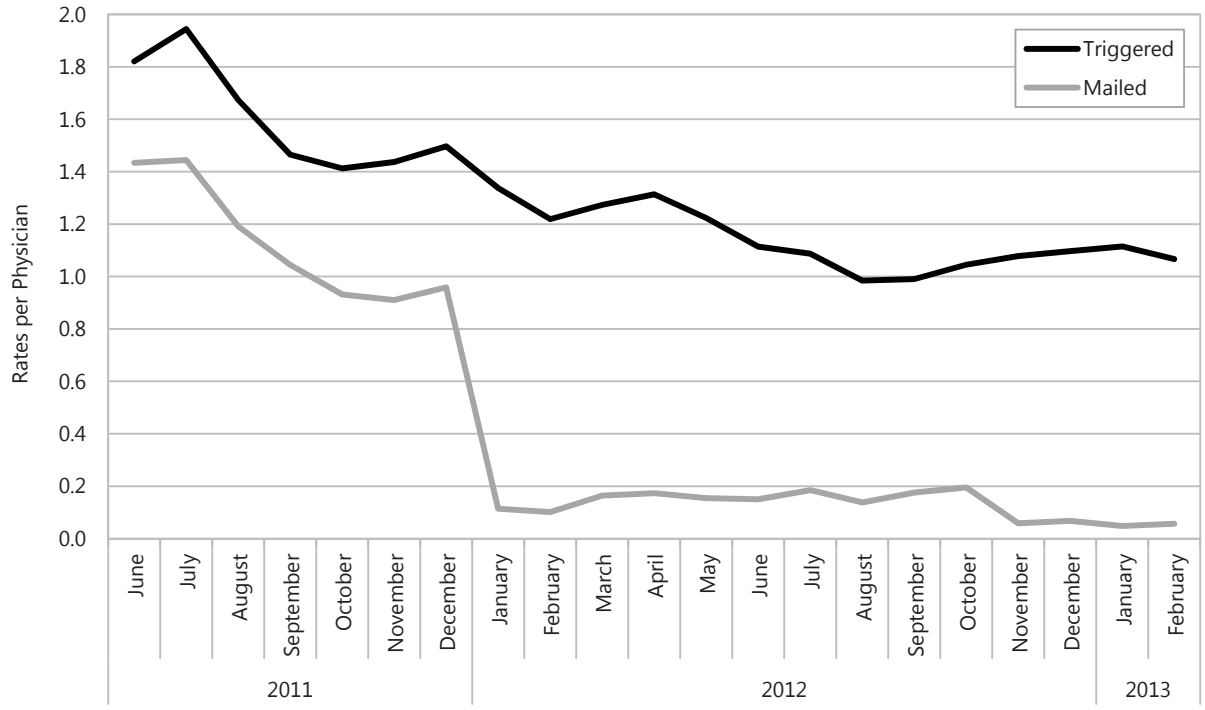
Use of any high dose benzodiazepine for 30 or more days, patients aged 18–64



There is a statistically significant trend over time for the mailed interventions: $p<0.001$

Figure 4.27: Rates of Triggers and Mailed Educational Packages for Quality Indicator 211

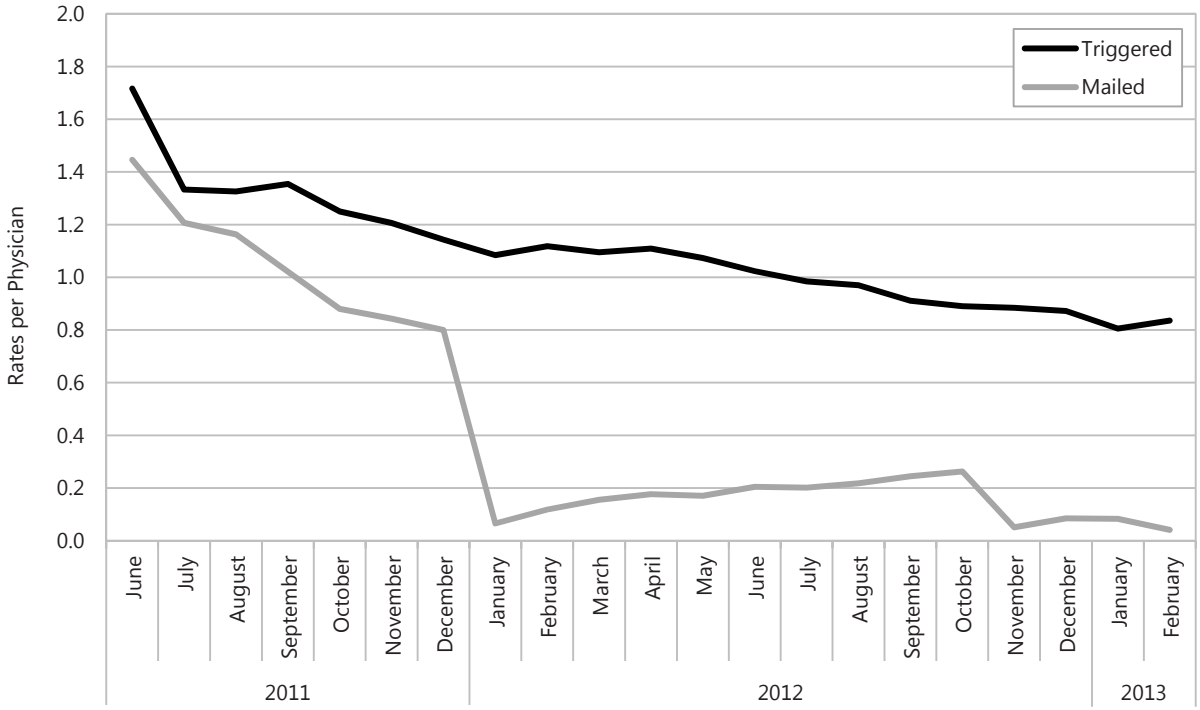
Use of two or more anti-insomnia agents for 60 or more days, patients aged 18–64



There is a statistically significant trend over time for the mailed interventions: $p<0.001$
A statistically significant impact of the Manitoba IMPR$_x$OVE Program was found for this quality indicator

Figure 4.28: Rates of Triggers and Mailed Educational Packages for Quality Indicator 156

Use of two or more anti-insomnia agents for 60 or more days, patients aged 65 or older



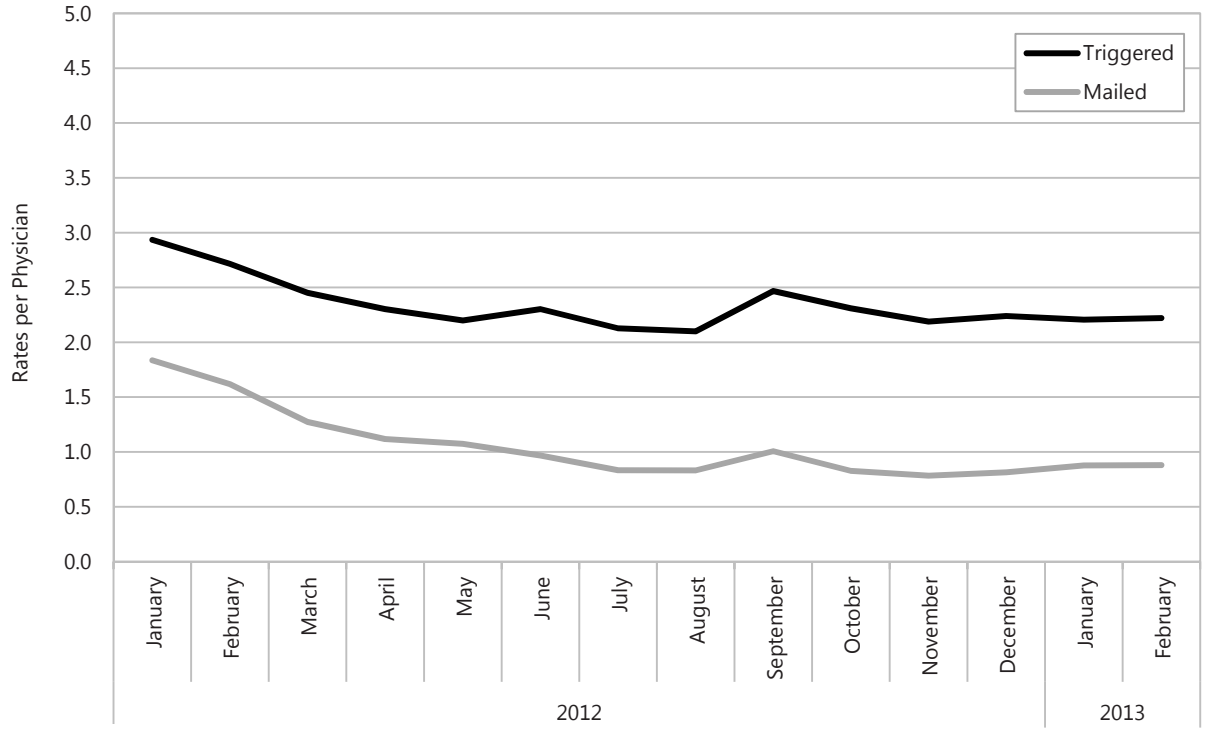
There is a statistically significant trend over time for the mailed interventions: $p<0.001$
A statistically significant impact of the Manitoba IMPR$_x$OVE Program was found for this quality indicator

Secondary Quality Indicators

The trends in mailing rates for the secondary QIs (figures 4.29 – 4.33) are very similar to those for the primary QIs. One notable exception is that the recurrent-QI filter did not have an apparent effect on mailing rates. This suggests that for many of the secondary QIs, each trigger was likely for a unique patient. As with QI 105 (Benzodiazepines for adults) and other QIs targeting multiple concurrent drugs, the mail rate for QI 206 (Psychotropics for adults; Figure 4.29) was much lower throughout the study period. This was most likely due to the multiple-prescriber mail filter. The rest of the secondary QIs target multiple prescribers where the multiple-prescriber filter is not applied (QI 405: multiple prescribers opioids for adults; and QI 411: multiple prescribers opioids for older adults), or target single prescription behaviours where it is not applicable (QI 602: Failure to refill antidepressants, and QI 606: failure to refill antipsychotics). The mail rate for these QIs is nearly identical to the QI trigger rate.

Figure 4.29: Rates of Triggers and Mailed Educational Packages for Quality Indicator 206

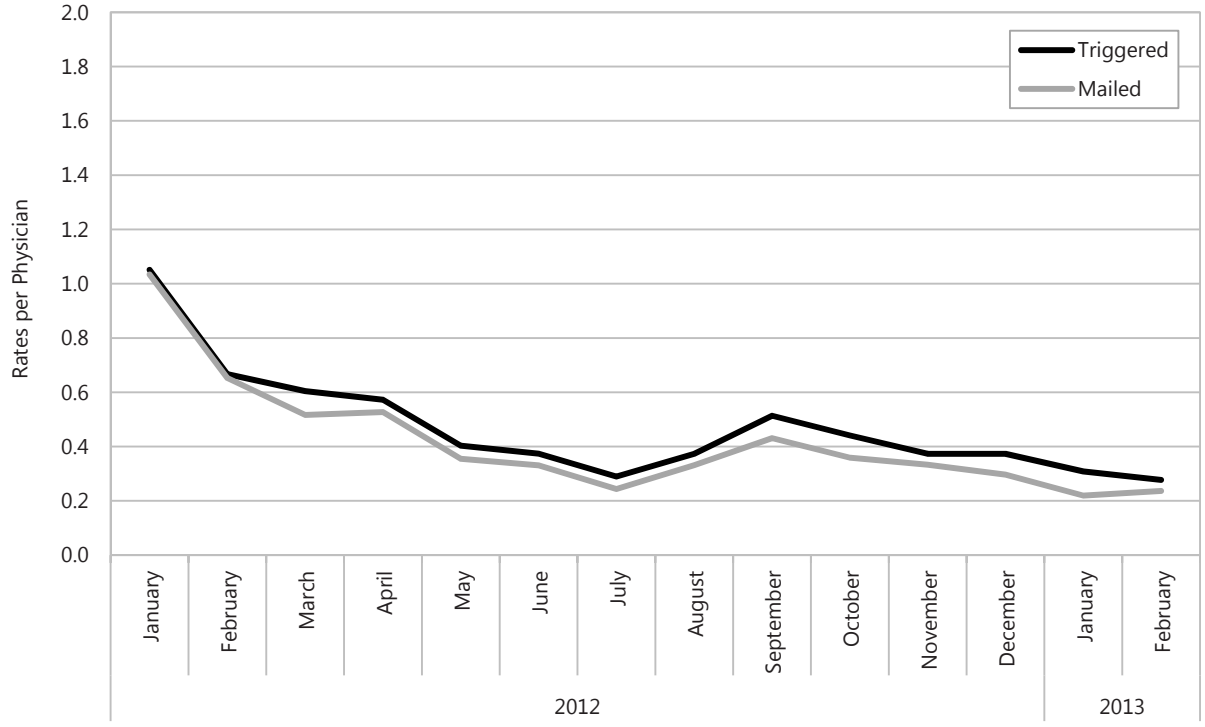
Use of five or more psychotropics for 60 or more days, patients aged 18–64



There is a statistically significant trend over time for the mailed interventions: p=0.0018

Figure 4.30: Rates of Triggers and Mailed Educational Packages for Quality Indicator 405

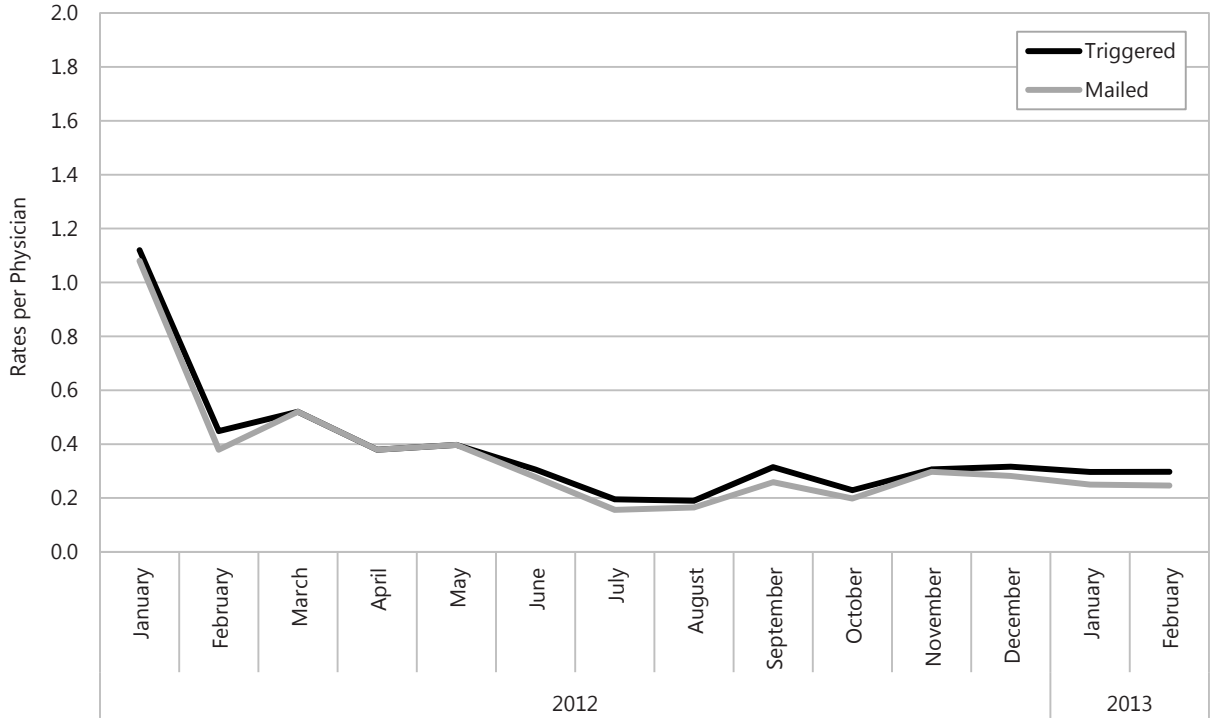
Multiple prescribers of one or more opioids for 30 or more days, patients aged 18–64



There is a statistically significant trend over time for the mailed interventions: p<0.001

Figure 4.31: Rates of Triggers and Mailed Educational Packages for Quality Indicator 411

Multiple prescribers of one or more opioids for 30 or more days, patients aged 65 or older



There is a statistically significant trend over time for the mailed interventions: p=0.0011

Figure 4.32: Rates of Triggers and Mailed Educational Packages for Quality Indicator 602

Patient failed to refill newly prescribed antidepressant within 30 days of prescription ending, patients aged 18–64

