PHYSICIAN INTEGRATED NETWORK BASELINE EVALUATION: Linking Electronic Medical Records and Administrative Data

August 2010

University of Manitoba | Faculty of Medicine
Community Health Sciences

Manitoba Centre for Health Policy
Department of Community Health Sciences
Faculty of Medicine, University of Manitoba

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Manitoba Centre for Health Policy

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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, Faculty of Medicine, University of Manitoba. The mission of MCHP is to provide accurate and timely information to health care 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, health care 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 (MB Health). 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 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 MB Health.

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Executive Summary

This report is one part of the evaluation of Phase 1 of the Physician Integrated Network (PIN), a primary care renewal initiative developed by Manitoba Health. At the outset of this initiative, a robust evaluation was designed including the extraction of clinical data from the Electronic Medical Records (EMRs) of the participating clinics. This deliverable, a part of the evaluation, compares the extracted data from the EMRs of participating clinics with the data from the Population Health Research Data Repository (Repository) housed at the Manitoba Centre for Health Policy (MCHP). This provides a unique opportunity to combine and compare the primary data collected for clinical purposes with the secondary data collected for administrative purposes.

Four clinics, with over sixty physicians, were enrolled in Phase 1 of PIN. They were all using EMRs for clinical note recording. The Assiniboine Clinic and Agassiz Medical Centre use the CLINICARE™ EMR and the other two clinics (Steinbach Family Medical Center and Dr C.W. Wiebe Clinic) use the JonokeMed™ EMR. Each of the clinics is unique in a variety of different ways which posed some challenges in our analysis of the data.

The four key objectives of PIN are:

1. to improve access to primary care
2. to improve primary care providers' access to and use of information
3. to improve the working environment for all primary care providers
4. to demonstrate high quality primary care with a specific focus on chronic disease management

This evaluation addressed only the fourth objective.

Quality Based Incentive Funding (QBIF) has been one of the key mechanisms for engaging physicians in PIN. PIN is using QBIF as part of a blended funding approach: fee–for–service (FFS) combined with incentive–based funding for meeting targets. The participating physicians continue to bill Manitoba Health for all services provided to their patients according to the same fee schedule used by other physicians and in the same way they did this prior to becoming part of PIN. The QBIF funding is provided to the clinic in addition to the usual physician funding mechanism. The clinic chooses how to use the QBIF funding to best serve its patients and meet the PIN objectives. This may include hiring non–medical staff to improve clinic access or other health professionals such as nurses or dietitians to provide patient care.

Another key component of the PIN funding is the funding that facilitates the changes necessary for the extraction of data from the EMR. In order to measure the outcomes for the quality indicators, it was necessary to work with the EMR vendors to develop the capacity to extract the relevant data from the clinic EMRs. The time taken to implement this process varied for the two vendors and even between clinics, which impacted on the data that was available for this study.

Research Questions

This report presents the lessons learned from the analyses comparing the EMR and administrative data sources. The two key research questions addressed in this study are:

1. *How comparable are the EMR and administrative data for data fields that are common to both data sources?*

   To answer this question, we present age and sex distributions of the total clinic population as determined by the two data sources for each clinic.

2. *What indicators are feasible to track using administrative data?*

   The results for each of the indicators are presented for the patients included in the clinic EMR core patients and for patients with physician billings in the administrative data but who were not identified as core clinic patients in the EMR.

In addition, this report demonstrates some of the challenges involved in measuring practice–level clinical performance and comparing performance across settings.

Methods

We compared the data from the clinic EMR chart extracts to the data available in the Repository. There were a number of challenges in combining the data from the four clinics with the Repository data. First, we were faced with the reality of not having an exact overlap in the period during which the data were collected from the two sources. The Repository data were only available up to the end of the 2007 fiscal year; thus, we had no administrative data after March 31, 2008. The clinics, however, were in the midst of PIN at that time, with Phase 1 ending on August 31, 2008. Because of challenges in extracting data from one of the EMRs, there was no overlap between two of the four clinics and the Repository data.

Second, the clinics did not use a standardized approach to identifying the patients to be included in the data extract. Each of the clinics had a different approach to identifying which patients to include in the indicator analysis. For example, some clinics provide services for walk–in patients but do not regard them as core clinic patients because the physicians do not take responsibility for their long term ongoing care. In contrast, MCHP has established standardized algorithms to allocate primary care patients to the most responsible physician. This resulted in differences in how some patients were allocated (clinic patient or not) between the data sources.

Third, we identified approximately 4,000 patients who were identified by more than one clinic as being a patient for whom that clinic took responsibility. We developed an approach to allocating those patients to a single clinic for our analyses.

The patients included in the analyses thus fell into a number of categories. Some were allocated to a clinic by both the MCHP algorithm and the clinic EMR. Others were identified by the EMR, but allocated to another clinic by the MCHP algorithm; some were allocated to the clinic by the MCHP algorithm but not identified by the EMR extract as a clinic patient. Once patients were allocated to a category, we included them in that category for all of the analyses.

We also created "virtual practices" of patients with the same demographics as the clinic patients to compare with the results received for the real clinic populations. This comparison is believed to be fairer than other comparisons in that it compares groups of similar patients. Comparing patients between real clinics with their different populations or to the Manitoba average rates could be an unfair assessment.

We looked at 15 care provision process indicators that are measurable with both the EMR extracts for PIN and the Repository data. The definitions for the PIN indicators initially followed the Canadian Institutes for Health Information (CIHI) Primary Care Indicators definitions. Some of these, however, were changed as they were implemented and problems with the CIHI definitions arose. The PIN Evaluation Committee, which had representation from all the participating clinics and Manitoba Health, decided on the changes to the EMR indicator definitions. The definitions used

for the administrative data analyses were those previously used at MCHP. All indicators could only be measured using the Repository data. Each individual clinic focused only on a small group of indicators for Phase 1 of PIN. Therefore, the majority of indicators were not available from all clinics.

Results

Some clear differences emerge when comparing the patient age and sex characteristics between the patients allocated to the clinics by the EMRs and those allocated to the clinics by the Repository.

The mean ages of the patients in the Repository were consistently older for the Assiniboine and Dr. C.W. Wiebe clinics but not for the other two clinics. Children (under 15 years of age) represented a considerably smaller percentage of patients at the Assiniboine Clinic than they did in the Manitoba population overall. In contrast, the percentage of patients who were younger than five years was much higher for the Dr. C.W. Wiebe Clinic than for the Manitoba population. Many of these young patients were never seen for ambulatory visits in–clinic; they were probably visited in hospital as newborns by physicians of the clinic.

According to the Repository, the Assiniboine Clinic appeared to provide care to a higher than expected percentage of older patients although many of these were not included in the EMR extracts.

The full report has details on the fifteen indicators that we analyzed:

A. Preventive Care

1. Cervical cancer screening
2. Childhood immunizations
3. Influenza vaccination (flu shots) for adults aged 65 and older
4. Breast cancer screening

B. Chronic and Acute Disease Care

5. Antibiotic prescribing
6. Antidepressant prescription follow–up
7. Asthma care
8. Benzodiazepine prescribing for community–dwelling adults aged 75 and older
9. Congestive heart failure (CHF): Treatment with an angiotensin converting enzyme inhibitor (ACEI) or an angiotensin II receptor blocker (ARB)
    a. Initiation of treatment
    b. Persistent use
10. Diabetes care
11. Post–Myocardial infarction care: Beta–Blocker prescribing
    a. Initiation of treatment
    b. Persistent use
12. Post–Myocardial infarction care: Cholesterol–Lowering drug prescribing
    a. Initiation of treatment
    b. Persistent use

We compared the rates for each of the clinic populations (EMR extracts, repository, and total clinic population) with the expected rates and the Manitoba rates. We did not find consistent patterns between clinics or across indicators, but we did demonstrate different patterns for each indicator.

Discussion

There are a number of lessons to be learned from this study. Firstly, there are clearly limitations in both the data extracted from clinic EMRs and the administrative data held in the Repository. One of the potential advantages of the study is to learn how to best use the two data sources together. Unfortunately, the time lag resulting from the single annual data download from Manitoba Health to the Repository prevents a more current analysis of the Repository data.

Secondly, the EMR extracts are limited by their dependence on the appropriate fields being both available in the EMR and routinely used by the clinicians. Relevant data that are not entered into the correct field are not captured in the data extract. At the initiation of PIN, there was no provincial qualification process to guide EMR vendors as to which EMR fields would be required to measure quality of care. Because the QBIF funding is intended to reward quality, it is important to be able to separate changes in the *provision* of quality care from the *documentation* of quality care. The use of the EMR to keep track of the indicator outcomes works best when this process fits with the normal care process.

For PIN to achieve its goals, a number of changes need to take place. This study has focused on two components of the required changes that are supported by PIN. First, the study provides context and insight into the measurement of some of the quality indicators (less than half of the indicators can be measured using the Repository data); and second, it highlights the extent and type of EMR use by clinicians. All EMRs offer the potential to use the information entered into the patient record in a variety of creative ways. Whether it is creating a longitudinal graphic comparison of the patients' blood pressure results or developing evidence–based automatic reminders to prompt care plans, for the EMR to provide an advantage over the use of a paper medical chart the clinician must be actively engaged. This study has shown huge variability in how the participating physicians used their EMRs at the start of the study. This variability made it difficult to separate true changes in clinical practice facilitated by PIN from changes in charting practice using the EMR. Real time administrative claims data analysis could potentially provide this insight but it is not currently available at MCHP.

While the results for each indicator are interesting, it is of greater interest to note that there are differences between the EMR–allocated patients compared to the ones identified from the Repository for many of the indicators. This finding should lead to an exploration of why these differences exist and, subsequently, an attempt to determine ways to ensure that the best possible information is being used to measure the success of PIN. As the PIN Evaluation Committee works to establish a standardized clinic–based definition for patients to include in the EMR abstract, it can use the findings of this study to compare how each of the current definitions has resulted in differences. This does not imply that the MCHP algorithm is the gold standard to which the clinic EMR patient allocation should aspire, but rather that the comparison between the two approaches provides an opportunity to explore their differences and learn from the comparison.

While this discussion reflects the research and quality measure consequences of determining which patients to include in these indicators, the ultimate concern is the acceptance of accountability for patient care by the physician. It is clear that this relationship is best determined in conjunction with the patient. Formal patient enrolment in practices, which involves a mutual commitment by both the patient and provider, has been widely implemented in Ontario and Quebec. In Ontario, more than 70% of the population has enrolled with a primary care physician (Kantarevic, Kralj, & Weinkauf, 2010). Implementation of some form of patient enrolment in Manitoba would address the concerns raised above.

There is often value in comparing results across different studies, either to validate the results of a new study or to explore the reasons for differences. We, however, encourage readers to focus on the internal comparisons in this study rather than looking for external comparisons. Most of the indicator definitions used in this study have not been used with clinical data before despite their origins as CIHI definitions. Operationalizing those definitions frequently resulted in refinements that could have significant impact on the indicator rates. Perhaps, more importantly, it is well known that patient characteristics such as age, sex, and socioeconomic status have a profound impact on their health status and health behaviors. Comparisons between different populations are fraught with built–in errors when these characteristics are not taken into account. This creates a challenge to meaningful indicator comparisons. To address it, we created "virtual practices" (matched on age and sex distributions of each clinic) in order to provide comparable populations.

The provincial rates for our indicators are generally consistent with previous studies using the Repository. Differences arise from different time periods and slight variations in indicator definitions due to the differing study purposes. For example, atlases often use consistent definitions over time to facilitate comparisons with previous atlases despite refinements in these definitions that may have developed.

The lack of any consistent pattern between clinics (i.e., no one clinic seems to provide consistently better or worse care than the others) and across indicators suggests widespread room for improvement amongst the PIN clinics. Because we have shown that the PIN clinics are not consistently worse than either the provincial rates or the expected rates for each clinic, we can conclude this room for improvement is to be found across the province. PIN has the potential to facilitate improved care for many Manitobans as the number of physicians participating in Phase 2 increases.

Future Research

While the comparisons within clinics provides useful information within the context of the organization of the PIN initiative, use of the Repository data has a potentially larger role to play in measuring two important outcomes. Firstly, one of the goals of PIN is to improve patient access to the primary care clinic with which the patient is associated. Improved access should lead to better continuity of care, which has been shown to lead to better health outcomes. (Katz, De Coster, Bogdanovic, Soodeen, & Chateau, 2004; Martens et al., 2008). Because the data contained in the EMR extracts are specific to the participating clinics, this provides no data on the use of other primary care clinics by patients identified by the PIN clinics as their patients. This information, while not an indication of the timeliness or appropriateness of access to care, is however available from the Repository and should be used in future evaluations as an indicator of access.

Secondly, the results of this study should be seen as baseline data for further research in determining whether PIN has led to improvement in patient care. While the initial hope was for the first phase to demonstrate these changes, inconsistencies in the charting practices within the EMR of many participating physicians prior to PIN and in its early implementation, has limited our ability to demonstrate that changes in the EMR extracts are indeed changes in clinical practice, rather than changes in use of the EMR. By allowing the initial period to be included as a baseline where charting practices were standardized, we will be able to measure future changes in practice using both the EMR and Repository. The Repository can then be used to validate the EMR changes over time for those indicators that can be measured by both data sources.

Chapter 1: Introduction

The study described in this report is one component of the broader **Physician Integrated Network (PIN)**[1] initiative, a multi–phase, ongoing **primary care** renewal initiative of Manitoba Health. The goal of PIN is to facilitate systemic improvements in the delivery of primary care among **fee–for–service (FFS)** physician groups (PIN website: http://www.gov.mb.ca/health/phc/pin/index.html).

Background

PIN evolved under the guidance of an advisory committee comprising representatives from the University of Manitoba, the Colleges of Registered Nurses and Physicians & Surgeons of Manitoba, the Manitoba Medical Association, the Winnipeg and Assiniboine Regional Health Authorities, and other primary care stakeholders.

The four key objectives of PIN are:

- to improve access to primary care
- to improve primary care providers' access to and use of information
- to improve the working life for all primary care providers
- to demonstrate high quality primary care with a specific focus on chronic disease management

Quality Based Incentive Funding (QBIF) is one mechanism of engaging physicians in PIN. It provides funding to clinics for meeting quality targets on selected clinical process indicators. PIN is using QBIF as part of a blended funding approach (fee–for–service combined with QBIF). The participating physicians continue to bill Manitoba Health for all services provided to their patients according to the same fee schedule used by other physicians and in the same way they did this prior to becoming part of PIN. The QBIF funding is provided to the clinic in addition to the usual physician funding mechanism. The clinic chooses how to use the QBIF funding to best serve its patients and meet the PIN objectives. For example, a clinic may hire non–medical staff to improve clinic access or other health professionals such as nurses or dietitians to provide patient care.

Another key component of the PIN funding is the change management funding which facilitates the extraction of data from the EMR. In order to measure the outcomes for the quality indicators, it was necessary to work with the EMR vendors to develop the capacity to extract the relevant data from the clinic EMRs. The time taken to implement this process varied for the two vendors and even between clinics and affected the data that were available for this study. A more detailed description of the PIN indicators is provided in the Evaluation Framework section of this report.

Phase 1 of PIN began in 2006 with a process of engaging physicians in the project. At the time of implementation in August 2007, there were four participating sites. One year after the initiation of the implementation phase these four clinics entered Phase 2. Phase 2 was launched in September of 2008 and includes an evolution of the implementation of the QBIF, as well as increasing the number of sites from the original four sites to thirteen sites.

1 Throughout this report, terms in **bold** typeface, and acronyms are defined in the glossary located at the end of the report.

In early June 2006, in response to a request for applications of interest from group practices interested in actively participating in the development and implementation of PIN, four practices joined Phase 1 of PIN: Agassiz Medical Centre in Morden, Dr. C.W. Wiebe Medical Centre in Winkler, and Assiniboine Clinic in Winnipeg as full participants and the Steinbach Family Medical Center as the control site. The Steinbach clinic was thus not eligible to receive the additional QBIF available to the other three clinics. Further details about each of these clinics are provided in Chapter 2. Additional clinics have since joined PIN as Phase 2 has been implemented.

Evaluation Framework

To evaluate the impact of the PIN initiative on patient care and physician satisfaction and to establish an ongoing evaluation process, an evaluation framework was developed. The evaluation framework is based on the above–mentioned objectives and comprises four components: 1) process measures (or indicators) from patient **electronic medical records (EMRs)**; 2) patient and provider surveys; 3) qualitative interviews with managers, providers, and patients; and 4) analysis of administrative data.

The indicators for the first component were derived from two sources. The main source is the Pan–Canadian Primary Health Care Indicator Development Project completed by the Canadian Institute for Health Information (CIHI) in March 2006 (Canadian Institute for Health Information, 2010). This project developed indicators to measure primary care reform as defined by the primary healthcare transition fund. The CIHI project identified over 150 indicators. Some were relevant for clinics and others relevant only at a regional or systemic level; therefore, only the former type was selected for PIN. These indicators were supplemented by indicators developed at the Manitoba Centre for Health Policy (MCHP) in previous research, including the report *Profiling Primary Care Practice in Manitoba* (Frohlich et al., 2006).

The indicators used in PIN can be categorized as follows:

- Health risk behaviors (e.g., tobacco use and physical inactivity) for all clinic patients
- **Preventive care** (e.g., fecal occult blood test and annual blood sugar) for all eligible clinic patients (generally age/gender–based)
- Acute and chronic disease management (**diabetes**, hypertension, coronary artery disease, **congestive heart failure**, **asthma**, and depression) for all eligible clinic patients

Some of the data needed to measure the indicators are available only through the clinics' electronic medical records, some are available only from the **administrative data** housed in the **Population Health Research Data Repository (Repository)** at MCHP, and others are found in both sources.

Qualitative interviews were also included in the broader evaluation plan. Since indicators are by definition quantitative and 'measurable', evaluations often include qualitative components, such as interviews to reflect aspects of a project that do not lend themselves well to linear measurements. This report reflects one component of the PIN evaluation: measuring and comparing indicators using data from the EMRs and the Repository. The methods section (Chapter 3) provides more details on these indicators and the data sources.

A fundamental step required for the evaluation was the need to define the PIN practice patients. This was done separately for the EMR and the administrative data sources.

a. EMR data—For each site, patients for whom a physician at that clinic was considered to be the most responsible provider were identified by the clinic based on the clinic EMR.

b. Administrative data—Algorithms that were previously developed at MCHP were used to allocate patients to physicians (and therefore to the clinic) based on which physician provided the majority of the patient's outpatient visits (Katz et al., 2004).

More details on the process and results of **patient allocation** are provided in Chapter 3.

Purpose of this Report

This report presents the lessons learned from the analyses comparing the EMR and administrative data sources. The two key research questions addressed in this study are:

1. *How comparable are the EMR and administrative data for data fields that are common to both data sources?*

   To answer this question we present age and sex distributions of the total clinic population as determined by the two data sources for each clinic.

2. *What indicators are feasible to track using administrative data?*

   The results for each of the indicators are presented for the patients included in the clinic EMR core patients and for patients with physician billings in the administrative data but who were not identified as core clinic patients in the EMR.

Additionally, this report demonstrates some of the challenges involved in measuring practice–level clinical performance and comparing performance across settings.

Chapter 2: PIN Clinic Profiles

The participating clinics vary across a range of characteristics including their community setting, relationship with local hospitals, clinic staff (physicians and others), governance structure, availability of walk–in services, and use of EMRs. To provide readers with an understanding of the different clinics, each clinic was asked to provide information about these characteristics. These profiles, as provided by the clinics, are presented in this chapter.

Both the specific type of EMR being used by the clinics and the way physicians at the clinics used the EMR has significant influence on the data available from the EMRs for use in analyses. For example, the data was required to be available in specific fields in the EMR in order for it to be extracted for use in analyses. There were differences in how physicians used the fields available to them as they charted clinical encounters with patients; there were also differences between EMR systems in how accessible these specific fields were to the physicians.

Agassiz Medical Centre
Morden, Manitoba

Location and community: Town of Morden (population: 7,500) with an additional outlying rural population.

Clinic staff: 18 physicians, a nursing dept, nurse practitioners, dietitian, clinic manager, and 25 support staff.

Hours of operation: Clinic: Mon–Fri: 9:00am–6:00pm
Walk–in: Mon–Thurs: 5:00pm–8:00pm

Data extract availability: April 2008

Detailed Profile

Clinic location and community: Located in Morden (population: 7,500) with an additional outlying rural population.

Association with hospital and other healthcare facilities: Most physicians have hospital privileges at Boundary Trails Health Centre, the hospital located between the communities of Morden and Winkler. Physicians cover many responsibilities at the hospital including ER, anesthesia, ambulatory care clinic, surgery, surgery assist, and obstetrics. They provide family practice, walk–in, and consults at the clinic, as well as, coverage for the personal care home.

Clinic staff: 18 physicians, a nursing department, nurse practitioners, a dietitian, a clinic manager, and 25 support staff.

Walk–in: available 5:00pm–8:00pm Monday–Thursday. Some physicians have walk–in spots available daily.

Governance structure: Community–owned and operated by a volunteer board of directors made up of community members as well as physician and clinic administrative representatives; the board meets monthly. All equipment located within the clinic is community–owned. The clinic manager has decision–making authority in specific areas and reports to the clinic shareholders, which consists of members of the Agassiz Medical Physicians Corporation. Shareholders meet once a month for decision making, policy and procedure creation and review, and financial review, decision making, and forecasting.

EMR and identifying core patients: Agassiz Medical has used CLINICARE™ since 1999. At the beginning of the PIN project, physicians were given lists of patients to review and the physicians determined which patients would be registered to each disease cluster. Presenting a challenge at the onset of the PIN project was the release of a management staff person with a lengthy vacancy of that position. In the initial stages of using CLINICARE™, they had not used the "usual doctor" field, which caused difficulties identifying their core patients for PIN. They also discovered that they had entered data into fields that were not extractable (required for PIN). Therefore, they had to move and re–enter a lot of data which made their extracts inaccurate as some data was not easily captured. The export feature did not work well and required a lot of extra staff time to work through the process of achieving a successful extract.

Assiniboine Medical Clinic
Winnipeg, Manitoba

Location and community: City of Winnipeg. Primarily serving St. James, Charleswood, Tuxedo, and River Heights areas.

Clinic staff: 17 family physicians, three general surgeons, two urologists, one internist, one gastroenterologist, and one neurologist. Other healthcare professionals are a dietitian, diabetes nurse educator, foot care nurse, mental health counselor, dentists, and a psychologist.

Hours of operation: Walk–in clinic**:** Mon–Thurs

Data extract availability: July 2008

Detailed Profile

Clinic location and community: Located in Winnipeg. It primarily serves the St. James, Charleswood, Tuxedo, and River Heights areas.

Association with hospital and other healthcare facilities: The clinic is adjacent to the Grace Hospital. A large number of family physicians assist in surgeries. The family physicians do not have admitting privileges at any Winnipeg Regional Health Authority facility. In addition to providing ambulatory care at Assiniboine, the family physicians provide care in a number of settings such as nursing homes, penal institutions, a menopause clinic, PRIME (high needs geriatric day hospital care), and private companies.

Clinic staff: The clinic currently has 17 family physicians, three general surgeons, two urologists, one internist, one gastroenterologist, and one neurologist. Other healthcare professionals delivering care at Assiniboine are a dietitian, a diabetes nurse educator, a foot care nurse, a mental health counselor, dentists, and a psychologist.

Walk–in: Six days of the week (not open on Fridays).

Governance structure: The physician group meets on a monthly basis. Three physicians elected by the physician group form a management committee. This committee meets on a weekly basis with the administrator of the clinic to deal with the day to day management of the clinic.