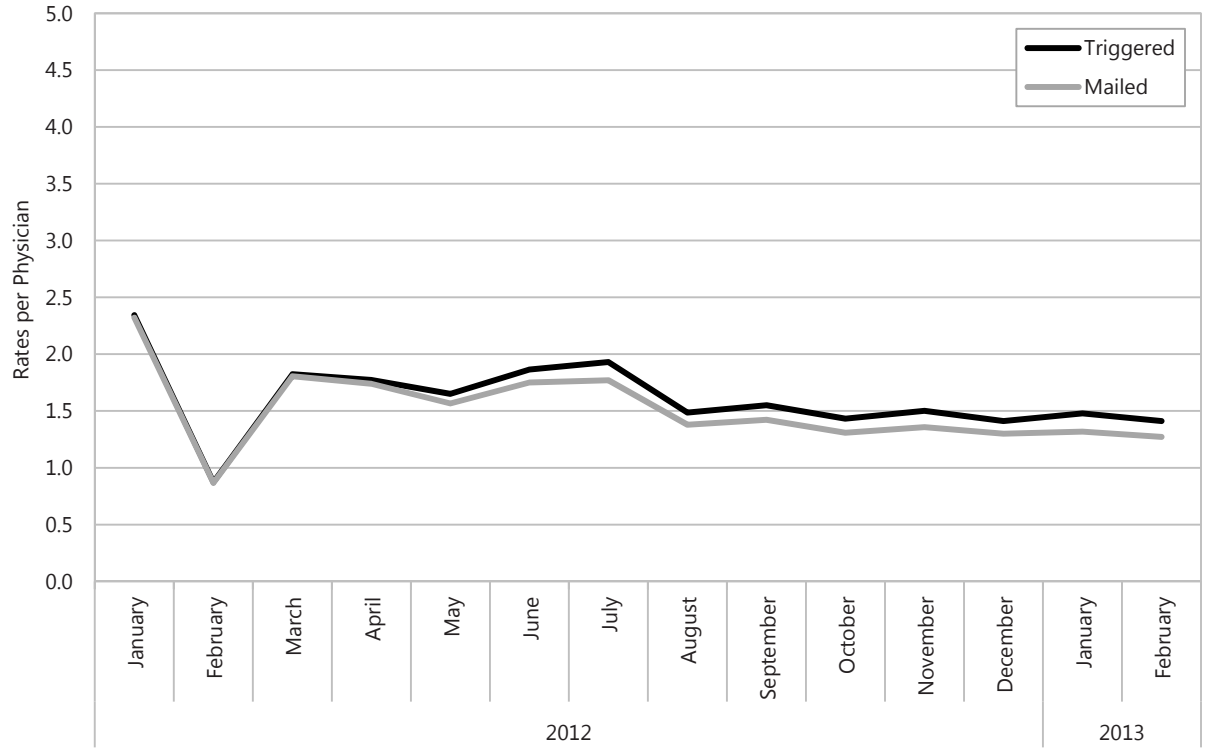
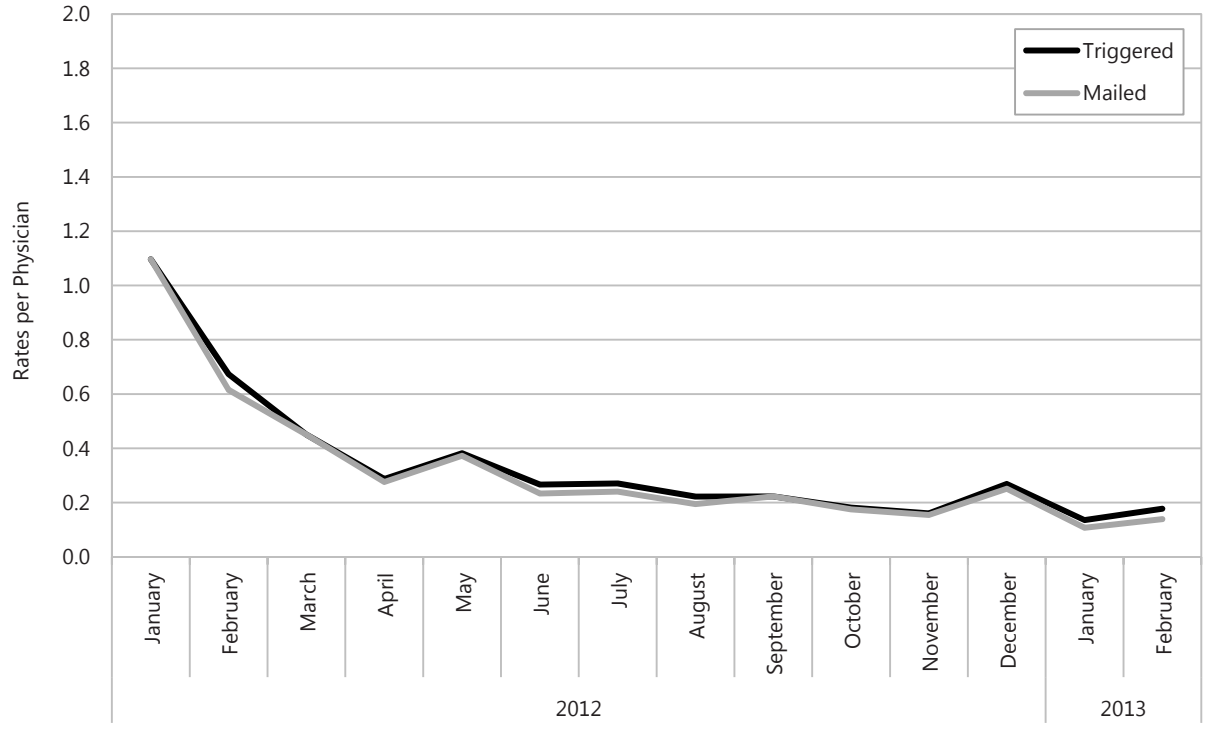


Figure 4.33: Rates of Triggers and Mailed Educational Packages for Quality Indicator 606

Patient failed to refill an antipsychotic within 30 days of prescription ending, patients aged 65 or older



There is a statistically significant trend over time for the mailed interventions: $p<0.001$

CHAPTER 5: RESPONSE TO THE MANITOBA IMPROVE PROGRAM

After establishing that the Manitoba IMPROVE Program had a significant impact on overall physician trigger rates for at least some QIs, a new question arose: were there particular types of physicians that were more or less likely to respond to the educational mailing intervention? That is, among physicians who received a mailing, were some more likely to reduce instances of the prescribing behaviour than others?

A positive response to the program would be easy to see among physicians with a consistently high trigger rate before the program's implementation, because we would be able to observe a drop in the number of QI triggers for that particular physician. However, for physicians who rarely trigger a particular QI, this would not be as straightforward. Some physicians might not trigger a QI at every reporting period, and in fact, might only trigger a particular QI rarely over the entire study period. It would be difficult determine whether or not such a physician had responded to the intervention. We chose to address this question with a method that would identify any consistent patterns of QI trigger rates that occurred among the intervention physicians over the 16 months of the evaluation, and assign physicians to groups based on their trigger pattern. By aggregating physicians into larger groups and evaluating the groups' trigger rates, rather than the individual physicians', we were able to determine easily whether the observed pattern of QI trigger rates represented a positive response to the program—i.e., did their QI trigger rate decline over the study period? This statistical-analysis method, known as a **Group-Based Trajectory Model** (hereafter "trajectory model") was run on each QI for which the intention-to-treat analysis revealed a significant effect of IMPROVE.

Trajectory-model analyses comb through the pattern of QI triggers for each physician over the time of the study and attempt to uncover subgroups of physicians within the larger group. These subgroups are distinguished by a particular pattern of QI triggers over time, which may be dependent either on the total number of QI triggers (i.e., high rates versus low rates) or by the change over time in the number of QI triggers (i.e., decreasing, increasing, or no change). The trajectory model identifies the consistent patterns of QI trigger rates that occurred in the data, and also reports whether any apparent increases or decreases in QI trigger rates were significant, or not. These analyses were conducted using PROC TRAJ software (Jones, Nagin, & Roeder, 2001), a plugin for use with SAS.

The trajectory models were not run on all physicians. In order to be included in the analyses certain criteria had to be met:

1. The physician had to be part of the intervention group. Control-group physicians could not respond to the Manitoba IMPROVE Program because they did not receive an educational mailing package. While it is possible that some control physicians were contaminated due to contact with colleagues who were part of the intervention group, it would be difficult to estimate this effect reliably.
2. The physician had to have triggered the QI being analysed, and have been sent an educational mailing package for the QI. Even intervention physicians cannot respond to a program if they had never triggered the QI, or were unaware that they had triggered the QI. The group with no triggers could be defined as having a trajectory with a flat line, with a QI trigger rate equal to zero.

With physicians grouped into trajectories, we could determine whether there were physician or practice characteristics related to the group, or trajectory, a physician belongs to. This analysis would help to determine whether the program was more effective for some groups than for others. For example, older physicians may be more likely to respond than younger physicians for a particular QI, and this would be indicated by a greater likelihood to belong to a trajectory that had a significant decrease in QI trigger rate over time. In these analyses we use the group that has the lowest overall rate of QI triggers as our reference group, because this represents the group least likely to engage in the potentially inappropriate prescribing behaviour. The likelihood of an event

occurring is presented in the following set of tables as an odds ratio. These tables help us identify what factors are associated with being a member of a group with a higher QI trigger rate. They also help identify what factors are associated with groups that do or do not show a significant declining trend over time—that is, a positive impact of the Manitoba IMPrOVE Program.

For practice characteristics, the most obvious factor that is associated with having a higher QI trigger rate is simply having a busier practice; the greater the volume of practice, the greater the likelihood that any QI might be triggered. As a measure of practice volume, we used the total number of prescriptions dispensed that were attributed to the physician in the year prior to the program's implementation. As an alternative, the total number of visits was also examined; it gave the same results as prescription dispensations. Prescription dispensation volume is presented here because some physicians in Manitoba are not remunerated via a fee-for-service model, and may therefore be missing visits due to incomplete shadow-billing practices. In fact, some physicians in the Manitoba IMPrOVE Program dataset had very few visits relative to prescriptions. For this reason, prescription dispensation data were deemed more reliable than visit data for capturing practice volume, particularly for an analysis of prescribing behaviours.

We also examined the assigned patients' age distribution (see Methods, above) by including the proportion of the patients over 65 in the physicians' practices. This factor might be expected to be associated with many QIs, because the QIs themselves are directed towards patients aged 18–65 or 65 and older. For QIs aimed at prescribing behaviours associated with patients aged 18–65, the likelihood of a trigger is greater when the proportion of patients in that age group is greater. The opposite is true for QIs aimed at prescribing behaviours related to patients aged 65 and older.

A number of physician characteristics were also included in these regression models: physician sex, physician age (<50, 50 and older), years of practice in Manitoba, and where the physician received their training (Canada, elsewhere). Tables 5.1 to 5.5 below present the results of these analyses for each of the QIs that were subjected to a trajectory analysis. As expected, for almost all QIs, the number of prescriptions attributed to a physician was significantly positively related to membership in a group with a higher overall QI trigger rate. There were few other significant results.

Physician Group Trajectories

Figure 5.1 shows the results of this analysis for QI 105 (Benzodiazepines for adults). For this particular QI, four subgroups of physicians were identified by the analysis. The largest group of physicians, which comprised 47% of the analysed cohort, rarely triggered the QI. In fact, the rate of QI triggers for this group was only about 0.27 triggers per physician at the beginning, and declined to around 0.18 triggers per physician at the end of the study period. Despite the very low rate, the decline over time was statistically significant. The second largest group of physicians, which comprised 34% of the cohort, started with a higher trigger rate of 1.5 triggers per physician, and also declined significantly over time to 0.90 per physician by the end of the study period. The last two groups were considerably smaller, but had higher rates of QI triggers per physician. Fifteen percent of physicians comprised a subgroup that started at around 3.5 QI triggers per physician, and increased significantly to around four triggers per physician. This group is the opposite of responders. The fact that their rate increased over time could warrant further investigation by MHHLS or another body.

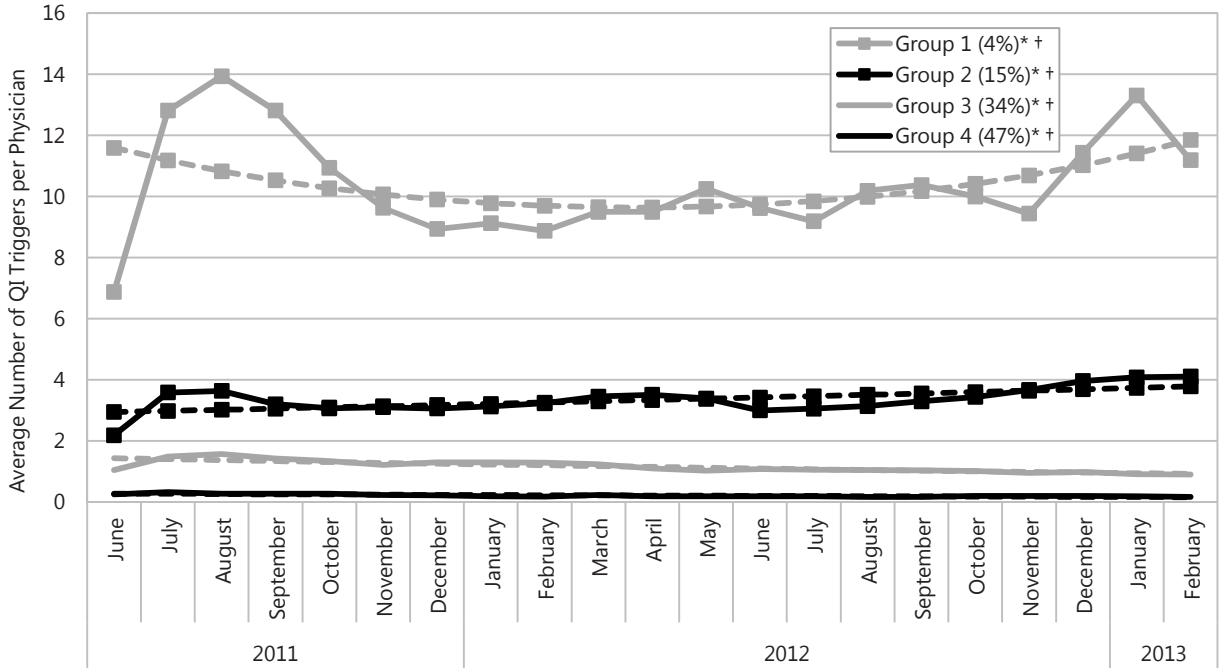
The last group was made up of only 4% of the physicians in the analysis and was perhaps the most interesting. The rate of QI triggers per physician started at around 13 per physician—which is very high—and declined significantly after the program's implementation, but subsequently increased between January 2012 and the end of the study period. This late increase raised the trigger rate almost equal to where the group had started. It may not be coincidence that the point at which the rate begins to increase is the same time that the mailing protocol was fundamentally changed. As described above, a recurrent-QI mail filter was introduced in January 2012, and

mailings ceased for triggers associated with patients for whom the physician previously received an educational package. This change in protocol would be most noticeable for those physicians who had previously received much larger mailing packages. It is not entirely clear whether the change in protocol was responsible for the increase, or whether the effect of the program had attenuated for this group. Additional research would be necessary to answer this question. Overall, for QI 105 (Benzodiazepines for adults), groups one, two, and four showed a positive effect of the IMPROVE (Figure 5.1).

The results of the analysis predicting group trajectory membership are given in Table 5.1. Group four had the lowest initial QI trigger rate and overall rate. It serves as the reference group in this analysis. As with the logistic-regression analysis presented at the end of Chapter Three, the statistic that is reported in these analyses is an odds ratio. Odds ratios greater than one indicate an increased likelihood of being in the group compared to the reference group. Odds ratios between zero and one indicate a decreased likelihood of being in the group. Being an older physician and having a greater percentage of younger patients (aged 18–64) was significantly associated with being in groups one, two, and three, as compared to group four. Since this QI has to do with use of benzodiazepines among 18–65 year olds, the latter result is not surprising; a younger practice leads to more QI triggers when the QI targets prescriptions to younger patients. However, for group one, which is the group with the highest rate of QI triggers, years of practice was also significantly associated. The longer a physician had practiced in Manitoba, the fewer QI triggers they were likely to have. Location of training and physician sex were not associated with group assignment for this QI. Importantly, there is no discriminating factor that predicts membership in group two (Table 5.1). Group two has a high QI trigger rate, and showed no effect of IMPROVE (Figure 5.1). In other words, there is nothing that clearly distinguishes the physicians who responded to the program (groups one, three, and four) from those that did not (group two).

Figure 5.1: Group-Based Trajectory Model for Triggers of Quality Indicator 105

Use of two or more benzodiazepines for 60 or more days, patients aged 18–64



Note: solid lines represent observed data; dashed lines represent fitted trend lines

* indicates statistically significant trend over time ($p<0.05$)

† percent of physicians assigned to each group from those in the intervention group triggering the QI

Table 5.1: Factors Associated with Patterns of Triggering Quality Indicator 105

QI 105: Benzodiazepines for adults

Factors	Odds Ratios by Physician Group (Reference = Group 4)		
	Group 1	Group 2	Group 3
Trained in Canada	ns	ns	ns
Physician Sex (Male)	ns	ns	ns
Physician Aged Over 50 Years	4.32 (1.18-15.73)	ns	2.02 (1.12-3.63)
Years of Practice	0.91 (0.83-0.99)	ns	ns
Number of Prescriptions*	3.06 (2.21-4.24)	2.19 (1.69-2.85)	2.00 (1.58-2.54)
Percent of Patients Aged Over 65 Years	0.87 (0.80-0.93)	0.93 (0.89-0.97)	0.94 (0.91-0.98)

* odds ratio per 10,000 drug prescriptions

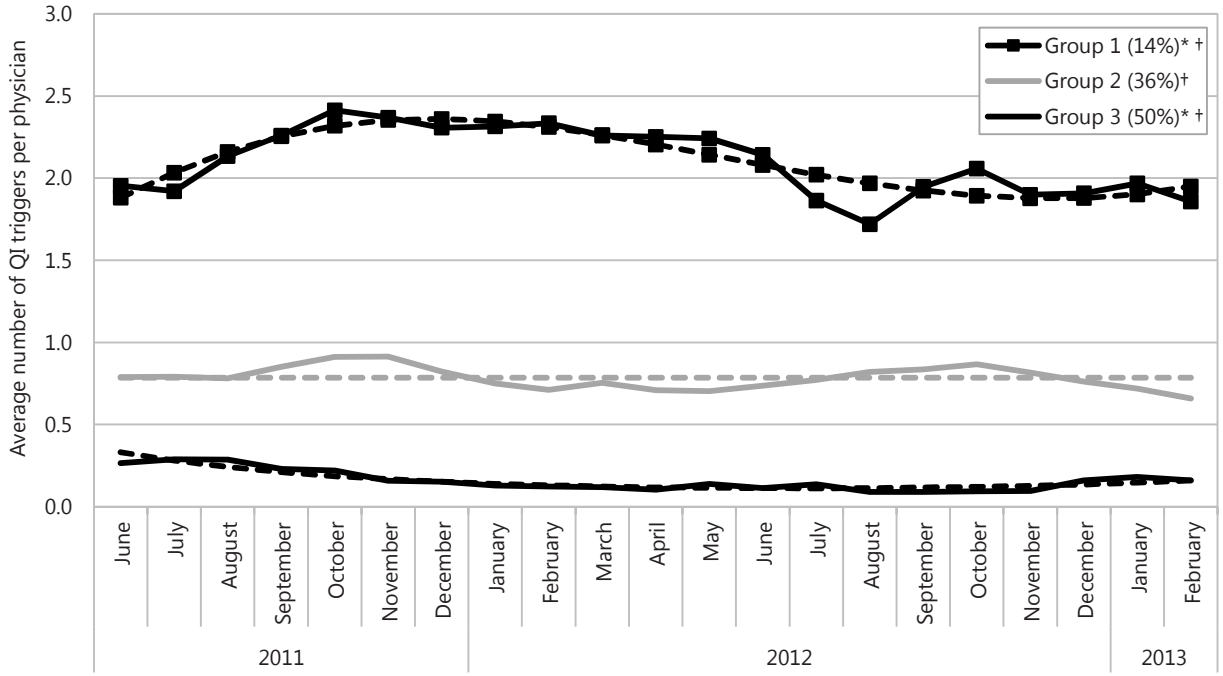
ns indicates variable effect not significant at $p<0.05$

Quality Indicator 145 (Benzodiazepines for older adults) is similar to QI 105 (Benzodiazepines for adults), but for adults aged 65 and older. For this QI, only three distinct groups of physicians were identified by the trajectory model (Figure 5.2). As with QI 105, group three—the largest, with about 50% of the physicians—had the lowest average number of QI triggers per month (~0.25 QI triggers). Despite starting with such a low rate, this group still showed a significant decrease in QI triggers per physician over the course of the intervention. Group two, which contains 36% of physicians, began with a higher rate of about 0.80 QI triggers) and showed no intervention effect (i.e., no change in trigger rates). Group one, the smallest at just 14%, started with the highest rate (~2.0 per physician), and showed a significant decreasing trend over time.