EMR and identifying core patients: Assiniboine has been using CLINICARE™ as its electronics medical records vendor since 2001.

For PIN, Assiniboine had to transition from an MS–DOS version of CLINICARE™ to a Windows version of CLINICARE™. Subsequent to this transition, Assiniboine developed flow sheets to capture the relevant information for the chronic diseases it had chosen to focus on.

These two transitions required a substantial amount of time from the administrator and network manager of the clinic. Physicians and staff had to be trained on the Windows version of CLINICARE™ and the flow sheets.

The core patients were identified by searching through billing **tariffs**. The billing tariffs were the only "smart fields" available when Assiniboine started its PIN journey. For example, if a physician had billed using a diabetes tariff, the patient was determined to have diabetes. These lists were compiled using CLINICARE™ and provided to the physicians. The physicians would then confirm whether this patient merited being identified as being both diabetic and a core patient.

Dr. C.W. Wiebe Clinic
Winkler, Manitoba

Location and community: Only medical clinic in the city of Winkler (pop. ~10,000). Serves a patient population of approximately 25,000.

Clinic staff: 23 family physicians, two orthopedic surgeons, one general surgeon, and one obstetrician/gynecologist. Other staff: full–time administrator and 45 support staff (approximately 30 full–time equivalent employees).

Hours of operation: Clinic: Mon–Fri: 8:00am–6:00pm
Urgent Care Centre (walk–in): Mon–Fri: 8:00am–8:00pm; Sat: 9:00am–1:00pm

Data extract availability: September 2007, December 2007, March 2008

Detailed Profile

Clinic location and community: Located in Winkler, a small city with an urban population of approximately 10,000 and serving a patient population of approximately 25,000. The community and area have been one of the fastest growing areas in the province for the past number of years. In large part, this had been fuelled by a significant influx of German/Russian immigrants and a significant number relocating to the area from Mexico, Paraguay, and Bolivia. The community is largely of Mennonite background. All physicians providing medical services in Winkler are part of this clinic.

Association with hospital: Nearly all physicians have hospital privileges at Boundary Trails Hospital and are involved in all aspects of hospital care including: emergency room (ER) coverage, surgical assisting in the operating room, anesthesia, obstetrics, and a variety of other hospital based care programs and services.

Clinic staff: Currently: 23 family physicians, two orthopedic surgeons, one general surgeon, and one obstetrician/gynecologist. Other staff includes a full–time administrator and 45 support staff (approximately 30 full–time equivalent employees).

Walk–in: An Urgent Care Centre for same–day visits sees approximately 25,000 visits per year. This facility is open from 8:00 am – 8:00 pm Monday – Friday, and 9:00 am – 1:00 pm on Saturdays. Most physicians provide service on a rotation basis.

Governance structure: The clinic is supported by a non–profit community organization called the Winkler and District Health Care Board. This board provides the facility and all equipment to the Clinic on a rental agreement basis. Nearly all physicians are shareholders and directors on an equal basis in the corporation. Shareholder/director meetings are held monthly to address both business operation and medical service agendas. Directors are also involved in working committees that meet regularly to report and make recommendations to the group. These include committees such as recruitment, finance, clinic standards, information technology, facility development, and others.

The Winkler and District Health Care board also meets on a monthly basis; the clinic corporation has two representatives on this board (one physician and the administrator).

EMR: The Dr C. W. Wiebe clinic has used the JonokeMed™ electronic medical record since 1999. All patients are encouraged to attend their **family physician** for their regular care; they may only book appointments with this physician. Every patient's record lists their family physician. Any patient may attend the walk–in clinic.

Core patients for this project were defined as those who had a family physician from this clinic listed as their family physician and who had been seen in the 18 months prior to the start of PIN. The clinic continued to include new core patients as they were added to a physician's practice.

Steinbach Family Medical Center
Steinbach, MB

Location and community: City of Steinbach. Serves approximately 65,000 people.

Clinic staff: 28 full–time and part–time staff including administrative staff, billing personnel, nurses, receptionists, and physician assistants. Also, 16 family physicians and two general surgeons.

Hours of operation: Walk–in: Mon–Thurs: 1:30–8:00pm; Fri: 1:30–4:00pm; Sat: 8:30am–1:00pm

Data extract availability: September 2007, December 2007, March 2008

Detailed Profile

Clinic location and community: Situated in the city of Steinbach within the South Eastman Regional Health Authority (RHA). Steinbach has a population of 11,066 (2006 census; 19% growth over the five–year census period (i.e., 2001–2006) and is surrounded by the Hanover municipality with a further population of 11,871. The South Eastman RHA provides services to approximately 65,000 Manitobans.

Association with hospital and other healthcare facilities: Physicians at Steinbach Family are involved in a variety of other medical areas including admitting and attending patients at the Bethesda Hospital in Steinbach, working in the emergency department, obstetrics, assisting in surgery, performing anesthesia, attending four personal care homes in the region, and doing administrative work (e.g., VP –Medical Services for the RHA, Chief of Staff and Executive of the hospital, other RHA committees, and Palliative Care Medical Director). They are also involved in the Family Medicine Residency training program and the teaching of Med IV students. Steinbach Family participated in the Manitoba Health sponsored Advanced Access program run by Mark Murray and Associates in 2008. Steinbach Family's physician group meets monthly to communicate on common clinic issues.

Clinic staff: Steinbach Family employs 28 full–time and part–time staff including administrative staff, billing personnel, nurses, receptionists, and physician assistants.

There are 16 family physicians and two general surgeons. During the study period, five physicians left Steinbach Family to practice in various other locations. At the end of 2008, one new physician joined Steinbach Family; at the beginning of 2009 a further three physicians joined the clinic, which was followed by the last one joining as a part–time physician in July 2009. The loss of four physicians in 2008 affected over 25% of the patients and, consequently, data extracts.

Walk–in: same day service; open 1:30 pm–8:00 pm Monday to Thursday, 1:30 pm–4:00 pm Friday and 8:30 am–1:00 pm on Saturday. Physicians of Steinbach Family rotate staffing of this clinic.

Governance structure: The Steinbach Family physician group meets monthly to communicate on common clinic issues.

EMR and identifying core patients: Steinbach Family has used the JonokeMed™ electronic medical record since 1999. All patients are encouraged to attend their family physician for their regular care and each patient has a family physician listed in their chart demographics and can only book appointments with their own physician. Any patient may attend the walk–in clinic. Approximately 20,000 patients have physicians at Steinbach Family listed as their family physician (the number has varied with the variation in physician number) for the sake of the PIN data, patients whose physicians left the clinic were not removed from the 2009 clinic data.

Core patients for this project were defined as those who had a Steinbach Family physician listed as their family physician and who had been seen in the previous 18 months from the start of PIN. The clinic continued to include new core patients as they were added to a physician's practice.

In 2008, Steinbach Family participated as a "control site" clinic in PIN, which involved working with the EMR vendor to: establish core patients within the clinic, set up indicator workflows within the EMR for data extraction, prepare data extracts, be involved with PIN committees and PIN days, and educate physicians and staff within the clinic regarding PIN objectives and goals. Steinbach Family has also had ongoing discussions with its RHA regarding its PIN involvement. As a control site, Steinbach Family was not funded to meet any indicator targets.

Because of prior work in defining core patients, Steinbach Family had a well–established core patient group at the start of PIN. Challenges in 2008 revolved around shifting indicator definitions, education of physicians and staff regarding EMR workflows and PIN indicators, and the establishment of meaningful and physician–individualized data extracts. All of these tasks were "works in progress" during 2008. This led to some data fluctuations that were either a reflection of changed workflow processes within the EMR or changed physician practice.

Chapter 3: Methods

Data Sources and Data Period

This study used data from the EMRs at each of the participating clinics along with files from the Repository housed at MCHP. The Repository is a comprehensive set of databases that contains records for all Manitobans' contacts with physicians, hospitals, home care, personal care homes and pharmaceutical prescriptions dispensed in retail pharmacies. The Repository records are anonymous; prior to data transfer, Manitoba Health processes the records to encrypt all personal identifiers and remove all names and addresses. In this study, we used **physician claims**, **hospital discharge abstracts**, **Manitoba Immunization Monitoring System** records, and pharmaceutical claims (from the **Drug Programs Information Network (DPIN))**.

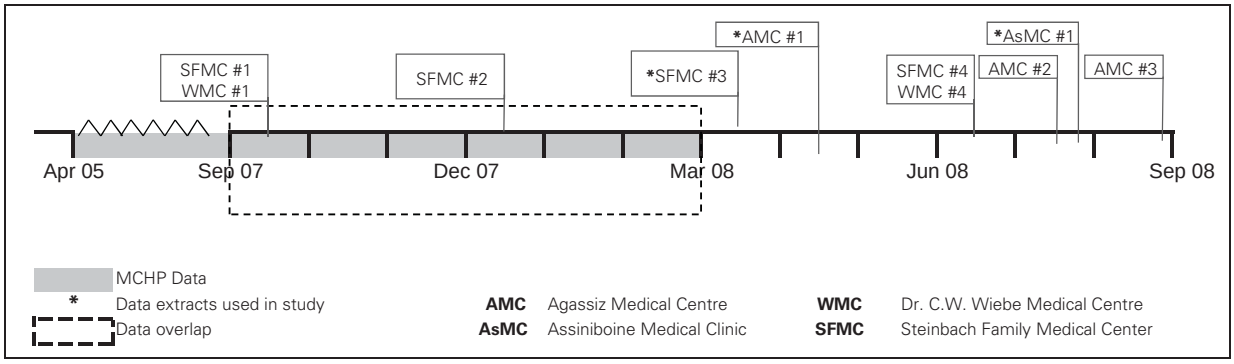
Information technology development was a critical component of PIN. The four participating clinics use one of two proprietary EMR systems. In order to be able to report on the indicators identified for the Quality Based Incentive Funding (QBIF), one of the key components of PIN, the EMR vendors worked with the clinics' leadership to ensure that the appropriate fields were available in the medical record in a user–friendly format and that the data could be extracted for the quarterly reports. As a result of the unique circumstances of each of the clinics (described in Chapter 2), the data extracts varied in quality and content.

Furthermore, early on in the PIN initiative, it was realized that the changes in the data extracts do not necessarily reflect changes in clinical practice, but more often result from changes in how the data were entered into the electronic chart. As clinicians became more aware of the need to enter the information in specific fields in order for it to be reported as part of the data extract, information reflecting care provided was more likely to be included. It was thus clear that the "baseline" data (the first data extract) was not a valid indication of clinical practice prior to PIN, but a combination of the clinical and charting practices at the time. As the information required to report on the indicators was more consistently recorded in the appropriate EMR fields, the data quality improved.

The analyses in this study were conducted with the EMR data extracts indicated in the timeline (Figure 3.1). We also used the most recent administrative data available: 2005/06–2007/08. These data only partially overlap with the data extract from the EMRs because the Repository's administrative data files are updated annually after the end of the **fiscal year**. In fact there is no overlap between the MCHP data and the data extract periods for the Assiniboine and Agassiz clinics because technical problems prevented them from providing a data extract prior to March 31, 2008.

All data management, programming, and analyses were performed using SAS® statistical analysis software, version 9.1.3 and 9.2.

Figure 3.1: PIN Data Extractions Timeline



Source: Manitoba Centre for Health Policy, 2010

Data Linkage

The data from the EMRs were linked to the Repository data using processes that are well established at MCHP. The EMR data files were first sent to the Health Information Management division at Manitoba Health. Data quality was assessed and the Personal Health Information Numbers (PHIN) of the patients included in the data extract files were "scrambled" using the same approach used with the administrative data. These scrambled PHINs made it possible to link the EMR files with the Repository files.