In the group-membership analysis for QI 145 (Table 5.2), only the number of prescriptions was associated with a higher odds of being in group one. Group one had a higher rate of QI triggers than group three, the reference group. As mentioned above, both of these groups appeared to respond to the intervention. Again, there were no identifiable factors that distinguished physicians who responded to the intervention (groups one and three) from those that did not (group two).

Figure 5.2: Group-Based Trajectory Model for Triggers of Quality Indicator 145

Use of two or more benzodiazepines for 45 or more days, patients aged 65 or older



Note: solid lines represent observed data; dashed lines represent fitted trend lines

* indicates statistically significant trend over time ($p<0.05$)

† percent of physicians assigned to each group from those in the intervention group triggering the QI

Table 5.2: Factors Associated with Patterns of Triggering Quality Indicator 145

QI 145: Benzodiazepines for older adults

Factors	Odds Ratios by Physician Group (Reference = Group 3)	
	Group 1	Group 2
Trained in Canada	ns	ns
Physician Sex (Male)	ns	ns
Physician Aged Over 50 Years	ns	ns
Years of Practice	ns	ns
Number of Prescriptions*	1.33 (1.08-1.63)	ns
Percent of Patients Aged Over 65 Years	ns	ns

* odds ratio per 10,000 drug prescriptions

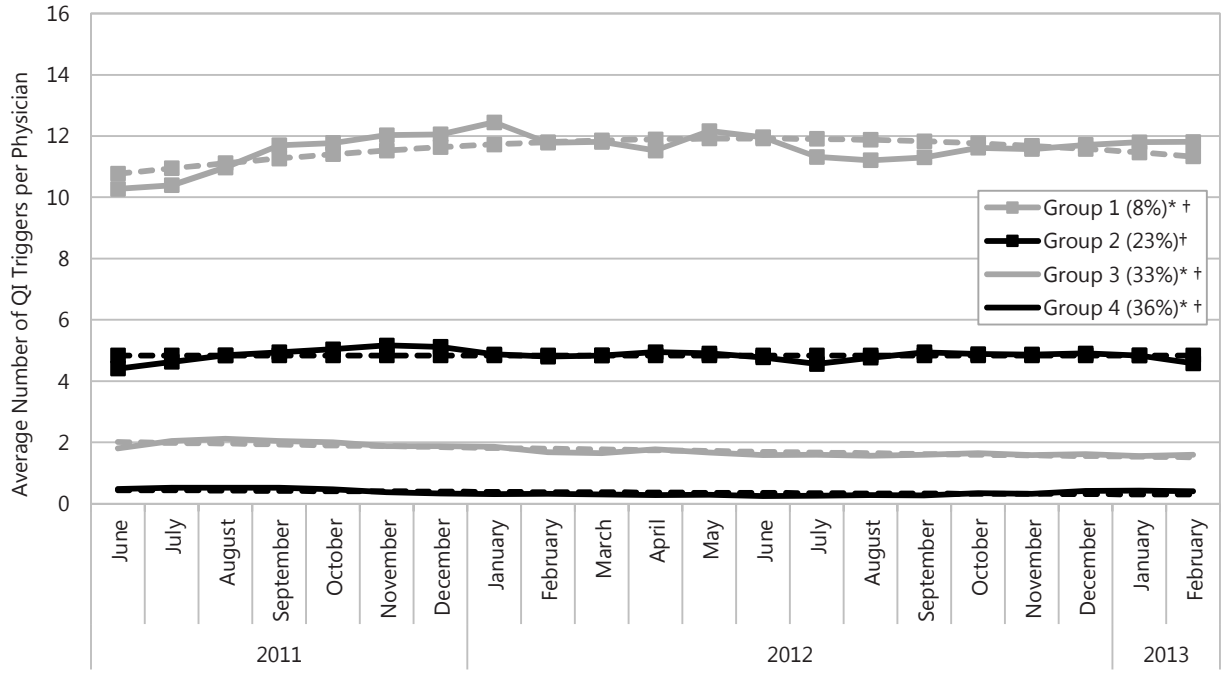
ns indicates variable effect not significant at $p<0.05$

The trajectory analysis results for QI 138 (Long-acting benzodiazepines for older adults; Figure 5.3) were quite different from QI 105 (Benzodiazepines for adults) and QI 145 (Benzodiazepines for older adults). The use of long-acting benzodiazepines in the elderly has potential negative consequences, such as falls that may require hospitalizations. Yet, according to our analyses, this potentially inappropriate prescribing behaviour is not uncommon in Manitoba. The trajectory analysis identified four distinct patterns for QI 138. Unlike with QI 105, the groups with the highest rates comprise a much larger proportion of physicians—about a third—and did not show a decrease in QI trigger rates over the study period. The two groups that started with lower rates showed significant declining trends over time, and the overall effect of the intervention on trigger rates for QI 138 seen in the intention-to-treat analysis should therefore be attributed to those groups.

In the group-membership analysis for QI 138 (Table 5.3), only prescription count and age distribution were associated with group assignment. The age-distribution effect is not surprising, because this QI targets older adults and a higher proportion in a physician's practice could be expected to lead to a higher trigger rate. Importantly, because the same factors were associated with membership in groups one, two, and three, compared to group four, this means there were no factors that differentiated physicians who responded to the intervention (groups three and four) from those that did not respond (groups one and two).

Figure 5.3: Group-Based Trajectory Model for Triggers of Quality Indicator 138

Use of any long-acting benzodiazepine for 30 or more days, patients aged 65 or older



Note: solid lines represent observed data; dashed lines represent fitted trend lines

* indicates statistically significant trend over time ($p<0.05$)

† percent of physicians assigned to each group from those in the intervention group triggering the QI

Table 5.3: Factors Associated with Patterns of Triggering Quality Indicator 138

QI 138: Long-acting benzodiazepines for older adults

Factors	Odds Ratios by Physician Group (Reference = Group 4)		
	Group 1	Group 2	Group 3
Trained in Canada	ns	ns	ns
Physician Sex (Male)	ns	ns	ns
Physician Aged Over 50 Years	ns	ns	ns
Years of Practice	ns	ns	ns
Number of Prescriptions*	2.40 (1.70-3.37)	2.38 (1.78-3.18)	1.78 (1.36-2.32)
Percent of Patients Aged Over 65 Years	1.33 (1.23-1.43)	1.20 (1.13-1.28)	1.16 (1.10-1.23)

* odds ratio per 10,000 drug prescriptions

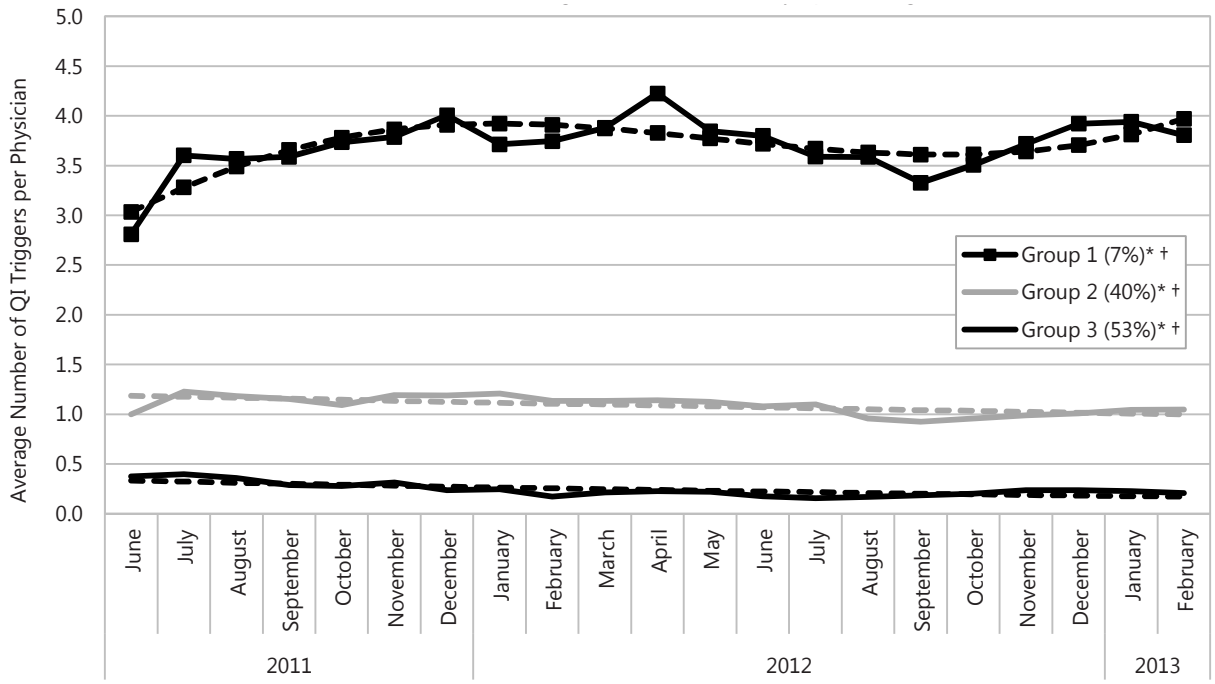
ns indicates variable effect not significant at $p<0.05$

The trajectory analysis for QI 211 (Anti-insomnia agents for adults; Figure 5.4) identified three subgroups. The results were similar to those for QI 145 (Benzodiazepines for older adults). The group with the highest QI trigger rate (~3.5–4 QI triggers per month) was small and showed a slight increase over time. The other two groups, which comprised over 90% of the physicians in the analysis, had much lower QI trigger rates at the beginning of the study period (<1.5), and showed significant declining trends over time.

Prescription count was again associated with group assignment (Table 5.4). Training location was significantly associated with group two. Although training location did not reach statistical significance for assignment to group one, the odds ratio was actually larger than the significant result for group two. This might be attributed to the small number of physicians in group two and the reduced power to detect a significant effect. As with the previous trajectory analyses, there was nothing systematically related to physicians who improved after the intervention (groups two and three), compared to those that did not improve (group one).

Figure 5.4: Group-Based Trajectory Model for Triggers of Quality Indicator 211

Use of two or more anti-insomnia agents for 60 or more days, patients aged 18–64



Note: solid lines represent observed data; dashed lines represent fitted trend lines

* indicates statistically significant trend over time ($p<0.05$)

† percent of physicians assigned to each group from those in the intervention group triggering the QI

Table 5.4: Factors Associated with Patterns of Triggering Quality Indicator 211

QI 211: Anti-insomnia agents for adults

Factors	Odds Ratios by Physician Group (Reference = Group 3)	
	Group 1	Group 2
Trained in Canada	ns	2.14 (1.25-3.66)
Physician Sex (Male)	ns	ns
Physician Aged Over 50 Years	ns	ns
Years of Practice	ns	ns
Number of Prescriptions*	1.37 (1.08-1.75)	1.29 (1.09-1.54)
Percent of Patients Aged Over 65 Years	ns	ns

* odds ratio per 10,000 drug prescriptions

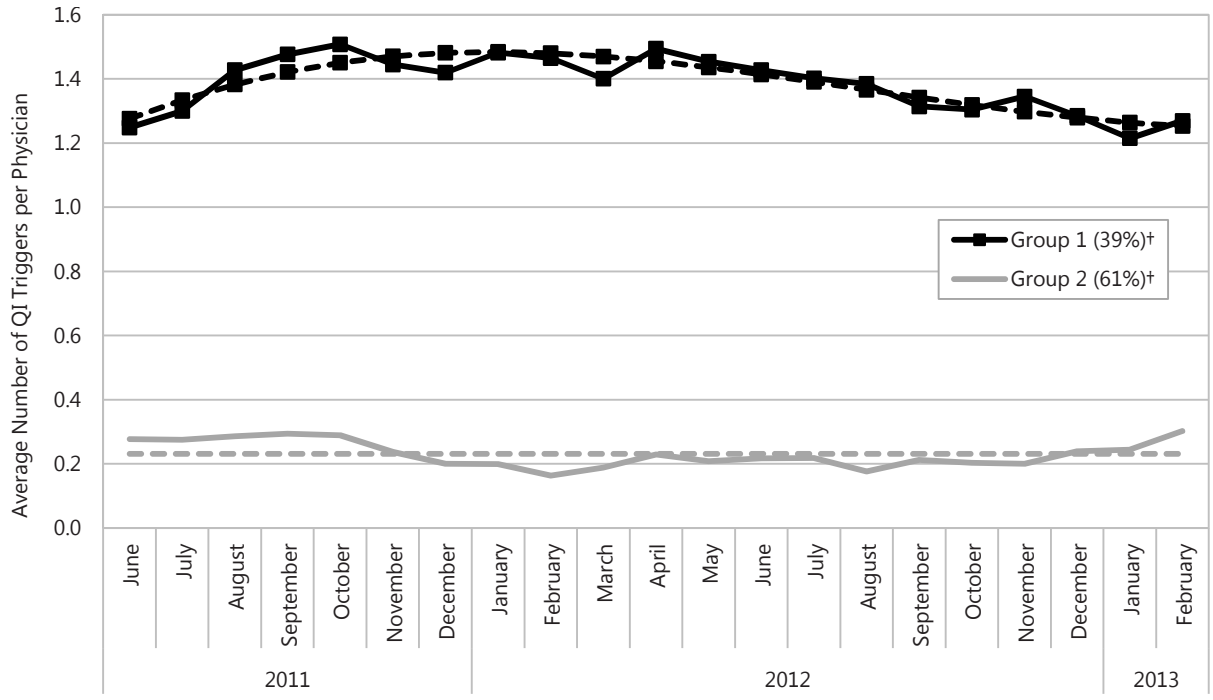
ns indicates variable effect not significant at $p<0.05$

Quality Indicator 156 examined the use of multiple anti-insomnia agents for older adults (aged 65+). Unlike QI 211 (Anti-insomnia agents for adults), the trajectory analysis identified only two subgroups (Figure 5.5). The largest group, which comprised about 61% of physicians, started with a low rate of QI triggers: about 0.2 triggers per physician per month. Although the rate of QI triggers appears to decline around six to seven months after the program's initiation, there was no significant linear trend. The smaller group had a much higher rate—about 1.2 triggers per physician per month—and the best fitting model identified a curvilinear trend. The rates appear to be declining towards the end of the study period.

For the group-membership analysis, there were no physician or practice characteristics associated with group assignment other than prescription volume, which simply differentiated the group with the higher rate from the group with the lower rate (Table 5.5). Given the curvilinear trend for group one and the non-significant linear trend for group two, it is difficult to determine if one, the other, or both groups are responsible for the significant results seen in the intention-to-treat analysis earlier.

Figure 5.5: Group Based Trajectory Model for Triggers of Quality Indicator 156

Use of two or more anti-insomnia agents for 60 or more days, ages 65 years and older



Note: solid lines represent observed data; dashed lines represent fitted trend lines

† percent of physicians assigned to each group from those in the intervention group triggering the QI

Table 5.5: Factors Associated with Temporal Trends of Triggering Quality Indicator 156

QI 156: Anti-insomnia agents for older adults

Factors	Odds Ratios by Physician Group (Reference = Group 2)
	Group 1
Trained in Canada	ns
Physician Sex (Male)	ns
Physician Aged Over 50 Years	ns
Years of Practice	ns
Number of Prescriptions*	1.24 (1.04-1.48)
Percent of Patients Aged Over 65 Years	ns

* odds ratio per 10,000 drug prescriptions

ns indicates variable effect not significant at $p<0.05$

Summary

In the trajectory analyses, at least two subgroups of intervention physicians could be identified for all QIs that showed a significant effect of the Manitoba IMPrOVE Program. In some cases, it was simply QI trigger rate that differed between subgroups, which otherwise showed a similar *trend* in QI trigger rates over the course of the study period. In other cases, subgroups also showed different trends. In all analyses but one, the physician group that began with low rates of QI triggers showed a significant decline in rates. This shows that the program affected prescribing behaviours even in physicians with low trigger rates. This is somewhat surprising in light of the Cochrane review of audit-and-feedback programs, which suggested that a high rate of behaviour is more likely to result in a significant intervention effect. It may be the case that a high rate in the population is the key, rather than a high rate for an individual physician in the population.

One of the most encouraging findings is that, for almost all QIs, the physician group with the lowest QI trigger rates was also the largest group of physicians, comprising half or more of all physicians in the analysis, and in some cases, over 90% of the physicians who had triggered the QIs. These groups usually also exhibited a significant impact of the Manitoba IMPrOVE Program. In some cases, linear decreasing trends were also found with groups of physicians that began with higher trigger rates. However, in most cases these trajectories had relatively few physicians. This means that the overall results from the intention-to-treat analysis were more dependent on the larger group of physicians with low rates than the smaller group with high rates.

For some QIs, there were subgroups that did not show any improvement over the course of the intervention. The regression models examining whether practice or physician characteristics were associated with subgroup assignment did not find a meaningful pattern. Only prescription count was consistently associated with QI-trigger-rate patterns. This may reflect an increased likelihood of triggering a QI because the physicians had more patients, rather than a differential likelihood of responding to the program. None of the additional physician- or practice-characteristic variables consistently differentiated physicians who responded to the program from those that did not. The lack of consistent findings among physician characteristics could indicate that the universal nature of the program is warranted.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

The preceding analyses demonstrate that the Manitoba IMPRoVE Program (IMPRoVE) has been effective at reducing many of the potentially inappropriate prescribing behaviours it targeted. Table 6.1 gives a summary of how frequently the QIs were triggered during the study period, and which QIs showed a statistically significant effect of the program. IMPRoVE's overall success can be gauged by a combination of the frequency of QI triggers and whether the intervention significantly reduced these rates. For example, if a high-frequency QI was significantly reduced by IMPRoVE, this would have a bigger impact overall than a low-frequency QI. Importantly, three out of four of the highest-frequency QIs (105: Benzodiazepines for adults, 138: Long-acting benzodiazepines for older adults, 211: Anti-insomnia agents for adults) showed a significant effect of IMPRoVE. Quality indicators with intermediate trigger frequency had mixed results; two showed a significant improvement and three did not show an improvement. The remaining QI trigger rates that did not show a statistically significant effect of the program were triggered at a low rate. On this metric, then, it is clear that IMPRoVE accomplished its goals. Many of the high-frequency primary QIs targeted by the program showed a clear significant reduction in trigger rates as a result of the educational mailing packages.

Besides the frequency of QI triggers, the program's impact can also be assessed with respect to the potential negative consequences for the patient from the prescribing patterns addressed by a QI. IMPRoVE reduced the trigger rate for QI 105 (Benzodiazepines for adults) by about 0.25 per physician per month, and for QI 138 (Long-acting benzodiazepines for older adults) by about 0.4 per physician per month. In one sense, the program was more effective for addressing long-acting benzodiazepines than for multiple benzodiazepine prescriptions. However, if we consider the use of multiple benzodiazepines a much more serious issue than the use of long-acting benzodiazepines among older adults, a different conclusion may be drawn. Likewise, despite the fact that QI 160 (Benzodiazepines for youth) was not triggered frequently enough to be analyzed, it may nevertheless be very important that the physician was advised about the prescribing practice in the few instances the QI was triggered. In that case, whether or not the Manitoba IMPRoVE Program had a statistically significant impact, we could judge the continued administration of QI 160 to be prudent.

The overall impact of the program can be assessed with these three factors in mind: 1) The QI trigger frequency; 2) The statistical significance of the impact of the IMPRoVE Program on QI trigger rates; and 3) The severity of the issue addressed by the QI.

Table 6.1: Summary of Intervention Effect and Number of Quality Indicator Triggers in the Manitoba IMPROVE Program, 2011–2013

Quality Indicators		Frequency of QI Triggers	Intervention Effect
Primary			
160	Benzodiazepines for youth	Low	Insufficient triggers
105	Benzodiazepines for adults	High	Significant
145	Benzodiazepines for older adults	Moderate	Significant
138	Long-acting benzodiazepines for older adults	High	Significant
542	High-dose benzodiazepines for youth	Low	Insufficient triggers
512	High-dose benzodiazepines for adults	Moderate	No change
211	Anti-insomnia agents for adults	High	Significant
156	Anti-insomnia agents for older adults	Moderate	Significant
Secondary			
206	Psychotropics for adults	Moderate	No change
114	Multiple SSRIs for adults	Low	Insufficient triggers
144	Multiple SSRIs for older adults	Low	Insufficient triggers
405	Multiple prescribers opioids for adults	Moderate	No change
411	Multiple prescribers of opioids for older adults	Low	No change
602	Failure to refill antidepressants	High	No change
606	Failure to refill antipsychotics	Low	No change

SSRI: Selective Serotonin Reuptake Inhibitor

Table 6.1 shows that the program was very effective at reducing QI triggers related to the use of multiple benzodiazepines and the use of multiple anti-insomnia agents (QIs 105, 145, 156, and 211). This was true for both adults aged 18–64 and adults 65 and older. The QI targeting the use of long-acting benzodiazepines among older adults also showed a significant impact of IMPROVE. The reduction in QI trigger rates for physicians receiving the intervention continued for the length of the evaluation with no indication that the effect of the program would attenuate. Although data were only available for 20 months after implementation, a consistent trend was evident: intervention physicians had a steady lower rate of QI triggers than control physicians.

To get an idea of the full impact of the IMPROVE for Manitobans, the number of QI triggers avoided due to the administration of the program was calculated for each of the five QIs for which a significant effect was observed. Based on the rates for intervention and control groups over the last three months of the evaluation period, the rate difference between the groups was multiplied by the number of intervention physicians to get an estimate of the program's immediate impact. We also estimated the reduction of QI triggers for when the program expanded to include control-group physicians in the educational package mailings. These data are presented in Table 6.2. The largest impact was on the most frequently triggered QI (138: Long-acting benzodiazepines for older adults). The smallest impact was on QI 211 (Anti-insomnia agents for adults), despite the fact that it was triggered more frequently overall than QI 156 (Anti-insomnia agents for older adults). This estimated substantial reduction in potentially inappropriate prescribing behaviours indicates that it would be prudent to continue the administration of the QIs for which there was a significant effect, so long as CNSC is contracted to run the Manitoba IMPROVE Program.

Table 6.2: Estimated Reduction in QI Triggers per Month due to Impact of the Manitoba IMPROVE Program

Quality Indicators		Immediate Impact*	Expanded Estimate**
Primary			
105	Benzodiazepines for adults	168	335
145	Benzodiazepines for older adults	64	127
138	Long-acting benzodiazepines for older adults	221	441
211	Anti-insomnia agents for adults	20	41
156	Anti-insomnia agents for older adults	41	81

* Immediate impact reflects estimated reduction in intervention group during the evaluation period.

** Expanded estimate reflects estimated reduction with program applied to the control physicians.

In contrast to the QIs that showed a significant impact of IMPROVE, there are a number of QIs for which it did not prove to be effective in reducing potentially inappropriate prescribing behaviours. The QIs that addressed patients failing to refill prescriptions showed no impact of IMPROVE (QI 602: Failure to refill antidepressants; and QI 606: Failure to refill antipsychotics). The rate did not change over time for either the intervention or control group. It would not be as easy for a physician to prevent these QIs from being triggered as it would be for other QIs. For QI 602 (Failure to refill antidepressants) and QI 606 (Failure to refill antipsychotics), the target behaviour is the patient's responsibility (refilling the prescription). A physician could affect the QI trigger rate more effectively by encouraging patients to refill their prescriptions, but this is likely beyond the scope of a mailed audit-and-feedback intervention. Despite the fact that the QI trigger rate was not changed by the intervention, physicians may find this information quite useful in their next interaction with these patients because it brings to the physicians' attention the patient's non-adherence to treatment. This should be considered when making a decision about the continued use of these particular QIs.

Another group of QIs that did not show a significant impact of the Manitoba IMPROVE Program were those related to patients obtaining opioids from multiple prescribers (QI 405: Multiple prescribers opioids for adults; 411: Multiple prescribers of opioids for older adults). Although there were enough triggers to permit a full analysis, they were relatively rare, similar to the pediatric QIs. The infrequency of these QI triggers is a testament to physicians engaging in *appropriate* prescribing of these drugs in Manitoba, and perhaps also to other concurrent programs and policies being run to prevent inappropriate prescribing of opioids. The advisory group for this report suggested that at least some instances of these QI triggers could be due to coordinated care. In such cases, multiple prescribers would not necessarily be inappropriate. The relative infrequency of these QI triggers might also call into question their continued use in the program. However, "double-doctoring" of opiates is a serious issue and this would need to be kept in mind. Moreover, as the program was implemented, these QIs required a relatively long period of concurrent prescribing from multiple physicians, and does not address other possible instances of double-doctoring that could be addressed through IMPROVE. Altering the QI to address other patterns of prescribing that reflect double-doctoring, may result in a much more effective QI for potentially inappropriate prescribing in this area.

QIs related to children and adolescents were not triggered frequently enough to be analyzed (QI 160: Benzodiazepines for youth; QI 542: High-dose benzodiazepines for youth). Including these QIs at the program's implementation was important because it revealed their very low incidence in Manitoba. This could mean that physicians are already aware that these prescribing behaviours are inappropriate. The few times when these QIs were triggered may have been cases where the drug regimen was an appropriate, effective treatment for those patients. Of course, it is also possible that the few QI triggers are the result of inappropriate therapy that might be discouraged through feedback from the Manitoba IMPROVE Program. Having established such a low rate of QI triggers, the continued administration of these QIs could be unnecessary, particularly if they could be replaced with new QIs for subsequent analysis by CNSC.

Taking into consideration the comprehensive Cochrane review of audit-and-feedback intervention studies presented in Chapter One (Ivers et al., 2012), we conclude that IMPrOVE performed as expected. The Cochrane review suggested that interventions that targeted prescribing behaviours, such as IMPrOVE, were more likely to be successful than audit-and-feedback program that targeted other types of physician behaviours. The review also suggested the following characteristics promoted success of an intervention:

1. *A high base rate of the targeted behaviour*. This was particularly true for three of the QIs that showed a significant impact of IMPrOVE. Only two out of five QIs with moderate trigger frequency were affected by IMPrOVE. Most of the least-frequently triggered QIs could not even be properly analyzed, but the two that were analyzed did not show an improvement.
2. *Feedback provided by a senior colleague*. While this approach was not part of IMPrOVE, and would be technically not feasible for a universal program, the letter accompanying all packages was signed by the head of the Department of Psychiatry and the head of the Department of Family Medicine at the University of Manitoba, the medical school for the province.
3. *Feedback provided both verbally and in writing*. In this case, the intervention was successful with only written feedback. It was important to test whether the written feedback alone would be successful because verbal feedback was not considered practical for a program that targeted all family physicians, pediatricians and psychiatrists in Manitoba.
4. *The intervention should include specific targets or an action plan*. Neither was really the case here. As an educational program, IMPrOVE does not address whether any particular instance of a QI trigger is actually inappropriate, and so there is no indication that a particular instance of a prescribing behaviour needs to change.
5. *The intervention should target a decrease in behaviours, rather than an increase*. This was true for most QIs, and for all of the QIs that demonstrated a significant impact of IMPrOVE. However, QI 602 (Failure to refill antidepressants) and QI 606 (Failure to refill antipsychotics) actually aimed to increase a positive behaviour, and both failed to show an impact of the Program.

Given that several of the conditions for a successful audit-and-feedback intervention mentioned in the Cochrane review were not present in the Manitoba IMPrOVE Program, this evaluation was essential for determining whether this particular program was a success. The results are very encouraging and indicate a success for the primary QIs addressed by the program. However, unsurprisingly, the results for the secondary QIs are not as clear. There were several QIs for which the program resulted in no change in potentially inappropriate prescribing behaviours. With these QIs identified, a thoughtful appraisal of the knowledge gained by administering them can be weighed against the possibility of substituting different QIs. For policy, the current study provides excellent information for the expansion or alteration of this audit-and-feedback program, or the implementation of other audit-and-feedback programs by MHHLS, perhaps targeting behaviours other than prescriptions. The result of this analysis clearly points to the type of QIs that are likely to be successful—high- or moderate-frequency QIs in the sole control of the prescribing physician—where success is gauged as a measurable change in prescribing behaviours.

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GLOSSARY

Administrative Data

Data generated through the routine administration of programs. Administrative databases are designed to collect and store this type of data. While not originally intended for research, administrative data can be a rich source of information. The Manitoba Centre for Health Policy collects and maintains de-identified administrative data from several domains, including:

- healthcare, such as hospital discharge abstracts, **medical services**/physician claims, claims for prescription drugs, immunizations, and the Manitoba Health Insurance Registry;
- education, such as enrollment, marks and grade level assessments; and
- social services, such as Employment and Income Assistance (EIA), Healthy Child Manitoba programs, and Manitoba Housing.

Using these administrative data, researchers can investigate the utilization of healthcare resources over time.

Antidepressant

Medicines used to help people who have depression, other mood and anxiety disorders, and numerous other conditions such as nerve pain (Kennedy, Lam, Cohen, Ravindran, & CANMAT Depression Working Group, 2001; Saarto & Wiffen, 2007). Most antidepressants are believed to work by slowing the removal of certain chemicals from the brain. These chemicals are called neurotransmitters and are needed for normal brain function. Antidepressants help people with depression by making these natural chemicals more available to the brain. Antidepressants are typically taken for at least four to six months. In some cases, patients and their doctors may decide that antidepressants are needed for a longer time. In addition, some drugs classified as antidepressants are also used for other health problems. See Table 2.2 for examples of antidepressant drugs associated with quality indicators in this study.

Kennedy SH, Lam RW, Cohen NL, Ravindran AV, CANMAT Depression Working Group. Clinical practice guidelines: Management of anxiety disorders. *The Canadian Journal of Psychiatry* 2001;46(Suppl 1):38S–58S.

Saarto T, Wiffen PJ. Antidepressants and neuropathic pain. *Cochrane Database Sys Rev* 2007;17(4).

Anti-Insomnia Agent

Medications with sedative and hypnotic effects that are used to induce or maintain sleep (Miller and Keane, 2003). See Table 2.2 for examples of insomnia agents associated with quality indicators in this study.

Miller BF, Keane CB. *Encyclopedia and Dictionary of Medicine, Nursing, and Allied Health*. 7th edition. Philadelphia, PA: Saunders; 2003

Antipsychotic

A broad class of medications used to treat a variety of psychiatric conditions. The class consists of newer, second-generation antipsychotics—also called "atypical" antipsychotics, which include clozapine, risperidone, olanzapine, and quetiapine; and the older, first-generation antipsychotics, which are also called "typical" antipsychotics. See Table 2.2 for examples of antipsychotic drugs associated with quality indicators in this study.

Benzodiazepines

Also called central nervous system depressants. They are used to slow down the nervous system and are typically classified as having a short-, intermediate-, or long-acting half-life, to reflect how long these medications remain active in the body. Benzodiazepines can be used to treat anxiety disorders, panic disorders, insomnia, seizures, muscle spasticity, alcohol withdrawal, and as a perioperative adjunct to anesthesia (Repchinsky, 2009). Tolerance and physical and psychological dependence may occur with prolonged use (Repchinsky, 2009). Abrupt cessation of benzodiazepines is not recommended. Tapering-down the dose can reduce withdrawal symptoms, which can occur with long-term use (Lader, Tylee, & Donoghue, 2009). See Table 2.2 for examples of benzodiazepines associated with quality indicators in this study.

Lader M Tylee, A, Donoghue J. Withdrawing benzodiazepines in primary care. *CNS Drugs* 2009;23(1):19–34.

Repchinsky C (ed). Benzodiazepines. Compendium of pharmaceuticals and specialties, online version (e-CPS), Canadian Pharmacists Association. 2009

Care Management Technologies (CMT)

Care Management Technologies (CMT) is a behavioral health analytics company headquartered in Morrisville, North Carolina in the United States of America. They specialize in using claims data to make predictions about future health events, and also have developed many algorithms to promote improvements in care. Comprehensive Neuroscience of Canada is a wholly owned subsidiary of CMT.

Control Group

A group of subjects that is used for comparison with treatment groups—subjects receiving a treatment—in randomized control trials and other epidemiological study designs. Selection of an appropriate control group is crucial to the validity of epidemiological studies (Last, 2001). In this report, physicians in the control group did not receive an **educational mailing package**, regardless of whether they **triggered** a **quality indicator**. The control group in this study was compared to the **intervention group**.

Last JM. *A Dictionary of Epidemiology*. 4th edition. New York, NY: Oxford University Press; 2001

Drug Identification Numbers (DINs)

An eight-digit number, assigned by the Therapeutic Products Directorate of Health Canada to each drug approved for use in Canada in accordance with the Food and Drug Regulation. The same drug—e.g., Amoxicillin, 250 mg capsules—can have several different DINs associated with it, perhaps due to different manufacturers, dosage forms, routes, or strengths.

Drug Program Information Network (DPIN) Data

Health data maintained by **Manitoba Health, Healthy Living and Seniors** (**MHHLS**) containing prescription drug claims from the Drug Program Information Network (DPIN). DPIN is an electronic, online, point-of-sale prescription drug database that connects MHHLS and all pharmacies in Manitoba. The DPIN system generates complete drug profiles for each client including all transactions at the point of distribution. Information about pharmaceutical dispensations, prescriptions identified as potential drug-utilization problems, non-adjudicated prescriptions, and ancillary programs and non-drug products is captured in real time for all Manitoba residents—including Registered First Nations—regardless of insurance coverage or final payer. Note that the prescription's indication—the physician's prescribing intent—is not collected and must be inferred from other data. Services not captured in DPIN include hospital pharmacies, nursing stations, ward stock, and outpatient visits at CancerCare Manitoba.

Educational Mailing Package

An information package sent to physicians in the **intervention group** who have **triggered** a **quality indicator** monitored by the **Manitoba IMPROVE Program**. This package includes a letter describing the intent and design of the program, a prescriber summary report, a patient profile report, clinical considerations for each quality indicator, and a prescriber feedback form. An example of the mail out package is given in Appendix 1.

Educational Mailing Package Rate

The rate at which the **intervention group** in the **Manitoba IMPROVE Program** received **educational mailing packages** for **triggered Quality Indicators** (**QI**). This rate closely resembles the **Quality Indicator Trigger Rate**, but is lower because of filters that prevent a package from being sent.