Exclusions

The first step in preparing the data for analysis was to determine which records from the Repository would be included. Every patient included could have any number of encounters with the system; each one generates a separate record. Thus, we started with the EMR extracts as the basis for the analyses. Some records from the EMR were excluded because they did not occur during the overlap period between the PIN EMR data extraction period and the 2007/08 administrative data (the most recent available), while other records had no valid PHIN. Table 3.1 provides details of the exclusions prior to the initiation of the analyses. There is a clear difference in the percentage of records eliminated between the two different EMR systems. This is due to the later implementation in the clinics using CLINICARE™.

Table 3.1: Final Study Cohort Development

	Agassiz Medical Centre	Assiniboine Medical Clinic	Dr. C.W. Wiebe Medical Centre	Steinbach Family Medical Center	Total
Number of EMR records received	**59,762**	**66,500**	**76,738**	**103,031**	**306,031**
	(33,570 patients)	(13,229 patients)	(22,010 patients)	(17,536 patients)	**(86,345 patients)**
Number of EMR records deleted *due to:*					
Invalid or missing PHIN	865	742	27	123	**1,757**
No records in medical file in study period	503	229	454	307	**1,493**
Dated prior to 2005/06	0	0	51	118	**169**
Dated after 2007/08	25,155	39,879	16,565	20,662	**102,261**
No date recorded	29	–	18	10	**57**
Incomplete or missing data	295 (109 patients)	223 (130 patients)	636 (187 patients)	713 (199 patients)	**1,867 (625 patients)**
***Number of records for analysis (% of EMR records received)**	**27,607 (46%)**	**25,322 (38%)**	**59,599 (78%)**	**80,837 (78%)**	**193,365 (63%)**
***Number of patients for analysis (% of patients with EMR records received)**	**9,207 (70%)**	**15,300 (46%)**	**15,272 (87%)**	**20,808 (95%)**	**60,587 (70%)**

Source: Manitoba Centre for Health Policy, 2010

* Note: The numbers of records and patients do not reflect a simple arithmatic sum of the numbers above

As indicated in Table 3.2, a number of patients had visited more than one of the participating clinics during the study period and their data was present in the EMR abstract from more than one clinic. We allocated these patients to a clinic based on MCHP's **plurality approach to allocation** (described in the next section) except in cases where the patient's most recent visits were consistently to one clinic indicating that they had switched to this clinic for their ongoing care.

Table 3.2: Patients Attending Multiple Clinics

Number of Patients	Agassiz Medical Centre	Assiniboine Medical Clinic	Dr. C.W. Wiebe Medical Centre	Steinbach Family Medical Center	
33,483	x				
11,514		x			
21,832			x		
15,861				x	
31	x	x			
36	x		x		
16	x			x	
79		x	x		
1,595		x		x	
55			x	x	
s	x	x	x		
s	x	x		x	
s		x	x	x	
s	x	x	x	x	
Attended only that clinic	33,483	11,514	21,832	15,861	
Attended multiple clinics	87	1,715	178	1,675	
Total Patients	**33,570**	**13,229**	**22,010**	**17,536**	**86,345**

s - suppressed due to numbers less than 10

Source: Manitoba Centre for Health Policy, 2010

Patient Allocation

The analyses for this deliverable, while focusing on patients who have been identified as "core" patients by the clinics, includes comparisons to others who may have attended the clinics, and to other Manitoba residents, for illustrative purposes. In an environment where patients are free to receive care at a clinic of their choice and where there is no formal identification of who the core clinic patients are, there is a lack of clarity as to the appropriate classification of patients for the analyses. The presence of a chart at a clinic is not enough to indicate that someone is a clinic patient because visits to a walk–in service at the clinic and receiving delivery of hospital–based care by a physician from that clinic both result in the presence of a chart in the clinic's EMR. It would also not be appropriate to include patients who were last seen at the clinic some years prior. The EMR data we received for this study included only patients for whom the physicians at the clinics have identified themselves as the primary care physician most responsible for the patient's care (referred to as EMR core patients).

Although the final definition of core patients for PIN at the clinic level is still being determined, a process was agreed upon for the Phase 1 analyses. Clinics identified the patients they considered to be core patients based on their own criteria. For some clinics, this was a matter of confirming an already present and frequently updated field in the EMR; while for others, a review of individual charts was necessary.

We used the plurality approach to patient allocation for patients who visited more than one of the participating clinics during the study period and based it on the patients' receipt of services from any of the physicians working at the clinic. We used the following algorithm that was developed and validated in previous research at MCHP (Katz et al., 2004): patients were allocated to the most responsible physician (i.e., the one who provided the majority of the patient's care) over a three–year period (2005/06–2007/08). We only considered ambulatory care visits for primary care physicians. Where there was a tie between different physicians, the one with the services amounting to greater fee value was determined to be the most responsible.

Using the different methods of within–clinic patient allocation for the two data sources likely resulted in some discrepancies in those identified by MCHP versus the clinics. However, this was somewhat offset by a potential to identify patterns where patients may have been systematically excluded by a clinic due to patient characteristics such as age. The time lag between the Repository and EMR data mentioned earlier likely also resulted in some differences in the rosters of core patients. Thus, we have patients falling into different categories as presented in Table 3.3.

Table 3.3: Patient Allocation

	EMR Total	MCHP Total	MCHP & EMR Core Overlap	MCHP Core only	EMR Core only
Agassiz	9,207	10,486	6,513	3,973	2,694
Assiniboine	15,300	29,298	11,109	18,189	4,191
Dr. C.W. Wiebe	15,272	20,835	14,529	6,306	743
Steinbach Family	20,808	28,487	19,464	9,023	1,344

Source: Manitoba Centre for Health Policy, 2010

There are clear differences in the distribution of patients at the Assiniboine clinic compared to the other three clinics. The percentage of patients who were allocated to the Assiniboine clinic according to the MCHP algorithm (but who were not included in the EMR extract) is twice as high as for the other clinics. In addition, the percentage of core patients identified by both the algorithm and in the EMR is considerably lower than that of the other clinics. The chief reason for these differences is likely due to the fact that the Assiniboine clinic had considerable practical difficulties in performing their EMR extracts; therefore, their first data extract was used in the study rather than the third or fourth extract as was the case for the other clinics. As the data from each EMR extract became available, the clinics responded to the analyses by refining and improving their patient identification and indicator outcome documentation. Thus, the results for the indicator for the Assiniboine clinic need to be interpreted with caution. It should also be noted that the Assiniboine clinic is an urban clinic while the other three PIN sites are rural. Differences that may exist in clinical practice due to the rural/urban setting may contribute to difficulties in making comparisons. Also, as noted in Chapter 2, this clinic had different EMR usage patterns before PIN and possibly even after the project's initiation.

Compared to the other clinics, the Agassiz Medical Centre had a higher percentage of patients identified in the EMR who had no ambulatory visits recorded in the Repository. These patients likely received services at the local hospital (e.g., via the emergency or outpatient departments) but were not actually seen at the clinic. For these patients, charts were established in the clinic EMR for billing purposes.

Virtual Practices

As established in previous MCHP work, there is value in determining the expected rates of services for a given patient group (e.g., a physician practice) based on their personal and demographic characteristics and comparing them to the actual rates (Frohlich et al., 2006). In the present study, we did this for the patients from each clinic's extract by creating comparable fictitious (or 'virtual') practices. These virtual practices established norms for a group of patients who were identical to those in each practice of interest in terms of age, sex, urban/rural status, and socioeconomic status. By randomly matching patients from each clinic with people in the same demographic category but who were not part of the participating clinics, we created four virtual practices of patients who received their care from a variety of different physicians. We used the care received by this virtual practice to calculate "expected" rates for the practice of interest. This group served as a comparison group for the PIN sites.

Measuring the Indicators

For this report, 15 indicators of preventive care and chronic disease management were analyzed. Table 3.4 presents the definitions used in this study. They are also provided in Chapter 4 (Results) at the beginning of each indicator. All indicators could only be measured using the Repository data. Since each individual clinic focused only on a small group of indicators for Phase 1 of PIN, the majority of indicators were not available from all clinics.

The patients included in these analyses were identified from the EMRs and the Repository data. Patient identification using the Repository was based on physician billings; each billing claim includes a code that is associated with the physician's clinic. Patients with codes associated with each of the participating clinics during the study period were then compared to those identified in the EMR extracts (i.e., the EMR core patients). This resulted in three patient groupings for each clinic: 1) *EMR* (those identified in the EMR extract and from the Repository); 2) *MCHP Only* (those found in the Repository, but were not in the EMR extract); and 3) *Clinic Total* (combination of the two previous groups). Specific codes used in defining indicators can be found in Appendix Table A.1.1.

Statistical Analyses

While the results in Chapter 4 are presented for all four clinics, this study is focused on within–clinic results. Comparing the data from the Repository to each clinic's data provides an opportunity to explore the impact of patient allocation on the outcomes. The virtual practices provide an additional comparison with the real clinic patient outcome rates.

We used a **negative binomial regression** to make three sets of comparisons. First, we compared the rate calculated for the virtual practice (called *Expected* in the indicator graphs) to the average rate for all Manitoba residents (*Manitoba* in the graphs). We also compared each of the three clinic populations (EMR, MCHP Only, and Clinic Total) to the Expected rate. Finally, we compared EMR to the MCHP Only population. We used age– and sex–adjusted rates for all comparisons.

Table 3.4: Indicators of Quality Primary Care

Indicator	Definition
Preventive Care	
1. Cervical cancer screening	**Eligibility**: Women aged 16-60 who have not had a hysterectomy. **Outcome**: A least one pap test during the study period.
2. Childhood immunizations	**Eligibility**: Children who turned two during the study period. **Outcome**: Received their complete primary course of immunization by aged 24 months. See the immunization schedule in the Appendix.
3. Influenza vaccination for adults aged 65 and older	**Eligibility**: Adults aged 65 or older. **Outcome**: At least one influenza vaccination during the study period.
4. Breast cancer screening	**Eligibility**: Female patients aged 50-69 **Outcome**: At least one mammogram during the study period
Acute and Chronic Disease Management	
5. Antibiotic prescription management	**Eligibility**: All patients with at least one visit during the study period. **Outcome**: At least one antibiotic prescription at a Manitoba retail pharmacy during the study period.
6. Antidepressant follow-up	**Eligibility**: Newly diagnosed during the study period (no diagnosis in the year prior to the start of the study period) and who filled a new prescription for an antidepressant within two weeks of the diagnosis. **Outcome:** Three subsequent ambulatory visits within four months of the prescription being filled (any diagnosis, any physician).
7. Asthma care	**Eligibility**: Patients with a diagnosis of asthma in either one or more hospital separations or in two or more medical claims, **OR** two or more prescriptions for asthma drugs during the study period. **Outcome**: Patients who received three or more prescriptions for bronchodilators (reliever drug) in a year who also received at least one prescription for a inhaled corticosteroid or leukotriene antagonist (preventer drug).
8. Benzodiazepine prescribing for community-dwelling adults aged 75 and older	**Eligibility**: Community-dwelling patients aged 75 and older. **Outcome**: Filled prescriptions for greater than a 30-day supply of one benzodiazepine **OR** a prescription for more than two different benzodiazepines.
9. Congestive heart failure (CHF): treatment with an Angiotensin Converting Enzyme Inhibitor (ACEI) or an Angiotensin II Receptor Blockers (ARB)	**Eligibility**: At least one diagnosis for CHF in either a hospital discharge abstract or a physician billing claim during the study period. **Outcome (New use)**: Newly diagnosed patients (i.e. no diagnosis of CHF in the year prior to the study period) who filled a prescription for either an ACEI or an ARB within three months of the diagnosis. **Outcome (Persistent use):** Filled prescription for a drug supply for 80% of the study period.
10. Diabetes care	**Eligibility**: Patients aged 20-79, with one or more hospital visits **OR** two or more physician claims **OR** one or more prescriptions for treatment of diabetes during the study period. **Outcome**: At least one visit to either an optometrist or ophthalmologist in the study period.
11. Post-myocardial infarction care: beta-blocker prescribing	**Eligibility**: Patients discharged alive from hospital after a myocardial infarction during the study period or the three years before the study period; excludes those with a diagnosis of either chronic obstructive pulmonary disease, asthma, or peripheral vascular disease. **Outcome (New use)**: One prescription filled within four months of hospital discharge. **Outcome (Persistent use):** Prescriptions filled for a minimum of 80% of the days between the hospital discharge and the end of the study period.
12. Post-myocardial infarction care: cholesterol lowering drug prescribing	**Eligibility**: Patients discharged alive from hospital after a myocardial infarction in the three years preceding the start of the study period. **Outcome (New use)**: One prescription filled within four months of hospital discharge. **Outcome (Persistent use):** Prescriptions filled for a minimum of 80% of the days between the hospital discharge and the end of the study period.