Group-Based Trajectory Model

Group-based trajectory models are a statistical regression method used to identify subgroups of cases—in this study, physicians—who share statistically similar trajectories over time on a criterion variable (Nagin, 1999). In this study, that variable is **quality indicator trigger rates**.

Nagin, DS. Analyzing developmental trajectories: A semiparametric, group-based approach. *Psychological Methods*. 1999;4(2):139–157

Intention-to-Treat Analysis

A method of analyzing the effect of a treatment performed in randomized control trial studies. This method considers all participants who meet the inclusion criteria and are assigned to the control and treatment groups, regardless of whether participants in the treatment group received the treatment or not (Last, 2001).

Last JM. A Dictionary of Epidemiology. 4th edition. New York, NY: Oxford University Press; 2001

Intervention Group

The group of participants receiving treatment in randomized control trials and other epidemiological study designs. In this report, "treatment" consisted of an **educational mailing package** that physicians in the intervention group received when they **triggered** a quality indicator. The intervention group was compared to the **control group**.

Logistic Regression

A regression technique used when the outcome is a binary, or dichotomous, variable. Logistic regression models the probability of an event as a function of other factors. These models are only able to state that there is a relationship ("association") between the explanatory and the outcome variables. This is not necessarily a causal relationship, since it is based on observational data for the most recent time period. The explanatory variable may be associated with an increase or decrease but one cannot be certain that it caused the increase or decrease).

Manitoba Health, Healthy Living and Seniors (MHHLS)

A provincial government department responsible for providing healthcare services in Manitoba. Before February 2014 this department was known as Manitoba Health.

Manitoba IMPROVE Program

The Improving Medication Prescribing and Outcomes Via Medical Education (IMPROVE) Program was launched in June 2011. The program is a joint initiative by Manitoba Health, Healthy Living and Seniors' Provincial Drug Programs unit and Comprehensive Neurosciences of Canada (CNSC). CNSC conducts monthly reviews of the **Drug Program Information Network** pharmacy claims data to evaluate the quality and appropriateness of the

prescriptions and to identify patients at risk due to potentially inappropriate use. Prescribers flagged by algorithms called quality indicators receive an audit-and-feedback-based intervention in the form of an educational mailing. The mailing provides details about the program, the **quality indicator** that was **triggered**, the patient that may be at risk, and includes a feedback form.

Manitoba IMPROVE Program Data

Data for the **quality indicator** (**QI**) triggers were recorded in a dataset by **CNSC** and transferred to the Manitoba Centre for Health Policy via Manitoba Health, Healthy Living and Seniors. This data contained the main elements required to administer the **Manitoba IMPROVE Program**: a physician identifier and a patient identifier—both unique, anonymized ID numbers—a QI identifier, a variable indicating whether the prescriber was a member of the **control group**, and a variable indicating whether a mailing packaged was sent, or if not sent, the reason.

Manitoba IMPROVE Program Evaluation Data

Contains only those records used for the **intention-to-treat analysis** and any subsequent analyses—i.e., only records that met the inclusion criteria. **Quality Indicator** (**QI**) triggers that did not meet the criteria and those associated with outlier physicians were not part of this dataset.

Medical Services Data

Health data maintained by **Manitoba Health, Healthy Living and Seniors** (**MHHLS**) that consists of claims for **physician visits** in offices, hospitals, and outpatient departments; fee-for-service components for tests such as lab and x-ray procedures performed in offices and hospitals; payments for on-call agreements (e.g. anaesthetists) that are not attributed to individual patients; as well as information about physicians' specialties. In Manitoba, fee-for-service providers must submit claims to MHHLS for reimbursement; salaried physicians also submit evaluation claims (shadow billing).

Odds Ratio

The ratio of the odds—or likelihood—of an event occurring in one group to the odds of it occurring in another group, or a data-based estimate of that ratio (e.g., from a **logistic regression** model). These groups might be men and women, an experimental group and a **control group**, or any other dichotomous classification. In models with multiple variables, the adjusted odds ratio shows the effect of that variable after controlling for the influences of other variables in the model (e.g., age, sex).

Opioid

A group of medications that are used in the symptomatic treatment of acute and chronic pain, and also as cough medications (Repchinsky, 2009; Krenzischek, Dunwoody, Polomano, & Rathmell, 2008; Dy et al., 2008). There is a risk of dependence and addiction with prescription opioids (Repchinsky, 2009; Byrne, Lander, & Ferris, 2009). See Table 2.2 for examples of opioids associated with quality indicators in this study.

Byrne MH, Lander L, Ferris M. The changing face of opioid addiction: Prescription pain pill dependence and treatment. *Health Soc Work* 2009;34(1):53–56.

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Repchinsky C (ed). Opiods. Compendium of pharmaceuticals and specialties, online version (e-CPS), Canadian Pharmacists Associaton. 2009

Patient Allocation

All Manitobans who had contact with the medical system in the three years immediately prior to the program were allocated to a single physician based on a physician assignment algorithm used in previous MCHP studies. It is based on the frequency of ambulatory visits the patient has made to each physician. Only patients who have made at least four visits during the three-year study period were assigned to a physician by the algorithm in our study. Where there is a tie in the number of visits to more than one physician, the visits with a higher fee are assigned a greater value to break the tie.

Personal Health Identification Number (PHIN)

A unique nine-digit numeric identifier assigned by **Manitoba Health, Healthy Living and Seniors** (**MHHLS**) to every person registered for health insurance in Manitoba, and to non-residents who are treated at facilities that submit claims electronically. Introduced as a linkage key in 1984, it was issued to the public in 1994 as the basic access identifier for the **Pharmacare/Drug Programs Information Network** (**DPIN**). At the Manitoba Centre for Health Policy (MCHP), the PHIN is either a scrambled (encrypted) version of the MHHLS PHIN or an alphanumeric identifier assigned via the MCHP Research Registry to individuals who do not have scrambled numeric PHINs.

Physician Resource Data

An elaboration of the basic physician information available to the **Population Health Research Data Repository** (**Repository**) from Manitoba Health, Healthy Living and Seniors. It contains physicians' demographic data and information derived from analysis of their practice patterns. These data can be used to analyze other components of the Repository from the perspective of physicians.

Physician Visits

Almost all contacts with physicians (general/family practitioners and specialists). This includes office visits, walk-in clinics, home visits, personal care home/nursing home visits and visits to outpatient departments. The type of service provided is defined by a tariff code. Also referred to as ambulatory visits.

Population Health Research Data Repository (Repository)

A comprehensive collection of administrative, registry, survey, and other data primarily comprised of residents of Manitoba. This repository is housed at the Manitoba Centre for Health Policy (MCHP). It was developed to describe and explain patterns of healthcare and profiles of health and illness, facilitating inter-sectoral research in areas such as healthcare, education, and social services. The administrative health data, for example, hold records for virtually all contacts with the provincial healthcare system, the Manitoba Health Services Insurance Plan (including physicians, hospitals, personal care homes, home care, and pharmaceutical prescriptions) of all registered individuals. MCHP acts as a trustee or steward of the information in the Repository for agencies such as Manitoba Health, Healthy Living and Seniors.

Psychotropics

Medications designed to influence the mind, emotions, and behavior. Includes **antipsychotics**, **antidepressants**, antianxiety agents, anti-panic agents, mood stabilizers, stimulants, **opioids** and hallucinogens (Miller and Keane, 2003). See Table 2.2 for examples of psychotropic drugs associated with quality indicators in this study.

Miller BF, Keane CB. Encyclopedia and Dictionary of Medicine, Nursing, and Allied Health. 7th edition. Philadelphia, PA: Saunders; 2003

Quality Indicator (QI)

Markers that have been developed by **Care Management Technologies** to reflect the presence or absence of potential shortcomings in the provision of care. These indicators are not intended to identify definitive problems in the quality of healthcare provision, but rather are intended to serve as prompts for healthcare providers to conduct further investigation/exploration into the care that **triggered** the QI. For the **Manitoba IMP℞OVE Program**, these were all related to potentially inappropriate prescribing patterns.

Quality Indicator Trigger Rates (QI trigger rates)

Calculated for the intervention-group physicians and control-group physicians as part of the **intention-to-treat analysis**; and calculated separately for each QI for each month of the study period. The rate is the sum of all QI triggers for the group during that month, divided by the total number of physicians in the group (based on inclusion and exclusion criteria described in the report).

Randomized Controlled Trial (RCT)

A scientifically rigorous study design used in clinical and epidemiological research. The participants in RCTs are assigned randomly to a control and one or more treatment groups. Participants in the latter group receive a preventive or therapeutic treatment. Analysis of the results involve a comparison of outcomes between the control and treatment groups (Last, 2001). In this report, the **Manitoba IMP℞OVE Program** was set up as a RCT at the physician level. Participants in the treatment group received an intervention. The group **Quality Indicator trigger rates** were compared between the control and treatment groups, and the intervention effect was measured using intent-to-treat analyses.

Source: Last JM. A Dictionary of Epidemiology. 4th edition. New York, NY: Oxford University Press; 2001

Selective Serotonin Reuptake Inhibitors (SSRIs)

Medication used to treat a mood disorder by helping to increase the level of available serotonin in the brain. See Table 2.2 for examples of SSRI drugs associated with quality indicators in this study.

Triggered – see **Quality Indicator Trigger Rates**

APPENDIX 1: EDUCATIONAL MAILING PACKAGES FOR IMPROVE PROGRAM, 2011–2013

The following set of documents is an example of the educational mailing package that a physician would receive from the Manitoba IMPROVE Program after triggering a Quality Indicator. There are five main parts to the package:

- A cover letter introducing the program (see page 92–93)
- A list of patients for whom QIs have been triggered, and which QI each patient has triggered (see page 94)
- A complete and relatively detailed listing of all prescription dispensations for the triggered QIs (see page 95–97)
- Descriptions of clinical considerations for the QIs triggered, outlining the issues related to the prescribing behaviours and providing references for further reading (see page 101–115)
- A feedback form for the physician (see page 100)

Sample of Educational Mailing Package for the Manitoba IMPRxOVE Program, 2011–2013

MANITOBA IMPRxOVE™ Manitoba

Dear

We are pleased to present the Improving Medication Prescribing and Outcomes Via Medical Education (IMPRxOVE™) Program. IMPRxOVE™, developed in consultation with the University of Manitoba Departments of Psychiatry and Family Medicine-Primary Care, is designed to improve the safety and health outcomes for Manitobans receiving mental health medications. The goal of IMPRxOVE™ is to provide you with an additional resource to support you in the care of your patients.

The program is designed around the following key principles:

1. information is evidence based and academically credible;
2. the intent is educational and non-punitive;
3. information is targeted and patient-specific; and
4. prescribers maintain the ability to use clinical judgment and knowledge to make the best prescribing and treatment decisions for patients.

Comprehensive NeuroScience of Canada (CNSC) has reviewed the most recent Drug Program Information Network (DPIN) pharmacy claims data to identify instances where there is an opportunity to further optimize patient care. **The most recent review of the last 3 months of DPIN data has triggered a Quality Indicator™ (QI) for one or more of your patients, indicating one or more of the following:**

1. Patient(s) may be receiving multiple medications of the same type.
2. Patient(s) may be receiving the same type of medication from more than one prescriber.
3. Patient(s) may be failing to refill a newly prescribed medication after 30 days of the prescription ending.
4. Patient(s) may be receiving a medication at a higher than recommended dose for an extended period of time.

Enclosed in this package is the following information for your consideration:

1. **Prescriber Summary Report**: a top-level summary to assist you in identifying potential patient-specific issues. It contains the name of your patient, the patient's Personal Health Identification Number (PHIN), the code number of the QI triggered, and the QI key. This report can be used to guide you to a specific patient in the Patient Profile Report.

2. **Patient Profile Report**: a chartable, patient-specific, detailed three-month DPIN history of mental health medications. It contains prescriber names, pharmacy names and

medication specifics (drug, strength, quantity, date dispensed). This report identifies potential patient care issues and may be beneficial in optimizing medical management.

3. **Clinical Considerations**: educational information specific to each QI. It includes a description of the clinical issue and alternative clinical pathways that are evidence based and academically credible for your consideration.

4. **Prescriber Feedback Form**: a form which enables you to provide feedback so that the information you receive will be as accurate and applicable to your practice as possible. There may, for a variety of reasons, be instances where DPIN pharmacy claims data have errors. Every effort will be made to eliminate these errors in advance. Please review the claims data for accuracy, and send your comments back on the prescriber feedback form by fax to our confidential number at (204) 926-8845. Reports will be updated monthly with new claims information.

The reports are intended to be informational and educational. There are no requirements to change your patient's medical therapy. Any prescribing and treatment decisions should be based upon your assessment of your patient's needs and your clinical judgment.

We hope that the information contained in this package provides you with additional information on which to base your treatment decisions and to assist you in optimizing the medical management/care of your patients with mental health disorders.

Sincerely,

Milton Sussman
Deputy Minister of Health

Dr. Murray Enns
Professor and Head, Department of Psychiatry, University of Manitoba

Dr. Jamie Boyd
Professor and Head, Department of Family Medicine, University of Manitoba

ALL Behavioral Pharmacy Management

Prescriber Summary Report

Prescriber:
Prescriber ID:

3 MONTH PERIOD ENDING: October 31, 2012

Below is a summary of the patients and Quality Indicators™ that have been triggered by the data provided by Manitoba Health. This mailing includes specific information on each patient and Clinical Considerations™, brief clinical messages associated with the Quality Indicators. We hope you find these useful.

Patient ID	*Patient Name*	*Associated Quality Indicators™*
		411
		138

Associated Quality Indicators™ Key

138 - Use of Any Long-Acting Benzodiazepine for 30 or More Days (65 Years or Older)
411 - Multiple Prescribers of 1 or More Opioids for 30 or More Days (65 Years or Older)

ALL Behavioral Pharmacy Management

Patient Profile Report

Patient Name:
Patient DOB:
Prescriber Name:

Patient ID:
Patient Age:
Prescriber ID:

3 MONTH PERIOD ENDING: October 31, 2012

RX Number	*Prescriber*	*Label*	*Date Filled*	*Days*	*Quantity Dispensed*	*Pharmacy Information*	*Associated Quality Indicators™*
		RATIO-FENTANYL 75 MCG/HR		14	7.000	LEILA PHARMACY 204-334-4248	411
		RATIO-FENTANYL 50 MCG/HR		16	8.000	LEILA PHARMACY 204-334-4248	411
		RATIO-FENTANYL 50 MCG/HR		14	7.000	LEILA PHARMACY 204-334-4248	411
		RATIO-FENTANYL 75 MCG/HR		14	7.000	LEILA PHARMACY 204-334-4248	411
		RATIO-FENTANYL 50 MCG/HR		14	7.000	LEILA PHARMACY 204-334-4248	411
		RATIO-FENTANYL 75 MCG/HR		14	7.000	LEILA PHARMACY 204-334-4248	411
		RATIO-FENTANYL 50 MCG/HR		14	7.000	LEILA PHARMACY 204-334-4248	411

CONFIDENTIAL

ALL Behavioral Pharmacy Management

Patient Profile Report

Patient Name:
Patient DOB:
Prescriber Name:

Patient ID:
Patient Age:
Prescriber ID:

3 MONTH PERIOD ENDING: October 31, 2012

QUALITY INDICATORS SUMMARY

This patient has been identified with the Quality Indicator(s)™ listed below. Attached to this document are the Clinical Consideration(s)™ for the Quality Indicator(s), for your consideration.

411 - Multiple Prescribers of 1 or More Opioids for 30 or More Days (65 Years or Older)

Medications Prescribed over the Last 3 Months:

RX Number	*Prescriber*	*Label*	*Date Filled*	*Days*	*Quantity Dispensed*	*Pharmacy Information*	*Associated Quality Indicators™*
		RATIO-FENTANYL 12 MCG/HO UR		14	7.000	LEILA PHARMACY 204-334-4248	411
		RATIO-FENTANYL 75 MCG/HR		14	7.000	LEILA PHARMACY 204-334-4248	411
		RATIO-FENTANYL 12 MCG/HO UR		14	7.000	LEILA PHARMACY 204-334-4248	411
		RATIO-FENTANYL 75 MCG/HR		14	7.000	LEILA PHARMACY 204-334-4248	411
		RATIO-FENTANYL 12 MCG/HO UR		14	7.000	LEILA PHARMACY 204-334-4248	411
		RATIO-FENTANYL 75 MCG/HR		14	7.000	LEILA PHARMACY 204-334-4248	411
		RATIO-FENTANYL 75 MCG/HR		14	7.000	LEILA PHARMACY 204-334-4248	411
		MYLAN-ZOPICLONE 7.5 MG TA BLET		14	7.000	LEILA PHARMACY 204-334-4248	

REVERSE SIDE MAY CONTAIN ADDITIONAL DATA

CONFIDENTIAL

CONFIDENTIAL

ALL Behavioral Pharmacy Management

Patient Profile Report

Patient Name:
Patient DOB:
Prescriber Name:

Patient ID:
Patient Age:
Prescriber ID:

3 MONTH PERIOD ENDING: October 31, 2012

QUALITY INDICATORS SUMMARY

This patient has been identified with the Quality Indicator(s)™ listed below. Attached to this document are the Clinical Consideration(s)™ for the Quality Indicator(s), for your consideration.

138 - Use of Any Long-Acting Benzodiazepine for 30 or More Days (65 Years or Older)

Medications Prescribed over the Last 3 Months:

RX Number	*Prescriber*	*Label*	*Date Filled*	*Days*	*Quantity Dispensed*	*Pharmacy Information*	*Associated Quality Indicators™*
		TYLENOL W/CODEINE NO. 3 T ABLET		32	384.000	REGENT PARK PHARMACY 204-222-9671	
		PMS-CLONAZEPAM R 0.5 MG T AB		30	30.000	REGENT PARK PHARMACY 204-222-9671	138

Use of Any Long-Acting Benzodiazepine for 30 or More Days (65 years or Older)

CLINICAL ISSUE

- Ageing prolongs Phase I metabolism (CYP mediated) of longacting benzodiazepines (e.g. diazepam) and further increases their already long half-life.
- Elderly individuals have a higher proportion of body fat than younger adults and are more likely to store long-acting agents in fat tissue and release them erratically for a long time.
- In the elderly, high plasma levels of benzodiazepines may cause memory loss, sedation, gait disturbances, and falls.
- Benzodiazepine dependence and abuse are the most common addictive disorders in older populations.

CLINICAL CONSIDERATIONS™

- The main indication for benzodiazepines in the elderly is short-term management of acute anxiety; consider lorazepam or oxazepam, which are benzodiazepines with relatively short half-lives that undergo only Phase II glucuronidation and in which elimination is not influenced by ageing.
- Limit the dose and duration of benzodiazepine use to avoid side effects and addiction.
- The most common causes of anxiety in elderly populations are major depressive disorder or adjustment disorder with depressed mood, generalized anxiety disorder, and panic disorder. These syndromes can best be treated with antidepressants.
- Selective serotonin reuptake inhibitors (SSRIs) and serotonin norepinephrine reuptake inhibitors (SNRIs) are the antidepressants with the best benefit-risk ratio in geriatric depressive and anxiety syndromes.
- Once an effective antidepressant dose is established and symptoms start to abate, consider tapering and then discontinuing the benzodiazepine.
- If anxiety persists 3-4 weeks beyond the taper period, consider increasing the antidepressant dose.
- If symptoms persist, consider psychosocial interventions and/or referral for psychiatric evaluation.

Drugs Considered a long-acting benzodiazepene for this Quality Indicator™	
Clordiazepoxide	Librax
Clonazepam	Klonopin
Clorazepic Acid	Tranxene
Diazepam	Valium
Flurazepam	Dalmane
Quazepam	Doral

REFERENCES

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- Salzman C, Small GW. Treatment of depression with new and atypical antidepressants. In: Salzman C, ed.: Clinical Geriatric Psychopharmacology. 4th Ed. Philadelphia: Lippincott, Williams & Wilkins, 2005:305-333.
- Shanmugham B, et al.; Evidence-based pharmacologic interventions for geriatric depression. Psychiatr Clin of North Am 2005; 28:821-835.

 Quality Indicator™ 138 version: 8/2010

Multiple Prescriber Alert

Multiple Prescribers of 1 or More Opioids for 30 or More Days (65 years or Older)

According to our data, your patient is receiving prescriptions for 1 or more opioids from more than one prescriber. To improve coordination of care, this information is being provided to you in case you are not already aware of this situation.

We understand that you may be already aware of this situation. You may be part of a group of physicians who cross-cover, or the other prescriber's prescriptions may date from before you became involved in this patient's care. On the other hand, this information would be useful to you if you were not aware of the other prescriptions, especially if these reflect a treatment plan different from your own.

Please review the information to assess whether our data are consistent with your understanding of the patient's care. You may wish to consider discussing this matter with your patient.

This indicator identifies patients 65 years or older who have been prescribed one or more opioids by two or more prescribers for at least a 30 day period.

All physicians or other prescribers for the identified patient, even if not one of the multiple prescribers, are provided this Alert to improve coordination of care.

 Quality Indicator™ 411 version: 8/2010

Comprehensive
NeuroScience™ of Canada
A Wholly-Owned Subsidiary of Care Management Technologies

Prescriber Feedback Form

Fax# **(204) 926-8845**

The goal of **MANITOBA IMPRxOVE** is to provide you with an additional resource that will assist and support you in the care of your patients. The information mailed to you is based on data from claims submitted by pharmacies. There may, for a variety of reasons, be instances where pharmacy claims data have errors. Every effort will be made to eliminate these errors in advance. If you did not prescribe the medication in question, **please contact the pharmacy involved** as this error needs to be resolved by the pharmacy. Please note that you may continue to receive mailings if the pharmacy has not been contacted and/or has not resolved the issue.

Prescribing and treatment decisions that prescribers make are based upon the assessment of the needs of the patient and clinical judgment. There may be clinical scenarios under which the therapy is considered by the prescriber to be appropriate for the patient. If you wish to provide feedback, please complete this form and fax it to **(204) 926-8845**.

Prescriber address on record:
(If incorrect, please provide correct address if possible.)

Patient Name and Patient ID	Quality Indicator™	My Patient, not My Script	Not My Patient	Treatment Appropriate for Patient (Please include comment)	Comments (Please write comments in the boxes below)

Clinical Considerations Included in the Educational Mailing Packages for the Manitoba IMPrOVE Program, 2011–2013

Clinical considerations sheets for all of the QIs included in the Manitoba IMPrOVE Program are presented below. These would be received as part of the educational mailing package when a QI is triggered by a physician.

Quality Indicator 160

Use of 2 or More Benzodiazepines for 45 or More Days (Under 18 Years)

CLINICAL ISSUE	CLINICAL CONSIDERATIONS™	REFERENCES

▪ The use of two or more benzodiazepines is a particularly worrisome practice in children.
▪ Benzodiazepines have not shown efficacy in controlled trials for childhood anxiety disorders (AACAP 2007).
▪ Benzodiazepines can be associated with sedation, disinhibition, cognitive impairment, sedative abuse, and difficulty with discontinuation (AACAP 2007).
▪ Treatment of childhood anxiety disorders should begin with psychotherapy. Cognitive behavioral therapies are strongly supported by evidence.
▪ "SSRIs have emerged as the medication of choice in the treatment of childhood anxiety disorders" (AACAP 2007). They are generally well tolerated, with mild and transient side-effects (GI symptoms, headaches, increased motor activity, insomnia) (ACCAP 2007).
▪ March & Vitiello (2009) argue "20 years of research reveals a positive benefit-to-risk ration for short-term treatment with SSRI or SNRI medications . . . in [pediatric] patients all ages with anxiety and obsessive-compulsive disorder."
▪ No evidence supports combining benzodiazepines.
▪ Non-response to psychotherapy and SSRIs may reflect presence of concurrent psychiatric comorbidity.
	▪ Please consider discontinuing at least one of the benzodiazepines in use in this patient.
	▪ SSRIs are the treatment of choice for childhood anxiety disorders. There is some evidence to support the use of venlafaxine (Effexor®).
	▪ In children, benzodiazepines should only be used as an adjunct short-term treatment with SSRIs.
	▪ If you haven't already, please consider:
	  ○ reviewing the original diagnosis and consider revising treatment to reflect your current clinical formulation;
	  ○ reviewing the patient's treatment history for adequacy of dose and duration of medications;
	  ○ assessing whether each medication has been tried at the optimal therapeutic dose and duration before adding new medications;
	  ○ assessing whether adherence to prescribed medications has been adequate;
	  ○ using treatment algorithms for incomplete or refractory response;
	  ○ reviewing medication use and adherence with patient and/or family.
	▪ Treatment outcomes are best when a multimodal approach is used combining psychotherapy (such as cognitive-behavioral therapy), family interventions, school consultation, and pharmacotherapy as needed (Walkup 2008).
		▪ AACAP Practice Parameter for the Assessment and Treatment of Children and Adolescents with Anxiety Disorders. *J Am Acad Child and Adolescent* Psychiatry. 2007;46:267-283.
		▪ March JS, Vitiello B: Benefits Exceed Risks of Newer Antidepressant Medications in Youth – Maybe. *Clinical Pharmacology and Therapeutics* 2009; 86(4):355-357.
		▪ Walkup JT, et al: Cognitive Behavioral Therapy, Sertraline or a Combination in Childhood Anxiety. *N Engl J Med* 2008; 59(26):2753-2766.
		▪ Ilomäki R, et al: Psychotropic medication history of inpatient adolescents—is there a rationale for benzodiazepine prescription? Addict Behav 2011;36:161-165.
		▪ Cunningham CM, et al: Patterns in the use of benzodiazepines in British Columbia: examining the impact of increasing research and guideline cautions against long-term use. Health Policy 2010;97:122-129.
		▪ Esposito E, et al: Patterns of benzodiazepine use in a Canadian population sample. Epidemiol Psichaitr Soc 2009;18:248-254.
		▪ Ipser JC, et al: Pharmacotherapy for anxiety disorders in children and adolescents. Cochrane Database System rev 2009;8:CD005170.
		NOTE: Brand names are provided for ease of identification only and do not reflect a preference for one formulation over another.

 Quality Indicator™ 160

Quality Indicator 105

Use of 2 or More Benzodiazepines for 60 or More Days

CLINICAL ISSUE	CLINICAL CONSIDERATIONS™	REFERENCES
■ The use of two or more benzodiazepines is a particularly worrisome practice in adults. ■ There is no evidence that combining agents increases efficacy. ■ This practice may reflect an attempt to treat anxiety and insomnia separately without consideration of their common causes. ■ Increased risk of accidents and memory impairment. ■ Increased risk for falls and/or confusion in older patients. ■ Increased risk of tolerance, dependency and/or abuse.	■ Consider gradually tapering medication to one benzodiazepine. ■ Reconsider original diagnosis and consider medical disorders which may present with anxiety or insomnia such as hyperthyroidism, migraine, asthma, and seizure disorders. ■ Consider using selective serotonin reuptake inhibitors (SSRIs) or serotonin norepinephrine reuptake inhibitors (SNRIs) which have proven effectiveness in treating depression and anxiety. ■ Consider buspirone which may be appropriate for your patient.	■ Clinical Guideline 113: Generalised anxiety disorder or panic disorder (with or without agoraphobia) in adults. UK National Institute for Clinical Excellence. January 2011. Available at www.nice.org.uk. ■ Kavan MG, et al: Generalized Anxiety Disorder: Practical Assessment and Management. *Am Fam Physician* 2009; 79(9): 785-791. ■ Lader M, et al: Withdrawing benzodiazepines in primary care. CNS Drugs 2009;23:19-34. ■ Roshanael-Mogdhaddam B, et al: Relative effects of CBT and pharmacotherapy in depression versus anxiety: is medication somewhat better for depression, and CBT somewhat better for anxiety? Depress Anxiety 2011;28:560-567. ■ Swinson RP, et al: Clinical Practice Guidelines: Management of Anxiety Disorders. *Can J Psychiatry* Vol 51, Suppl 2, July 2006 http://ww1.cpa-apc.org:8080/Publications/CJP/supplements/july2006/anxiety_guidelines_2006.pdf. ■ Barbui C, et al: Efficacy of antidepressants and benzodiazepines in minor depression: systematic review and meta-analysis. Br J Psychiatry 2011;198:11-16, sup 1.

 Quality Indicator™ 105

Quality Indicator 145

Use of 2 or More Benzodiazepines for 45 or More Days (65 Years or Older)

CLINICAL ISSUE	CLINICAL CONSIDERATIONS™	REFERENCES
▬ The use of two or more benzodiazepines is a particularly worrisome practice in the elderly. There is no evidence to support this practice. ▬ The side effects of benzodiazepines are more pronounced and dangerous in the elderly than in younger adults and include memory problems, confusion, gait disturbance and an increased risk of falls. ▬ According to a recent meta-analysis, the use of sedative-hypnotics, antidepressants, and benzodiazepines were significantly associated with falls in the elderly (Woolcott et al., 2009). ▬ "Oxazepam and lorazepam do not undergo phase 1 hepatic metabolism, have no active metabolites, have acceptable half-lives that do not increase with age, and are not subject to drug interactions. Lorazepam is preferred for inducing sleep because oxazepam has a relatively slow and erratic absorption" (Mulsatt and Pollock 2009). ▬ Anxiety disorders are common in the elderly (7% of elderly respondents in the National Comorbidity Survey Replication met criteria in the last 12 months (Gum 2009)) and are highly comorbid with depression and medical illness (Wolitzky-Taylor 2010). ▬ Both pharmacotherapy and psychological therapies are effective for older adults with anxiety (Wolitzky-Taylor 2010, Ayers 2007) and insomnia (Bloom 2009).	▬ Please consider discontinuing at least one of the benzodiazepines in use in this patient. ▬ If you have not already, please consider the following: ○ A common reason for anxiety and insomnia to persist is the presence of an underlying medical or psychiatric disorder (such as depression) and that presenting symptoms may respond to treatment of the underlying disorder. ○ If a benzodiazepine is indicated, lorazepam, which is available as a generic in the US, may be preferred in the elderly (Mulsatt and Pollock 2009). ○ The use of relaxation techniques may be helpful in alleviating symptoms in your patient (Ayers 2007, Bloom 2009). ○ Other psychological treatments, such as cognitive-behavioral therapy, supportive treatment, and cognitive therapy may be of help to your patient (Ayers 2007, Bloom 2009). ○ If symptoms of anxiety or insomnia persist, referral for psychiatric evaluation (if you are not a psychiatrist) may be helpful.	▬ Gum AM, et al: Prevalence of mood, anxiety and substance-abuse disorders for older Americans in the National Comorbidity Survey Replication. *Amer J Geriatr Psychiatry* 2009: 17:769-781. ▬ Wolitzky-Taylor KB: Anxiety Disorders in Older Adults: A Comprehensive Review. Depression and Anxiety 2010; 27:190-211. ▬ Ayers CR, et al: Evidence-based psychological treatments for late-life anxiety. *Psychology and Aging* 2007:22(1):8-17. ▬ Bloom HG, et al: Evidence-based recommendations for the assessment and management of sleep disorders in older persons. *J Amer Geriatr Soc* 2009: 57(5):761-789. ▬ Woolcott JC, et al: Meta-Analysis of the Impact of 9 Medication Classes on Falls in Elderly Persons. *Arch Intern Med.* 2009; 169(21):1952-1960. ▬ Mulsatt BH, Pollock BG: Psychopharmacy, In: Blazer DG, Steffens DC: Textbook of Geriatric Psychiatry, 4th Ed., Washington DC: American Psychiatric Publishing, 2009:453-483. ▬ Generalised anxiety disorder and panic disorder (with or without agoraphobia) in adults. NICE Clinical guideline 113: 2011. guidance.nice.org.uk/CG113

 Quality Indicator™ 145

Quality Indicator 138

Use of Benzodiazepine with Long-Acting Metabolites for 30 or More Days (65 Years or Older)

CLINICAL ISSUE

- The benzodiazepines covered by this Quality Indicator™ are metabolized by oxidative pathways and have active metabolites with very long half-lives (see Table). In addition, clearance of oxidatively metabolized benzodiazepines is reduced in the elderly (especially in men) (Jacobson 2007).
- "Oxazepam and lorazepam do not undergo phase 1 hepatic metabolism, have no active metabolites, have acceptable half-lives that do not increase with age, and are not subject to drug interactions. Lorazepam is preferred for inducing sleep because oxazepam has a relatively slow and erratic absorption" (Mulsatt and Pollock 2009).
- In the elderly, benzodiazepines with long half-lives should be avoided (Mulsatt and Pollock 2009). Accumulation can occur and high plasma levels of benzodiazepines may cause memory loss, sedation, gait disturbances, and falls.
- Several studies failed to find any long-term benefits from the use of benzodiazepines to treat insomnia in the elderly.
- According to a recent meta-analysis, the use of sedative-hypnotics, antidepressants, and benzodiazepines were significantly associated with falls in the elderly (Woolcott 2009). Benzodiazepine use is also associated in the elderly with risk for automobile accidents and cognitive impairment.
- The risk of benzodiazepine abuse and dependence is an important consideration in older populations.

NOTE: Brand names are provided for ease of identification only and do not reflect a preference for one formulation over another.

CLINICAL CONSIDERATIONS™

- If you have not already, please consider the following:
  - Whether the continued use of benzodiazepines is indicated in your patient: recent studies have shown that many elderly patients can be successfully weaned off benzodiazepines and is associated with decreased risk for dementia and improved motor control and cognitive function in the elderly.
  - Reviewing your patient's diagnosis. Elderly patients prescribed benzodiazepines are often suffering from depression, which requires other effective interventions.
  - If indicated, switching to lorazepam, which appears to be the safest benzodiazepine in the elderly.
  - Whether psychosocial interventions may be helpful in your patient:
    - A recent study demonstrates the effectiveness of Brief Behavioral Treatment for Chronic Insomnia in elderly patients (Buysse 2011).
    - Other interventions designed to reduce stressors that may be contributing to the need for benzodiazepines may be of help; improving sleep hygiene, altering living situations in nursing homes, etc.
  - Whether referral for psychiatric evaluation may be helpful in your patient.