Source: Manitoba Centre for Health Policy, 2010

Chapter 4: Results

Comparison of Patient Age and Sex Characteristics between Data Sources

To answer Research Question 1 *"How comparable are the EMR and administrative data for data fields that are common to both data sources*?" we divided each clinic's patients identified by physician billings in the Repository, into two groups:

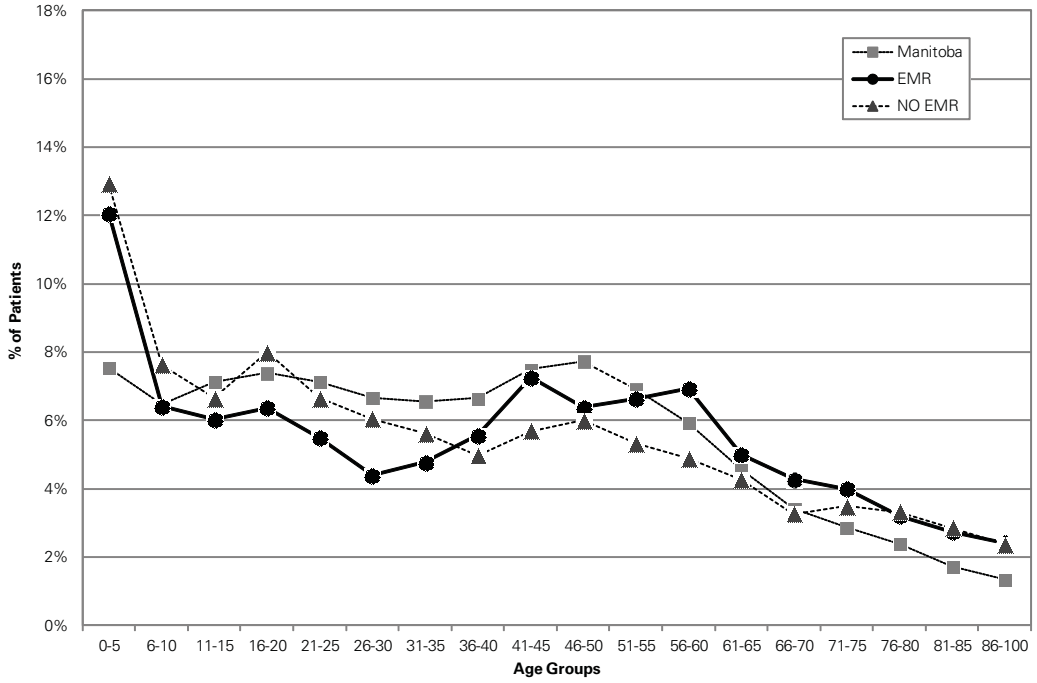
- EMR – those who were also identified in the EMR extract as core patients
- No EMR – those who were not part of the EMR extract

The mean ages of the patients in the Repository, but not in the EMR, are consistently older for the Assiniboine and Dr. C.W. Wiebe clinics but not the other two clinics. The age–sex distributions for each clinic are presented in Figures 4.1–4.8.

Some clear patterns emerge. Children (under 15 years of age) represent a considerably smaller percentage of patients at the Assiniboine clinic than they do in the other clinics or in the Manitoba population overall. In contrast, the percentage of patients who are less than five years old is much higher for the Dr. C.W. Wiebe clinic than for the provincial average or at the other three clinics. Many of these young patients were never seen for ambulatory visits in clinic; they were probably visited in hospital.

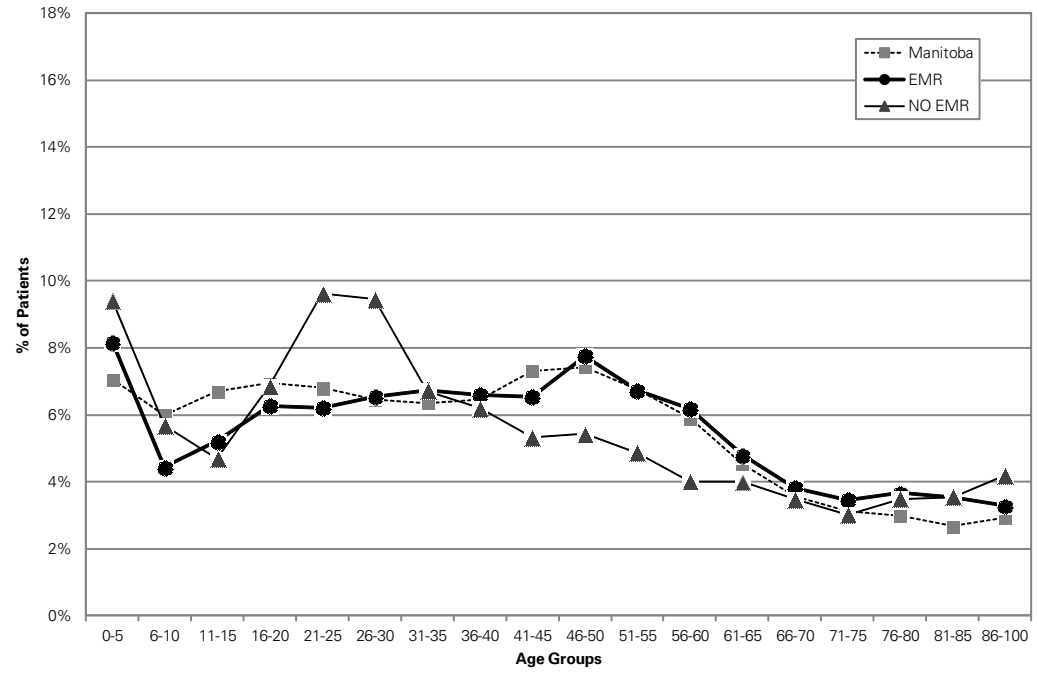
The Assiniboine clinic does appear to provide care to a higher than expected percentage of older patients even though many of these were not included in the EMR extract.

Figure 4.1: Agassiz Medical Centre—Distribution by Age for Males: 2005/06–2007/08



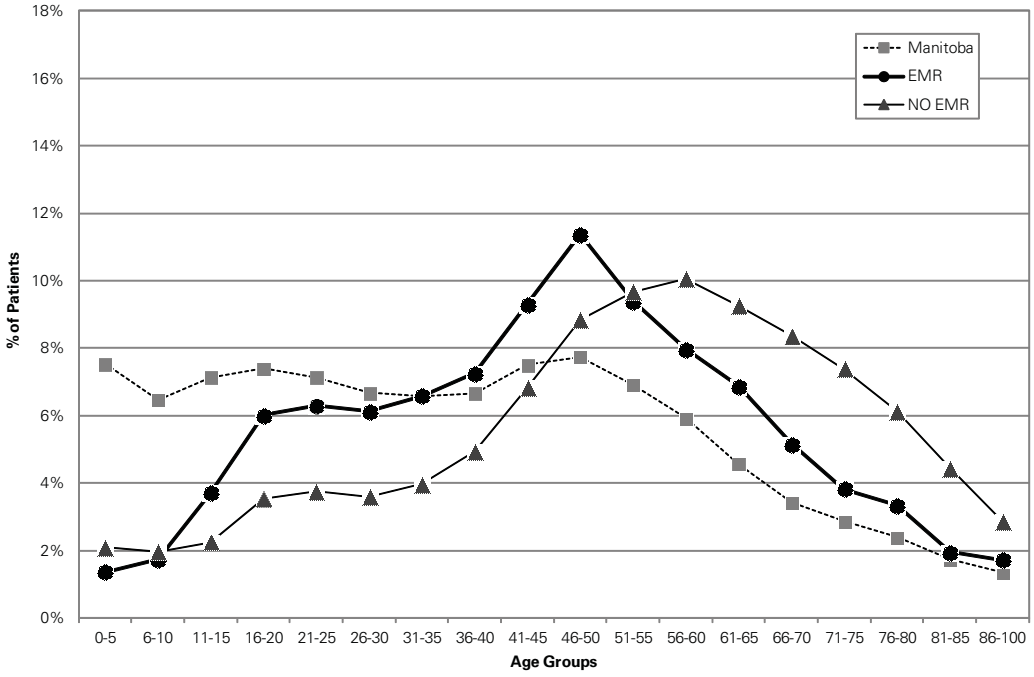
Source: Manitoba Centre for Health Policy, 2010

Figure 4.2: Agassiz Medical Centre—Distribution by Age for Females: 2005/06–2007/08



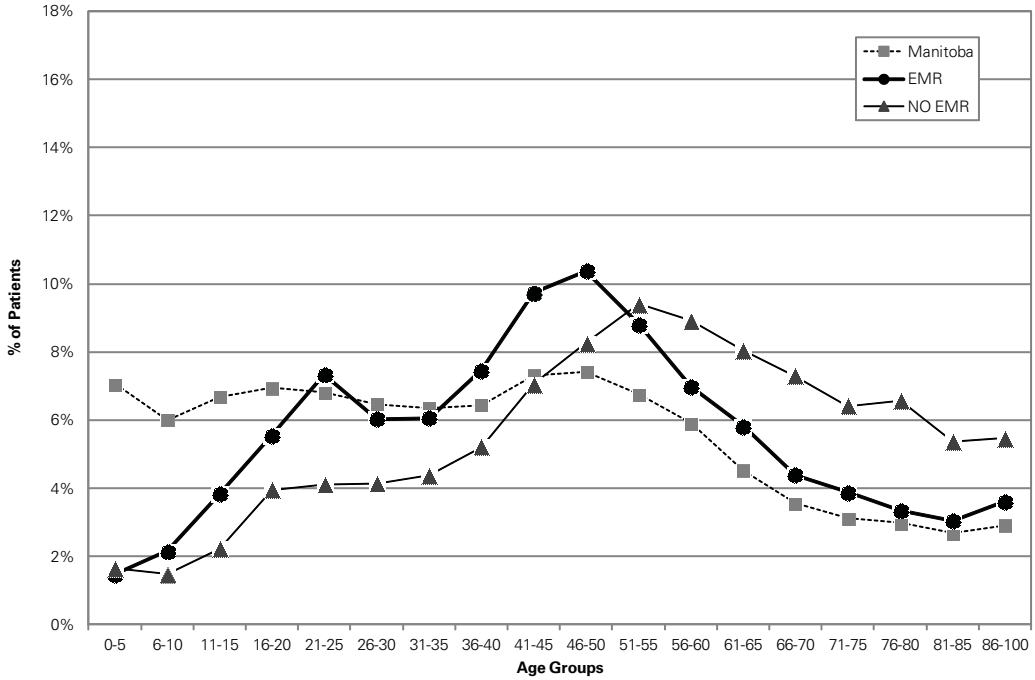
Source: Manitoba Centre for Health Policy, 2010

Figure 4.3: Assiniboine Medical Clinic—Distribution by Age for Males: 2005/06–2007/08



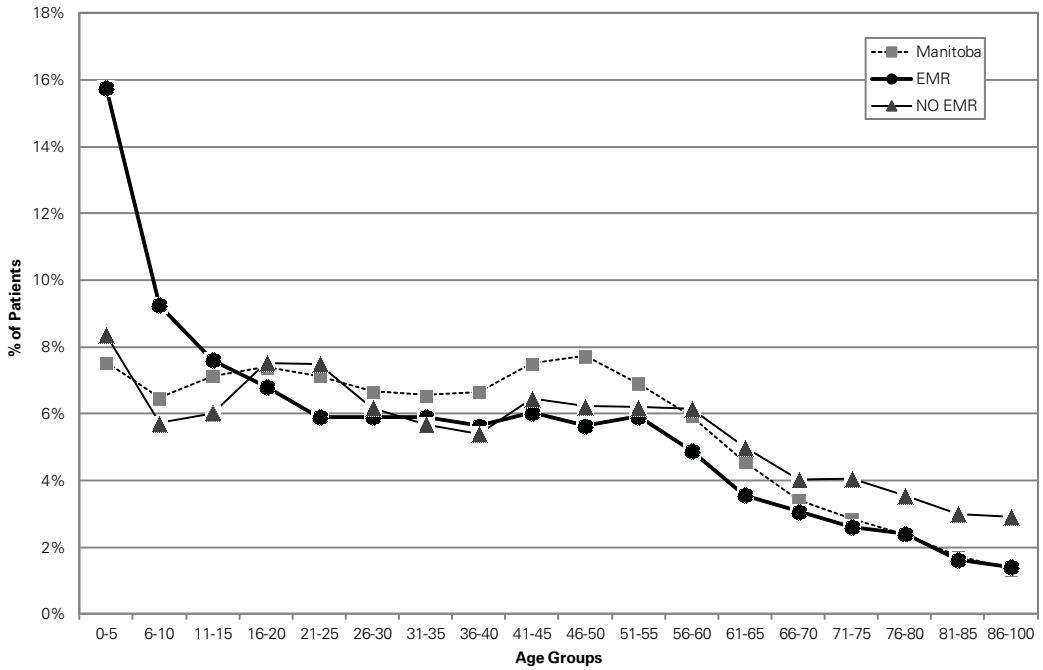
Source: Manitoba Centre for Health Policy, 2010

Figure 4.4: Assiniboine Medical Clinic—Distribution by Age for Females: 2005/06–2007/08



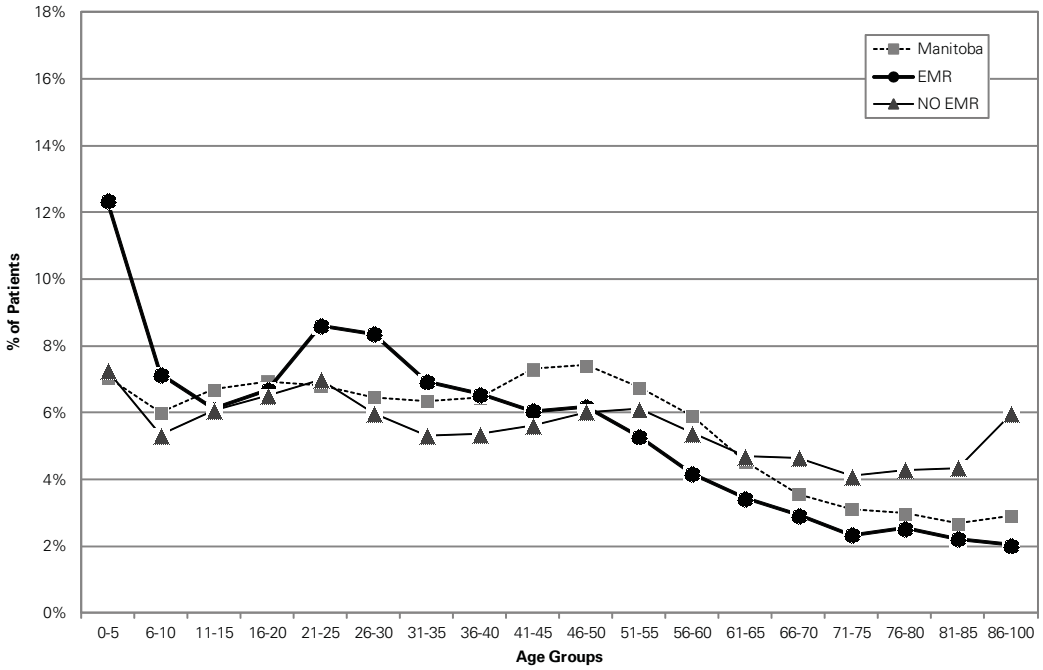
Source: Manitoba Centre for Health Policy, 2010

Figure 4.5: Dr. C.W. Wiebe Medical Centre—Distribution by Age for Males: 2005/06–2007/08



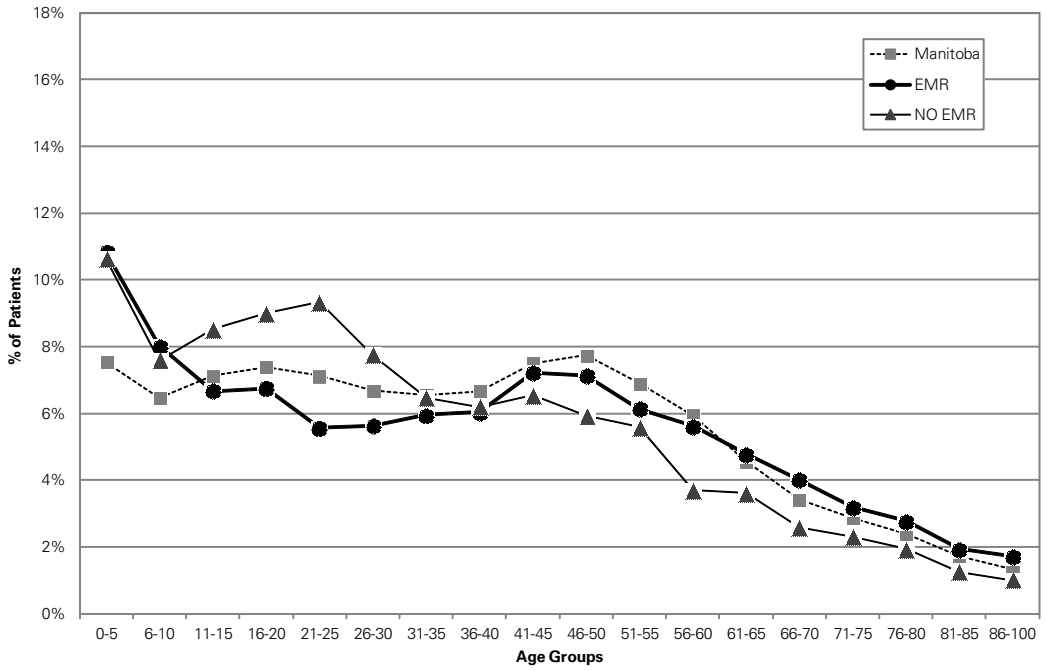
Source: Manitoba Centre for Health Policy, 2010

Figure 4.6: Dr. C.W. Wiebe Medical Centre—Distribution by Age for Females: 2005/06–2007/08



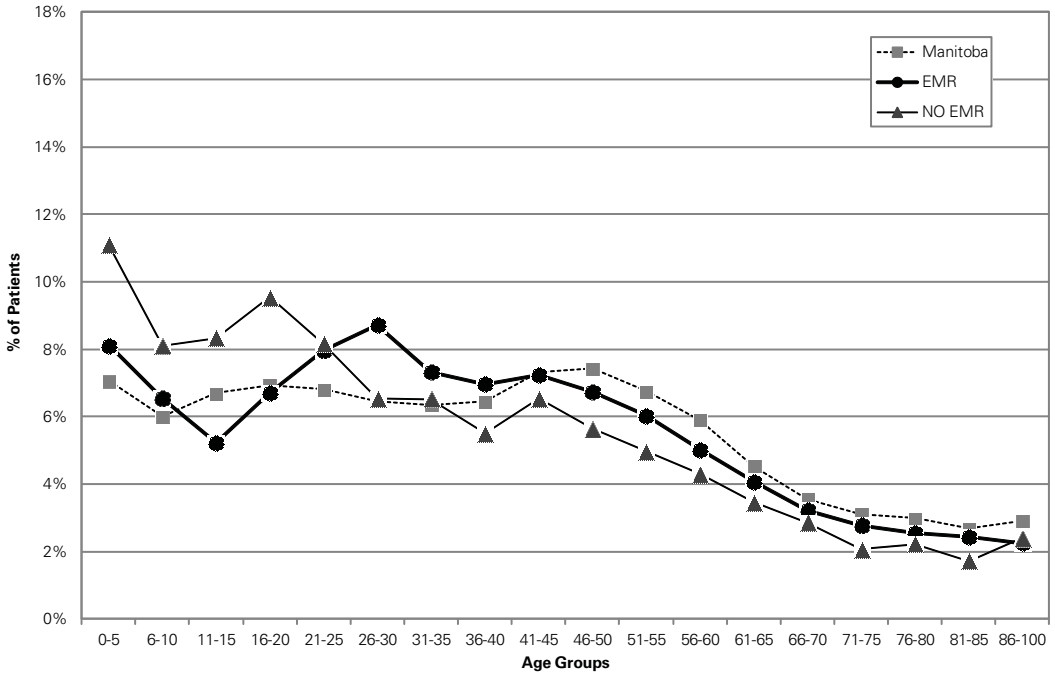
Source: Manitoba Centre for Health Policy, 2010

Figure 4.7: Steinbach Family Medical Center—Distribution by Age for Males: 2005/06–2007/08



Source: Manitoba Centre for Health Policy, 2010

Figure 4.8: Steinbach Family Medical Center—Distribution by Age for Females: 2005/06–2007/08



Source: Manitoba Centre for Health Policy, 2010

How the Indicator Results are Presented

The remainder of this chapter presents the results of the analyses for Research Question 2—"*What indicators are feasible to track using administrative data?*"—by indicator. For each one, the following is presented:

- **Definition of the indicator**. This is a short description of how the indicator was measured using the Repository data. The Acute and Chronic Disease Management indicators (except Antibiotic Prescribing) have separate definitions for the eligibility criteria and the outcome.
- **Eligible population**. This is either based on patient age and/or sex (e.g., **childhood immunizations**) or on having a particular condition (e.g., congestive heart failure). It is presented in table format for the Preventive Care indicators. Each Acute and Chronic Disease Management indicator includes a table and a graph of the condition's prevalence.
- **Outcome rates** (graph) and corresponding counts (table).

In the prevalence and outcome graphs, four bars are presented for each clinic:

1. the expected rate for that clinic—the rate calculated for the randomly selected virtual practices (Expected)
2. the patients found in the MCHP Repository with billings from that clinic and also found in the EMR (EMR)
3. clinic patients identified by the MCHP algorithm but not found in the EMR (MCHP Only)
4. all patients who attended the clinic over a three–year period using the MCHP data (i.e., the combination of 2 and 3 above) (Clinic Total)

In the prevalence and outcome graphs, bars are presented for each of the patient groupings and for the Expected rate as described in Chapter 3: Measuring the Indicators. The horizontal line represents the Manitoba average rate.

Our primary interest in interpreting these results is not the comparison between the clinics, but rather the *within–clinic comparison* between the Expected rate for that clinic and the different clinic populations (EMR and MCHP Only).