Drugs considered a long-acting benzodiazepine for this Quality Indicator™ (from Jacobson 2007)

Generic Name	Brand Name	Metabolite Half-life (hrs)
Chlordiazepoxide	Librium®	24-96
Clonazepam	Klonopin®	18-50 (parent compound)
Clorazepate	Tranxene®	50-100
Diazepam	Valium®	50-100
Flurazepam	Dalmane®	40 - 114
Quazepam	Doral®	28-114

REFERENCES

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Use of a Benzodiazepine at a Higher than Recommended Dose for 60 or More Days (Under 18 Years)

CLINICAL ISSUE	CLINICAL CONSIDERATIONS™	REFERENCES
▪ Benzodiazepines have not shown efficacy in controlled trials for childhood anxiety disorders (AACAP 2007). ▪ Benzodiazepines can be associated with sedation, disinhibition, cognitive impairment, sedative abuse, and difficulty with discontinuation (AACAP 2007). ▪ Treatment of childhood anxiety disorders should begin with psychotherapy. Cognitive behavioral therapies are strongly supported by evidence. ▪ "SSRIs have emerged as the medication of choice in the treatment of childhood anxiety disorders" (AACAP 2007). They are generally well tolerated, with mild and transient side-effects (GI symptoms, headaches, increased motor activity, insomnia) (ACCAP 2007). ▪ March & Vitiello (2009) argue "20 years of research reveals a positive benefit-to-risk ration for short-term treatment with SSRI or SNRI medications . . . in [pediatric] patients all ages with anxiety and obsessive-compulsive disorder." ▪ Non-response to psychotherapy and SSRIs may reflect presence of concurrent psychiatric comorbidity.	▪ SSRIs are the treatment of choice for childhood anxiety disorders. There is some evidence to support the use of venlafaxine (Effexor®). ▪ Benzodiazepines should only be used as an adjunct short-term treatment with SSRIs. ▪ Consider gradually tapering benzodiazepines to determine lowest effective dose. ▪ If you haven't already, please consider: ○ reviewing the original diagnosis and consider revising treatment to reflect your current clinical formulation; ○ reviewing the patient's treatment history to assess whether justification for increase in benzodiazepine dose is still valid; ○ assessing whether adherence to prescribed medications has been adequate; ○ using treatment algorithms for incomplete or refractory response; ▪ Treatment outcomes are best when a multimodal approach is used combining psychotherapy (such as cognitive-behavioral therapy), family interventions, school consultation, and pharmacotherapy as needed (Walkup 2008).	▪ AACAP Practice Parameter for the Assessment and Treatment of Children and Adolescents with Anxiety Disorders. *J Am Acad Child and Adolescent* Psychiatry. 2007;46:267-283. ▪ March JS, Vitiello B: Benefits Exceed Risks of Newer Anti-depressant Medications in Youth – Maybe. *Clinical Pharmacology and Therapeutics* 2009; 86(4):355-357. ▪ Walkup JT, et al: Cognitive Behavioral Therapy, Sertraline or a Combination in Childhood Anxiety. *N Engl J Med* 2008; 59(26): 2753-2766. ▪ Ilomäki R, et al: Psychotropic medication history of inpatient adolescents—is there a rationale for benzodiazepine prescription? Addict Behav 2011;36:161-165. ▪ Cunningham CM, et al: Patterns in the use of benzodiazepines in British Columbia: examining the impact of increasing research and guideline cautions against long-term use. Health Policy 2010;97:122-129. ▪ Ipser JC, et al: Pharmaco-therapy for anxiety disorders in children and adolescents. Cocharane Database System rev 2009;8:CD005170.

Quality Indicator 512

Use of Benzodiazepines at a Higher Than Recommended Dose for 60 or More Days

CLINICAL ISSUE	CLINICAL CONSIDERATIONS™	REFERENCES
• Most anxiety disorders will respond to alternate behavioural and pharmacological treatments. • Increased risk of accidents and memory impairment. • Increased risk for falls and/or confusion in geriatric patients. • Increased risk of dependency and/or abuse.	• Identify and treat the primary symptoms of anxiety using appropriate pharmacologic treatment. • Consider gradually tapering benzodiazepines to determine lowest effective dose. • Consider psychosocial interventions for anxiety and insomnia and/or consider referral for psychiatric consultation.	• Swinson RP, et al.: Clinical Practice Guidelines: Management of Anxiety Disorders. Can J Psychiatry Vol 51, Suppl 2, July 2006 http://ww1.cpaapc.org:8080/Publications/CJP/supplements/july2006/anxiety_guidelines_2006.pdf • Clinical Guideline: Management of anxiety in adults. UK National Institute for Clinical Excellence. 2004;152. http://www.nice.org.uk/pdf/CG022niceguideline.pdf • Barbone F, McMahon AD, et al. Association of road-traffic accidents with benzodiazepine use. Lancet. 1998;352:1331-1336. • Sorg MH, Mugford JG, Gressitt S. Maine Benzodiazepine Study Group Annual Report. 2003;137. http://www.med.mun.ca/getdoc/da33b567-a3ef-4810-8552-5325d42e15ec/mugford_MBSG 2004.aspx

 Quality Indicator™ 512 version: 8/2010

Quality Indicator 211

Use of 2 or More Insomnia Agents for 60 or More Days

CLINICAL ISSUE	CLINICAL CONSIDERATIONS™	REFERENCES
■ Persistent symptoms of insomnia may be associated with underlying medical disorders such as obstructive sleep apnea or periodic limb movement disorder. ■ Persistent symptoms of insomnia may be associated with underlying psychiatric disorders such as depression, post-traumatic stress disorder and anxiety disorders. ■ Increased risk of side effects. ■ There is little evidence to support the use of two insomnia agents concomitantly. ■ May reflect failure to discontinue ineffective treatment or interruption of cross-titration. ■ Non-pharmacological treatments of insomnia, including cognitive behavioral therapy (CBT) have a strong evidence base and efficacy generally at least equal to sleep medications.	■ Reconsider original diagnosis and revise treatment to reflect current clinical formulation including comorbidity. ■ Consider discontinuing medications which lack clear therapeutic benefit. ■ Assess whether each medication has been tried at the optimal therapeutic dose for sufficient time before adding new treatments. ■ Consider psychosocial interventions including education about sleep hygiene. ■ Consider referral for psychiatric or sleep medicine consultation.	■ NIH State-of-the-Science Conference Statement on manifestations and management of chronic insomnia in adults. NIH Consensus State Sci Statements 2005;22:1-30. ■ Benca RM: Diagnosis and treatment of chronic insomnia: a review. *Psychiatric Services.* 2005;56(3):332-343. ■ Stewart SA: The effects of benzodiazepines on cognition. *J Clin Psychiatry*. 2005;66(Suppl. 2):9-13. ■ Taylor DJ, Roane BM: Treatment of insomnia in adults and children: a practice-friendly review of research. J Clin Psychol 2010;66(11):1137-1147. ■ Morgenthaler T, et al: Practice parameters for the psychological and behavioral treatment of insomnia: an update. An American Academy of Sleep Medicine Report. Sleep 2006;29:1415-1419. ■ Baglioni C, et al: Insomnia as a predictor of depression: a meta-analytic evaluation of longitudinal epidemiological studies. J Affect Disord. 2011;135:10-19. ■ Lauyster FS, et al: Comorbid insomnia and obstructive sleep apnea: challenges for clinical practice research. J Clin Sleep Med 2010;6:196-204. ■ Siversten B, et al: Cognitive behavioral therapy vs zopiclone for treatment of chronic primary insomnia in older adults: a randomized controlled trial. JAMA 2006;295:2851-2858.

 Quality Indicator™ 211

Quality Indicator 156

Use of 2 or More Insomnia Agents for 60 or More Days (65 Years or Older)

CLINICAL ISSUE	CLINICAL CONSIDERATIONS™	REFERENCES
▬ Persistent symptoms of insomnia may be associated with underlying medical disorders such as obstructive sleep apnea or periodic limb movement disorder. ▬ Persistent symptoms of insomnia may be associated with underlying psychiatric disorders such as depression, post-traumatic stress disorder and anxiety. ▬ Increased risk of side effects may occur, including the possibility of additive respiratory depression. ▬ There is little evidence to support the use of two insomnia agents concomitantly. ▬ May reflect failure to discontinue ineffective treatment or interruption of cross-titration.	▬ If you have not already, please consider the following: ○ Reconsider original diagnosis and revise treatment to reflect current clinical formulation including comorbidity. ○ Consider discontinuing medications which lack clear therapeutic benefit. ○ Assess whether each medication has been tried at the optimal therapeutic dose for a sufficient period of time before adding new treatments. ○ Review the original diagnosis and revise treatment to reflect current clinical formulation including comorbidity. ○ Consider psychosocial interventions including education about sleep hygiene and cognitive behavioral therapy (CBT). ○ Consider referral for consultation by a psychiatrist or sleep medicine specialist (if you are not one).	▬ Schutte-Rodin S, et al: Clinical guideline for evaluation and management of chronic insomnia in adults. J Clin Sleep Med 2008;4:487-504. ▬ Salzman C: Pharmacologic treatment of disturbed sleep in the elderly. Har Rev Psychiatry 2008;16:271-278. ▬ Bain KT: Management of chronic insomnia in the elderly persons. Am J Geriatr Pharmacother 2006;4:168-192. ▬ Shub D, et al: Non-pharmacologic treatment of insomnia in persons with dementia. Geriatrics 2009;64:22-28. ▬ Irwin MR, et al: Comparative meta-analysis of behavioral interventions for insomnia and their efficacy in middle-aged adults and in older adults 55+ years of age. Health Psychol 2006; p25:3-14. ▬ Stewart SA: The effects of benzodiazepines on cognition. *J Clin Psychiatry*. 2005;66(Suppl. 2):9-13. ▬ Benca RM: Diagnosis and treatment of chronic insomnia: a review. *Psychiatr Serv.* 2005;56:332-43. ▬ National Heart, Lung, and Blood Institute Working Group on Insomnia. Insomnia: assessment and management in primary care. *Am Fam Physician*. 1999;59:3029-38.

 Quality Indicator™ 156

Quality Indicator 206

Use of 5 or More Psychotropics for 60 or More Days

CLINICAL ISSUE	CLINICAL CONSIDERATIONS™	REFERENCES
■ The use of five or more psychotropic medications may reflect that your patient has severe, difficult-to-treat psychiatric illness. In many cases the medications in use may all be clearly indicated -- this is especially likely to be the case if your patient is in full remission. ■ At the same time, one or more of the medications in use may be unnecessary: ○ It may be a medication that at one time was due to be tapered off, but the tapering process became stalled. ○ It may have been started for a clinical reason that is no longer relevant or was not clearly defined. ○ It may have been a medication trial that has not produced benefit. ■ As you know, the use of multiple medications is associated with increased morbidities, due to drug interactions and additive adverse effects; these can resemble symptoms of the diseases being treated. The use of multiple medications is often associated with high doses of those medications and can increase the risk of adverse events like metabolic syndrome, diabetes, and cognitive impairment. ■ The use of multiple medications might reflect poor adherence, which can produce the appearance that the patient is only partially responsive to treatment. ■ The use of multiple medications may suggest that the patient's disorder has been incompletely diagnosed. ■ Studies have shown that many patients receiving multiple medications can be switched to monotherapy without clinical deterioration when this is done under careful medical supervision.	■ If you have not already, please consider the following: ○ reviewing the original diagnosis (including any comorbidities) and clinical formulation and revise your patient's treatment to reflect any changes; ○ reviewing medication use and adherence with the patient; ○ consider discontinuing medications which lack clear therapeutic benefit; ○ assessing whether each medication has been tried at the optimal therapeutic dose for sufficient time before adding any new medication; ○ whether the patient's incomplete response might warrant reviewing clinical guidelines to see whether changes in the treatment plan might be warranted (for example, to refer a patient with severe depression for ECT); ○ reviewing medication use and adherence with the patient; ○ whether referral for consultation by a psychiatrist (if you are not one) might be warranted.	■ Mojtabai R, Olfson M: National Trends in Psychotropic Medication Polypharmacy in Office-Based Psychiatry. *Arch Gen Psychiatry* 2010; 67(1): 26-36. ■ Correll CU, et al**:** Antipsychotic Combinations vs Monotherapy in Schizophrenia: A Meta-analysis of Randomized Controlled Trials. *Schizophr Bull* 2009 35: 443-457. ■ Misawa F, et al: Is antipsychotic polypharmacy associated with metabolic syndrome even after adjustment for lifestyle effects?: a cross-sectional study. BMC Psychiatry 2011;26:118. ■ Essock SM, et al: Effectiveness of switching from antipsychotic polypharmacy to monotherapy. Am J Psychiatry 2011;166:702-708. ■ Procyshyn RM, et al: Persistent antipsychotic polypharmacy and excessive dosing in the community psychiatric treatment setting: a review of medication profiles in 435 Canadian outpatients. J Clin Psychiatry 2010;71:566-573. ■ Constantine RJ, et al: Trends in adult antipsychotic polypharmacy: progress and challenges in Florida's Medicaid program Community Ment Health J 2010;46:523-530. ■ Elie D, et al: Cognitive effects of antipsychotic dosage and polypharmacy: a study with the BACS in patients with schizophrenia and schizoaffective disorder. J Psychopharmacol 2010;24:1037-1044. ■ Kessing LV, et al: Treatment with antipsychotics and the risk of diabetes in clinical practice. Br J Psychiatry 2010;197:266-271.

 Quality Indicator™ 206

Quality Indicator 114

Use of 2 or More SSRIs for 60 or More Days

CLINICAL ISSUE	CLINICAL CONSIDERATIONS™	REFERENCES
• Combining SSRIs offers no additional benefits when compared with an adequate dose of one agent. The serotonergic transporter is saturated by adequate doses of any SSRI. • May indicate that a process of switching between SSRIs was interrupted. • Lack of response to a single SSRI may reflect a possible issue with the patient's adherence to treatment. • Possible comorbid conditions may be interfering with antidepressant or anxiolytic effectiveness. • Increased risk of side effects may contribute to poor adherence.	• If you have not already, please consider: ○ Tapering and then stopping one of the SSRIs and maximizing dose of the other. ○ Ensuring an adequate dose and duration of SSRI. ○ For treatment resistance, consider monotherapy with an alternate antidepressant. If your patient remains treatment resistant, consider: ▪ Adding an evidenced based psychotherapy (such as Cognitive Behavioural Therapy); ▪ Augmentation strategies developed from empirical data (Little, 2009). ○ If there is a clinical need for a second antidepressant (for example, in treating comorbid anxiety and depression or residual depressive symptoms), using agents with complementary mechanisms of action, rather than two SSRIs ○ Reviewing the original diagnosis and consider revising treatment to reflect the current clinical formulation, including comorbid psychiatric and physical disorders. ○ Reviewing medication use and adherence with patient and/or family. ○ Referral for psychiatric consultation (if you are not a psychiatrist).	• Little A. Treatment Resistant Depression. Am Fam Physician 2009; 80:167-172. • Adams SM, Miller KE, Zylstra RG. Pharmacological management of adult depression. Am Fam Physician 2008; 77(6):785-796. • VA/DOD Clinical Practice Guidelines for Management of Major Depressive Disorder. Dept of Veterans Affairs & Department of Defense, May 2009. http://www.healthquality.va.gov/Major_Depressive_Disorder_MDD_Clinical_Practice_Guideline.asp • Depression: the treatment and management of depression in adults. National Clinical Practice Guideline Number 90. National Institute for Health and Clinical Excellence, London UK, 2009. http://guidance.nice.org.uk/CG90 • Depression in adults with chronic physical health problems: treatment and management. National Clinical Practice Guideline Number 91. National Institute for Health and Clinical Excellence, London UK, 2009. http://guidance.nice.org.uk/CG91

 Quality Indicator™ 114 version: 8/2010

Quality Indicator 144

Use of 2 or More SSRIs for 60 or More Days (65 years or Older)

CLINICAL ISSUE	CLINICAL CONSIDERATIONS™	REFERENCES
• Combining selective serotonin reuptake inhibitors (SSRIs) offers no additional benefit to treatment with a single agent at an adequate dose. • There is an increased risk of side effects with combined use of SSRIs, including the possibility of potentially fatal serotonin syndrome. • Use of multiple SSRIs may reflect failure to discontinue ineffective treatment or interruption of cross-titration. • Use of multiple SSRIs may contribute to poor adherence.	• Assess whether each SSRI has been tried at the optimal therapeutic dose for a sufficient time before adding any new medications. • When switching medications, ensure that the first medication is discontinued. • Augment an antidepressant only when the first antidepressant led to at least a partial response. • When augmenting an antidepressant consider using a second antidepressant with a different mechanism of action. • Consider reviewing medication use and adherence with patient and/or family. • Reconsider original diagnosis and revise to reflect current clinical formulation including comorbid psychiatric and medical disorders.	• Avorn J, Wang P: Drug prescribing, adverse reactions, and compliance in elderly patients. Salzman C, ed. In: Clinical Geriatric Psychopharmacology. Fourth Edition, Philadelphia: Lippincott, Williams & Wilkins, 2005:23-47. • Alexopoulos GS. Depression in the elderly. Lancet. 2005; 365:1961-1970. • Shanmugham B, Karp J, Drayer R, et al. Evidence-based pharmacologic interventions for geriatric depression. Psychiatr Clin North Am. 2005:28;821-835. • Alexopoulos GS, Katz IR, Reynolds CF, et al. The Expert Consensus Guideline Series. Pharmacotherapy of Geriatric Depression. Postgrad Med (Special Report), October 2001. • Boyer EW, Shannon M. The serotonin syndrome. N Engl J Med 2005;352:1112-1120.

 Quality Indicator™ 144 version: 8/2010

Multiple Prescriber Alert

Multiple Prescribers of 1 or More Opioids for 30 or More Days

According to our data, your patient is receiving prescriptions for 1 or more opioids from more than one prescriber. To improve coordination of care, this information is being provided to you in case you are not already aware of this situation.

We understand that you may be already aware of this situation. You may be part of a group of physicians who cross-cover, or the other prescriber's prescriptions may date from before you became involved in this patient's care. On the other hand, this information would be useful to you if you were not aware of the other prescriptions, especially if these reflect a treatment plan different from your own.

Please review the information to assess whether our data are consistent with your understanding of the patient's care. You may wish to consider discussing this matter with your patient.

This indicator identifies patients who have been prescribed one or more opioids of the same class by two or more prescribers for at least a 30 day period.

All physicians or other prescribers for the identified patient, even if not one of the multiple prescribers, are provided this Alert to improve coordination of care.

 Quality Indicator™ 405 version: 8/2010

Quality Indicator 411

Multiple Prescriber Alert

Multiple Prescribers of 1 or More Opioids for 30 or More Days (65 years or Older)

According to our data, your patient is receiving prescriptions for 1 or more opioids from more than one prescriber. To improve coordination of care, this information is being provided to you in case you are not already aware of this situation.

We understand that you may be already aware of this situation. You may be part of a group of physicians who cross-cover, or the other prescriber's prescriptions may date from before you became involved in this patient's care. On the other hand, this information would be useful to you if you were not aware of the other prescriptions, especially if these reflect a treatment plan different from your own.

Please review the information to assess whether our data are consistent with your understanding of the patient's care. You may wish to consider discussing this matter with your patient.

This indicator identifies patients 65 years or older who have been prescribed one or more opioids by two or more prescribers for at least a 30 day period.

All physicians or other prescribers for the identified patient, even if not one of the multiple prescribers, are provided this Alert to improve coordination of care.