Preventive Care

Cervical Cancer Screening

*Definition: Female patients aged 16–60 who have not had a hysterectomy and who have had at least one **Papanicolaou ("Pap") test** during the study period.*

Table 4.1: Female Patients Aged 16–60

	Clinic Total	EMR	MCHP Only
Agassiz	6,685	3,020	3,665
Assiniboine	14,490	5,047	9,443
Dr. C.W. Wiebe	10,037	4,700	5,337
Steinbach	11,906	7,074	4,832
Manitoba: 366,682			

Source: Manitoba Centre for Health Policy, 2010

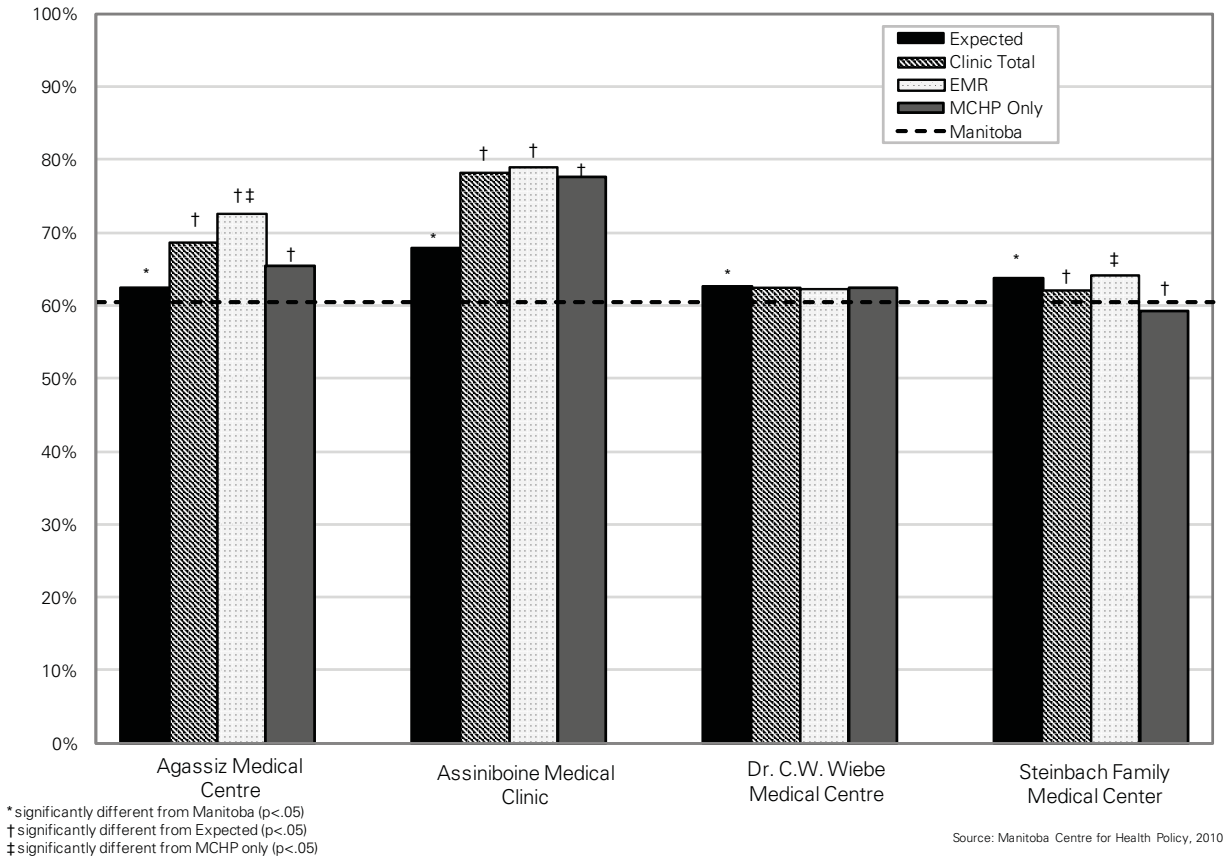
Table 4.2: Female Patients Aged 16–60 Screened for Cervical Cancer

	Clinic Total	EMR	MCHP Only
Agassiz	4,607	2,197	2,410
Assiniboine	11,321	4,007	7,314
Dr. C.W. Wiebe	6,265	2,939	3,326
Steinbach	7,383	4,553	2,830
Manitoba: 221,799			

Source: Manitoba Centre for Health Policy, 2010

The rates for the Assiniboine and Agassiz clinics (see Figure 4.9 and corresponding Table 4.2) of patient counts are significantly higher than the Expected rate and the provincial rate. Agassiz clinic's patients in the EMR have higher rates than those not allocated to a clinic physician in the EMR (MCHP Only). Thus, the Agassiz clinic patients who have a relationship with a clinic physician are receiving Pap tests more often than those without a relationship. All the rates for the Dr. C.W. Wiebe Clinic are similar to the Expected rates.

Figure 4.9: Female Patients Aged 16–60 Screened for Cervical Cancer: 2005/06–2007/08
Age-adjusted



*significantly different from Manitoba (p<.05)
†significantly different from Expected (p<.05)
‡significantly different from MCHP only (p<.05)

Source: Manitoba Centre for Health Policy, 2010

Childhood Immunizations

Definition: Children who turned two during the study period and received their complete primary course of immunization by age 24 months.

The immunization schedule used in this study can be found in Appendix (Table A1.1).

Table 4.3: Children Who Turned Two Years in the Study Period

	Clinic Total	EMR	MCHP Only
Agassiz	1,062	363	699
Assiniboine	467	125	342
Dr. C.W. Wiebe	1,788	1,038	750
Steinbach	1,992	1,054	938
Manitoba: 42,758			

Source: Manitoba Centre for Health Policy, 2010

Table 4.4: Two–Year–Olds with Complete Immunizations

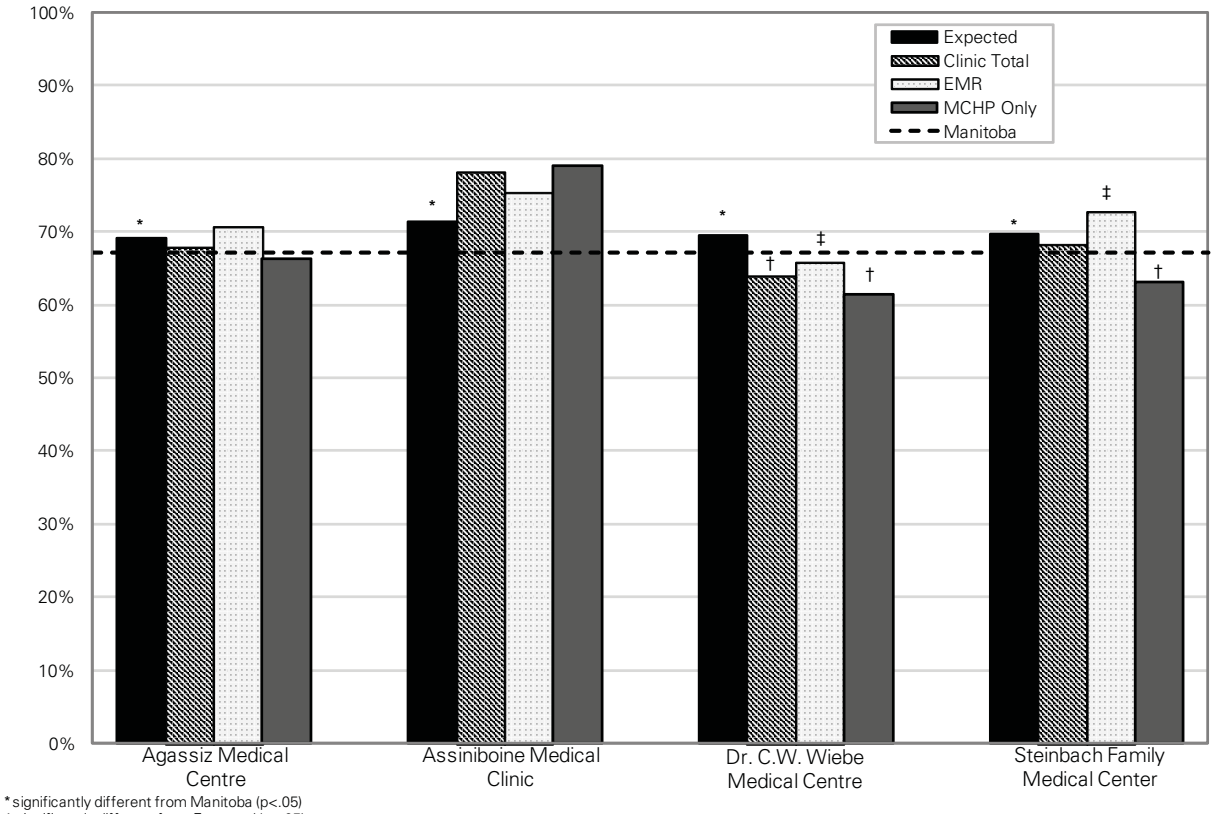
	Clinic Total	EMR	MCHP Only
Agassiz	719	256	463
Assiniboine	364	94	270
Dr. C.W. Wiebe	1,142	681	461
Steinbach	1,356	765	591
Manitoba: 28,669			

Source: Manitoba Centre for Health Policy, 2010

Even though the rates at the Assiniboine clinic appear to be higher than Expected (Figure 4.10), these differences are not statistically significant due to the small numbers of patients included in these analyses. The Expected rates at all four clinics are, however, higher than the provincial rate. Though the rates for Agassiz and Steinbach are very similar to their Expected rates, the rates for the Dr. C.W. Wiebe clinic (except for the EMR patients) are significantly lower than Expected. The rate for EMR children is higher than the MCHP Only rate at both C.W. Wiebe and Steinbach.

Note: Childhood immunizations are generally provided by physicians in Winnipeg while in rural areas both public health nurses and family physicians provide this service; both are included in the analyses.

Figure 4.10: Two–Year–Olds with Complete Immunizations: 2005/06–2007/08
Age– and sex–adjusted



* significantly different from Manitoba (p<.05)
† significantly different from Expected (p<.05)
‡ significantly different from MCHP only (p<.05)

Source: Manitoba Centre for Health Policy, 2010

Influenza Vaccination (flu shots) for Patients Aged 65 years and Older

Definition: Patients aged 65 years and older who received at least one influenza vaccination during the study period.

Table 4.5: Patients Aged 65 and Older

	Clinic Total	EMR	MCHP Only
Agassiz	3,762	1,681	2,081
Assiniboine	13,325	2,791	10,534
Dr. C.W. Wiebe	6,281	1,877	4,404
Steinbach	5,028	2,955	2,073
Manitoba: 180,883			

Source: Manitoba Centre for Health Policy, 2010

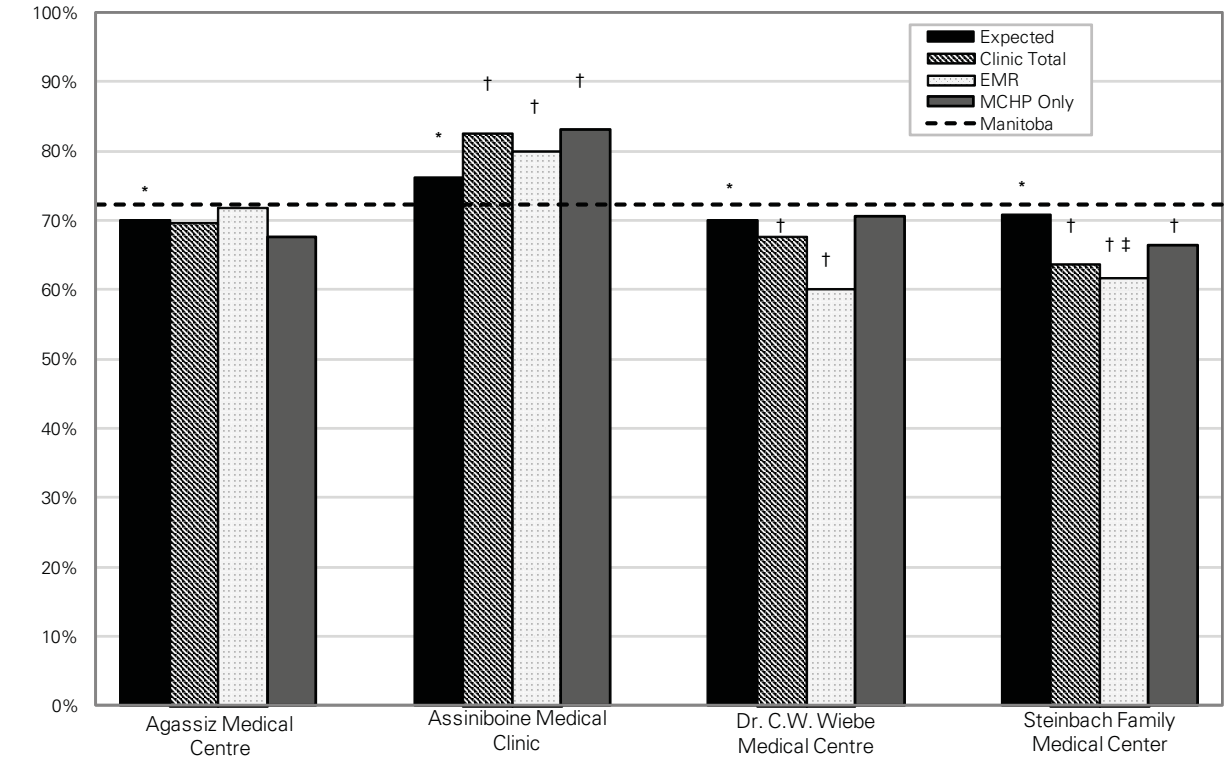
Table 4.6: Patients Aged 65 and Older Who Had At Least One Flu Vaccination

	Clinic Total	EMR	MCHP Only
Agassiz	2,650	1,217	1,433
Assiniboine	10,955	2,213	8,742
Dr. C.W. Wiebe	4,290	1,126	3,164
Steinbach	3,189	1,816	1,373
Manitoba: 130,836			

Source: Manitoba Centre for Health Policy, 2010

The rates for Assiniboine (Figure 4.11) are statistically better than the Expected rate. The rates for both Steinbach and the Dr. C.W. Wiebe Clinic are lower than the Expected rates, which are lower than the provincial rate. Agassiz's Expected rate is lower than the provincial rate, but the clinic's rates are similar to the Expected rate. The within–clinic comparisons show that the EMR patients have lower rates of vaccination than the MCHP Only patients for Steinbach.