 Quality Indicator™ 411 version: 8/2010

Quality Indicator 602

Patient Failed to Refill Newly Prescribed Antidepressant Within 30 Days of Prescription Ending

CLINICAL ISSUE	CLINICAL CONSIDERATIONS™	REFERENCES
• Please note that this Quality Indicator™ is related to patient, not physician, behaviour and is provided to you as a matter of information. We are aware that the lack of a medication refill may be due to a decision made by you and the patient collaboratively. • 50% of patients do not adhere to treatment as prescribed. • One-third of adult patients with depression who need long term treatment are nonadherent within first 6 weeks. • Treatment of depression should continue for at least 4-9 months after symptoms resolve. • Risk of relapse is high. • Relapse is associated with increased social and occupational disability. • There may be increased risk of suicide.	• Provide education about depression and its management. • Consider using an easy to understand treatment regimen. • Involve patient in decision making process. • Consider reviewing medication use and adherence with patient and/or family. • Consider psychosocial interventions and/or referral for psychiatric consultation.	• Velligan DI, et al.: The Expert Consensus Guideline Series: Adherence problems in patients with serious and persistent mental illness. J Clin Psychiatry 2009; 7 (Suppl 4):1-46. • Nunes V, et al.: Clinical Guidelines and Evidence Review for Medicines Adherence: Involving patients in decisions about prescribed medicines and supporting adherence. London: National Collaborating Centre for Primary Care and Royal College of General Practitioners, January 2009. http://www.nice.org.uk/CG76 • Buckley PF, Foster AE, Patel NC, Wermert A: Adherence to Mental Health Treatment. Oxford Univ. Press, 2009. • Colom F, et al.: Identifying and improving non-adherence in bipolar disorders. Bipolar Disorders 2005: 7 (5):24-31.

 Quality Indicator™ 602 version: 8/2010

Quality Indicator 606

Patient Failed to Refill an Antipsychotic Within 30 Days of Prescription Ending (65 Years or Older)

CLINICAL ISSUE	CLINICAL CONSIDERATIONS™	REFERENCES
• Please note that this Quality Indicator™ is related to patient, not physician, behaviour and is provided to you as a matter of information. • We are aware that the lack of a medication refill may be due to a decision made by you and the patient collaboratively. • 50% of patients with schizophrenia are non-adherent during the first year after discharge from the hospital. • There is a high risk of relapse (nearly 4 times greater) in non-adherent patients than in those who adhere to treatment. • Relapse is associated with increased rates of re-hospitalization. • Non-adherence and relapse can cause increased social and occupational disability.	• Adherence to antipsychotic medication treatment is an often difficult, yet critical, part of the treatment of persons with chronic psychotic illness. • If the failure to refill the antipsychotic is not due to a decision made by the patient and you, collaboratively, please consider measures that might improve medication adherence (Velligan 2009, Nunes 2009). • If you haven't already, please consider: ○ reducing the number of times each day your patient needs to take medications, since this can improve adherence; ○ discussing reasons for impaired adherence with the patient/family; ○ educating the patient/family regarding the problem that requires treatment and the expectations of drug therapy, including adherence, duration of treatment and side effects; ○ use of long acting (depot) formulation of antipsychotic medication; ○ involving the patient in decision-making process; ○ enlisting the patient's/caregiver's help in organizing an effective system to take medication; ○ If you haven't already, please consider monitoring follow through with phone calls or more frequent visits. ○ Consider psychosocial interventions and/or referral for psychiatric consultation.	• Velligan D, et al.:The Expert Consensus Guideline Series: Adherence problems in patients with serious and persistent mental illness. J Clin Psychiatry 2009; 70 (Suppl 4):1-46 • Nunes V, et al.: Clinical Guidelines and Evidence Review for Medicines Adherence: Involving patients in decisions about prescribed medicines and supporting adherence. London: National Collaborating Centre for Primary Care and Royal College of General Practitioners, January 2009. http://www.nice.org.uk/CG76

 Quality Indicator™ 606 version: 8/2010

APPENDIX 2: CHANGES IN DRUG DEFINITIONS FOR QUALITY INDICATORS IN THE MANITOBA IMPROVE PROGRAM, 2011–2013

The following table lists the two changes to dose requirements for QI 512 (high dose benzodiazepines for adults) that were made during the study period (September, 2012). These changes resulted in fewer prescriptions meeting the threshold for triggering the QI.

Appendix Table 2.1: Dose Range Changes for Benzodiazepines Used in the Definition of Quality Indicator 512 for Mailings in the Manitoba IMPROVE Program

Active Ingredients	Low Dose (mg/d)		High Dose (mg/d)	
	Original	Revised	Original	Revised
Alprazolam	0.75	0.75	4.00	6.00
Lorazepam	1.00	2.00	4.00	8.00

Appendix Table 2.2: Top 10 Deletions of Drugs from DIN List for Quality Indicators (512, 411, 405, 206, 606) in the Manitoba IMPROVE Program

DIN Deletions
Apo-Levocarb 10-100 Mg Tab
Apo-Levocarb 25-100 Mg Tab
Apo-Pramipexole 0.25 Mg Tab
Co Pramipexole 0.25 Mg Tab
Co Sumatriptan 100 Mg Tab
Mylan-Sumatriptan 100 Mg Tab
Pms-Pramipexole 0.25 Mg Tab
Sandoz Pramipexole 0.25 Mg Tab
Sinemet Cr 25-100 Mg Tablet
Sinemet Cr 50-200 Mg Tablet

Appendix Table 2.3: Additions of Drugs to the DIN List for Quality Indicators (512, 411, 405, 206, 606) in the Manitoba IMPROVE Program

DIN Additions		
Abilify 10 Mg Tablet	Methoxisal C 1/2 Tablet	Targin 20 Mg-10 Mg Tablet
Abilify 15 Mg Tablet	Mogadon 5 Mg Tablet	Targin 40 Mg-20 Mg Tablet
Abilify 2 Mg Tablet	Mylan-Cyclobenzaprine 10 Mg Tb	Teva-Citalopram 10 Mg Tablet
Abilify 20 Mg Tablet	Mylan-Mirtazapine 15 Mg Tablet	Teva-Gabapentin 800 Mg Tab
Abilify 30 Mg Tablet	Mylan-Mirtazapine 45 Mg Tablet	Teva-Hydromorphone 1 Mg Tablet
Abilify 5 Mg Tablet	Mylan-Olanzapine 10 Mg Tablet	Teva-Hydromorphone 2 Mg Tablet
Adderall Xr 10 Mg Capsule	Mylan-Olanzapine 15 Mg Tablet	Teva-Hydromorphone 4 Mg Tablet
Adderall Xr 15 Mg Capsule	Mylan-Olanzapine 2.5 Mg Tablet	Teva-Hydromorphone 8 Mg Tablet
Adderall Xr 20 Mg Capsule	Mylan-Olanzapine 5 Mg Tablet	Teva-Methylphen Er-C 18 Mg Tab
Adderall Xr 25 Mg Capsule	Mylan-Olanzapine 7.5 Mg Tablet	Teva-Methylphen Er-C 27 Mg Tab
Adderall Xr 30 Mg Capsule	Novo-Cycloprine 10 Mg Tablet	Teva-Methylphen Er-C 36 Mg Tab
Adderall Xr 5 Mg Capsule	Oxyneo 10 Mg Tablet	Teva-Methylphen Er-C 54 Mg Tab
Apap, Caffein & Codeine Tab	Oxyneo 15 Mg Tablet	Teva-Olanzapine 10 Mg Tablet
Apo-Cyclobenzaprine 10 Mg Tb	Oxyneo 20 Mg Tablet	Teva-Olanzapine 15 Mg Tablet
Apo-Olanzapine Odt 10 Mg Tab	Oxyneo 30 Mg Tablet	Teva-Olanzapine 2.5 Mg Tablet
Apo-Olanzapine Odt 15 Mg Tab	Oxyneo 40 Mg Tablet	Teva-Olanzapine 5 Mg Tablet
Apo-Olanzapine Odt 5 Mg Tablet	Oxyneo 60 Mg Tablet	Teva-Olanzapine 7.5 Mg Tablet
Apo-Quetiapine 200 Mg Tablet	Oxyneo 80 Mg Tablet	Teva-Olanzapine Od 10 Mg Tab
Apo-Tramadol/Acet 37.5-325 Mg	Pms-Cyclobenzaprine 10 Mg Ta	Teva-Olanzapine Od 15 Mg Tab
Auro-Mirtazapine Od 15 Mg	Pristiq 100 Mg Tablet	Teva-Olanzapine Od 5 Mg Tablet
Auro-Mirtazapine Od 30 Mg	Pristiq 50 Mg Tablet	Tramacet Tablet
Auro-Mirtazapine Od 45 Mg	Ralivia 100 Mg Tablet Er	Tridural 100 Mg Tablet
Champix Continuation Pack	Ralivia 200 Mg Tablet Er	Tridural 200 Mg Tablet
Champix Starter Pack	Ralivia 300 Mg Tablet Sr	Tridural 300 Mg Tablet
Co Olanzapine 15 Mg Tablet	Ran-Gabapentin 100 Mg Capsule	Tryptan 500 Mg Capsule
Codeine Phos 25 Mg/5 Ml Sirop	Ran-Gabapentin 300 Mg Capsule	Ultram 50 Mg Tablet
Dimetapp-C Liquid	Ran-Gabapentin 400 Mg Capsule	Vyvanse 20 Mg Capsule
Durela 100 Mg Capsule	Ran-Risperidone 0.25 Mg Tablet	Vyvanse 30 Mg Capsule
Hydromorph Contin 4.5 Mg Cap	Ran-Risperidone 0.5 Mg Tablet	Vyvanse 40 Mg Capsule
Hydromorph Contin 9 Mg Capsule	Ratio-Cotridin Expect Soln	Vyvanse 50 Mg Capsule
Invega 3 Mg Tablet	Robaxacet-8 Tablet	Vyvanse 60 Mg Capsule
Jamp-Citalopram 40 Mg Tablet	Sandoz Olanzapine 10 Mg Tablet	Zopiclone 7.5 Mg Tablet
Lamictal 2 Mg Tablet	Strattera 10 Mg Capsule	Zyban 150 Mg Tablet
Lyrica 150 Mg Capsule	Strattera 18 Mg Capsule	Zytram Xl 150 Mg Tablet
Lyrica 25 Mg Capsule	Strattera 25 Mg Capsule	Zytram Xl 200 Mg Tablet
Lyrica 300 Mg Capsule	Strattera 40 Mg Capsule	Zytram Xl 300 Mg Tablet
Lyrica 50 Mg Capsule	Strattera 60 Mg Capsule	Zytram Xl 400 Mg Tablet
Lyrica 75 Mg Capsule	Strattera 80 Mg Capsule	Zytram Xl 75 Mg Tablet
Methoxacet-C 1/8 Tablet	Talwin 50 Mg Tablet	

APPENDIX 3: REASONS FOR NO EDUCATIONAL PACKAGE MAILINGS TO PHYSICIANS TRIGGERING A QUALITY INDICATOR IN THE MANITOBA IMPROVE PROGRAM, 2011–2013

The following table presents the detailed reasons for filtering (i.e., holding back) an educational mailing package from a physician who has triggered a QI.

Appendix Table 3.1: Reasons for No Educational Package Mailings to Physicians Triggering a Quality Indicator in the Manitoba IMPROVE Program, 2011–2013

Filter	Description	Priority
Unknown Prescriber Name	Prescriber did not receive mailings for any patient due to: ▪ incomplete prescriber contact information	1
DoNotSend by Prescriber	Prescriber did not receive mailings for any patient due to: ▪ exclusion of prescriber from randomized control group; ▪ request by Manitoba Health, Healthy Living and Seniors; ▪ request by the prescriber (feedback about a previous intervention)	2
DoNotSend by Prescriber/Patient	Prescriber did not receive mailings for a specific patient due to: ▪ request by Manitoba Health, Healthy Living and Seniors; ▪ request by the prescriber (feedback about a previous intervention)	3
DoNotSend by QI	Prescriber did not receive mailings for a specific quality indicator due to: ▪ request by Manitoba Health, Healthy Living and Seniors; ▪ request by the prescriber (feedback about a previous intervention)	4
Poly Pharmacy Filter (multiple prescriber filter)	Prescriber did not receive mailings for a specific patient and quality indicator (105, 114, 206, or 211) due to: ▪ multiple prescribers trigger the same quality indicator for the same patient	5
Two prescribers where one is unknown	Prescriber did not receive mailings for a specific quality indicator (405 or 411) due to: ▪ unknown prescriber (missing information)	6
Redundant QI Filter	Prescriber did not receive mailings for a specific patient and quality indicator due to: ▪ prescriber triggeringa related quality indicator of greater severity for that patient	7
Prescriber not being in Speciality list	Prescriber did not receive mailings for any patient or any quality indicator due to: ▪ prescriber specialty missing from list of targeted specialties (pediatrics, psychiatry, general practice, and family practice)	8

APPENDIX 4: SUMMARY OF PRESCRIBER FEEDBACK TO THE IMPROVE PROGRAM DURING THE STUDY PERIOD

Appendix Table 4.1 breaks down data from the Provider Feedback Form that was provided to physicians with the educational mailing packages. As a voluntary component of the program, not all mailings resulted in a Prescriber Feedback Form being returned to the program. Feedback from physicians was more frequent at the start of the program, and these numbers are presented separately for each month until September, 2011. Quarterly summaries are presented thereafter. In addition to the options presented below, an open text field provided the opportunity for physicians to comment further on QIs that were triggered, the patient(s), or the program in general. For this open text, the most frequent type of response not represented below was that patients may have been 'inherited' by the prescribing physician and they were working to correct the prescribing behavior.

Appendix Table 4.1: Summary of Prescriber Feedback to the IMPROVE Program During the Study Period

	Justified Practice	My Patient, Not My Script	Not My Patient, My Script	Not My Patient, Not My Script	No Longer My Patient	Total
July 2011	228	9	12	0	9	258
August 2011	454	38	31	0	19	542
September 2011	498	36	24	0	12	570
Oct-Dec 2011	348	s	6	0	s	359
Jan-Mar 2012	144	s	s	0	6	154
April-June 2012	353	0	0	s	32	s
Jul-Sep 2012	355	s	0	11	11	s
Oct-Dec 2012	270	14	38	s	18	s
Jan-Feb 2013	392	s	23	s	15	435

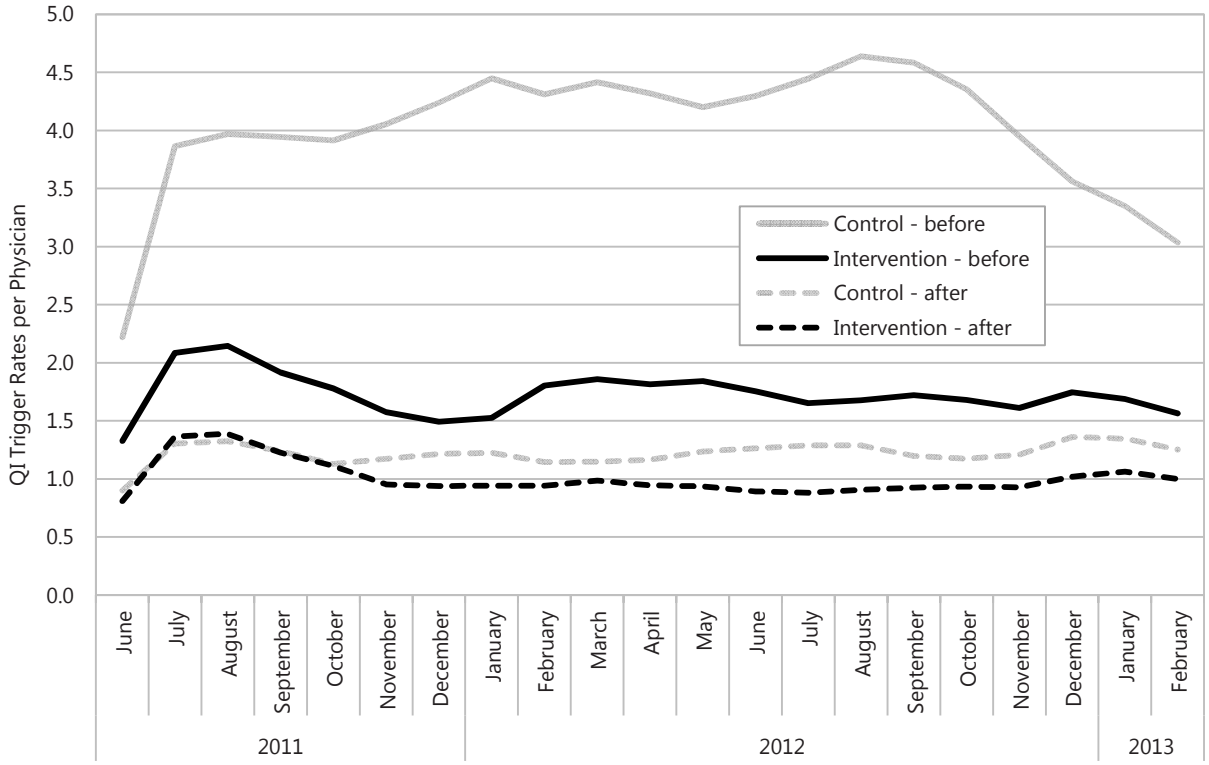
Source: CNS of Canada

APPENDIX 5: TRIGGER RATES FOR QUALITY INDICATOR 105 (BENZODIAZEPINES FOR ADULTS) BEFORE AND AFTER REMOVAL OF OUTLIER PHYSICIANS

In creating the IMPROVE Program evaluation dataset, twenty-three physicians were removed from the population of 1447 physicians due to extremely high trigger numbers for a single Quality indicator (>1000 triggers over the study period). Fifteen of these outliers were in the control group, and eight were in the intervention group. Twenty-two were removed due to having high counts on QI 105 (Benzodiazepines for adults). The impact of removing the associated QI triggers for these physicians is displayed in the Figure below. Overall QI trigger rates were reduced by more than half for the control group, and by about 40% for the intervention group, due to the removal of only a small subset of physicians.

Appendix Figure 5.1: Trigger Rates for Quality Indicator 105 Before and After Excluding Outlier MDs

Use of two or more benzodiazepines for 60 or more days, patients aged 18–64



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