Figure 4.11: Patients Aged 65 and Older Who Had At Least One Flu Vaccination: 2005/06–2007/08
Age– and sex–adjusted



* significantly different from Manitoba (p<.05)
† significantly different from Expected (p<.05)
‡ significantly different from MCHP only (p<.05)

Source: Manitoba Centre for Health Policy, 2010

Breast Cancer Screening

Definition: Female patients aged 50–69 with at least one mammogram during the study period.

Table 4.7: Female Patients Aged 50–69

	Clinic Total	EMR	MCHP Only
Agassiz	2,444	1,270	1,174
Assiniboine	8,577	2,191	6,386
Dr. C.W. Wiebe	3,865	1,465	2,400
Steinbach	3,905	2,375	1,530
Manitoba: 144,956			

Source: Manitoba Centre for Health Policy, 2010

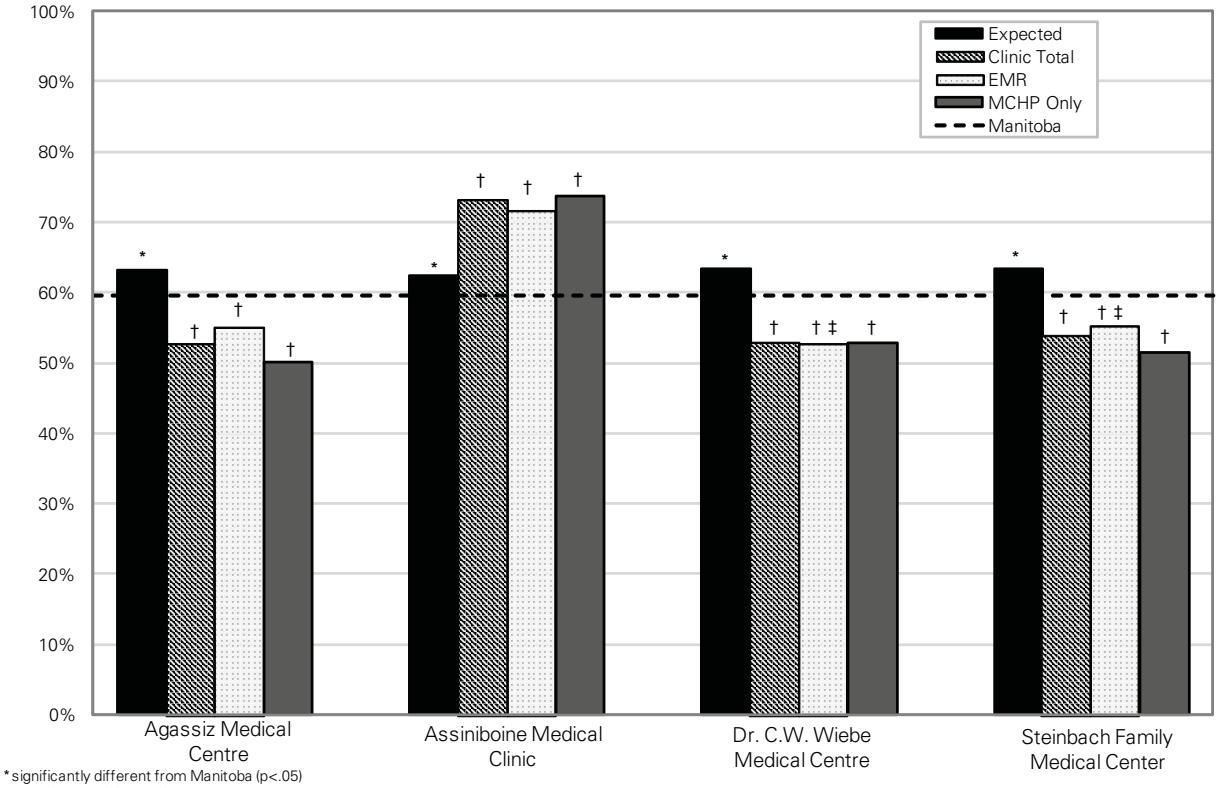
Table 4.8: Female Patients Aged 50–69 Who Had At Least One Mammogram

	Clinic Total	EMR	MCHP Only
Agassiz	1,288	695	593
Assiniboine	6,331	1,565	4,766
Dr. C.W. Wiebe	2,050	768	1,282
Steinbach	2,101	1,311	790
Manitoba: 86,310			

Source: Manitoba Centre for Health Policy, 2010

Figure 4.12 shows a striking pattern in the consistency between the three rural clinics with all the clinic patients (regardless of allocation) as below the Expected **mammography** rate. In contrast, the Expected rates for all four clinics are above the provincial rate. The clinic rates for Assiniboine are higher than the Expected rate. The only statistically significant within–clinic differences are at Dr. C.W. Wiebe and Steinbach Family, where MCHP Only is higher than EMR.

Figure 4.12: Female Patients Aged 50–69 Who Had At Least One Mammogram: 2005/06–2007/08
Age–adjusted



*significantly different from Manitoba (p<.05)
†significantly different from Expected (p<.05)
‡significantly different from MCHP only (p<.05)

Source: Manitoba Centre for Health Policy, 2010

Acute and Chronic Disease Care

Antibiotic Prescription Rates

Definition: All patients with at least one visit during the study period who filled one or more prescriptions for an antibiotic at a Manitoba retail pharmacy during the study period.

Table 4.9: All Patients Who Had At Least One Clinic Visit in the Study Period

	Clinic Total	EMR	MCHP Only
Agassiz	21,185	9,207	11,978
Assiniboine	48,224	15,300	32,924
Dr. C.W. Wiebe	35,840	15,272	20,568
Steinbach	39,982	20,808	19,174
Manitoba: 1,260,172			

Source: Manitoba Centre for Health Policy, 2010

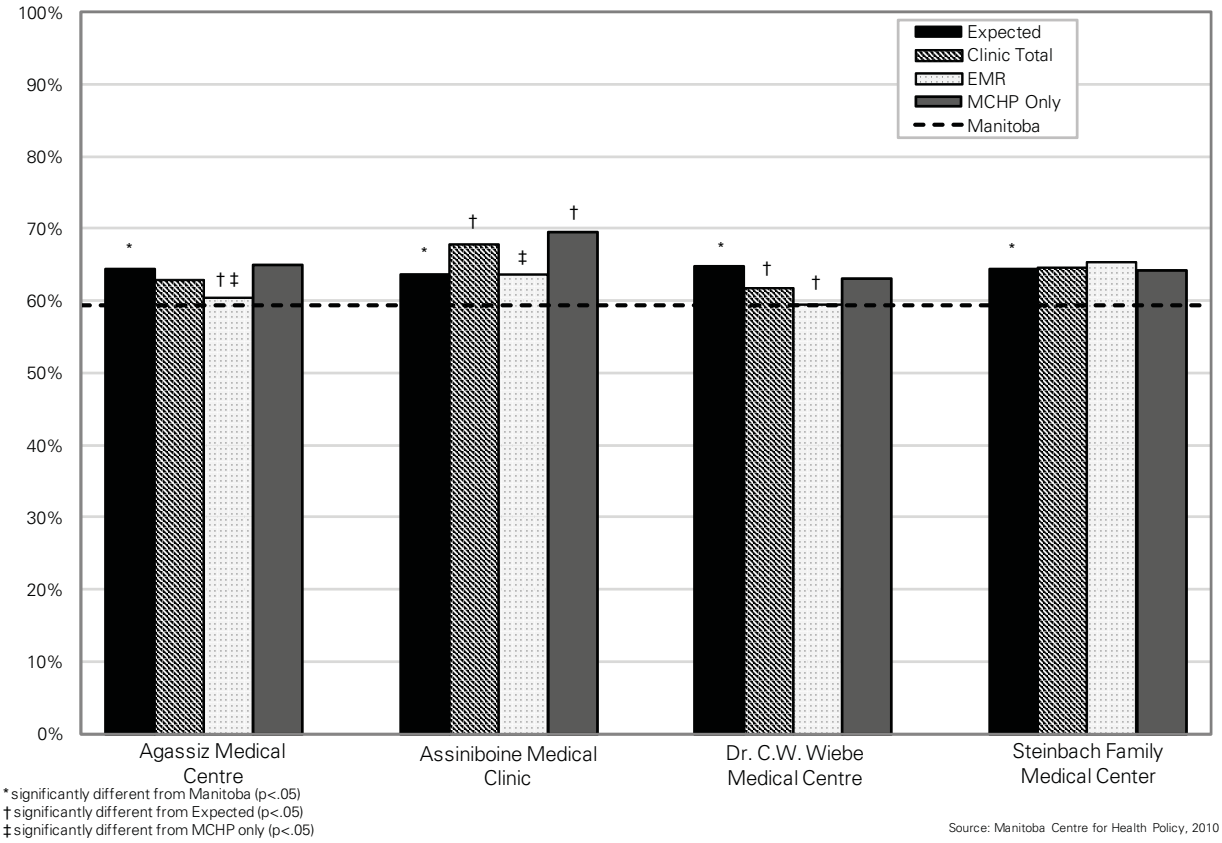
Table 4.10: Patients with At Least One Antibiotic Prescription

	Clinic Total	EMR	MCHP Only
Agassiz	13,575	5,659	7,916
Assiniboine	32,526	9,689	22,837
Dr. C.W. Wiebe	22,428	9,339	13,089
Steinbach	26,156	13,911	12,245
Manitoba: 748,796			

Source: Manitoba Centre for Health Policy, 2010

Compared to the provincial average, more patients in the Expected group at all clinics filled at least one antibiotic prescription (Figure 4.13); more patients in the Assiniboine Clinic's (Clinic Total) group filled an antibiotic prescription than the Expected group, while the opposite was true at C.W. Wiebe. At the Agassiz and Assiniboine clinics, the EMR rates were lower than the MCHP Only rates.

Figure 4.13: Patients with At Least One Antibiotic Prescription: 2005/06–2007/08
Age– and sex–adjusted



* significantly different from Manitoba (p<.05)
† significantly different from Expected (p<.05)
‡ significantly different from MCHP only (p<.05)

Source: Manitoba Centre for Health Policy, 2010

Antidepressant Prescription Follow–Up

Depression Prevalence

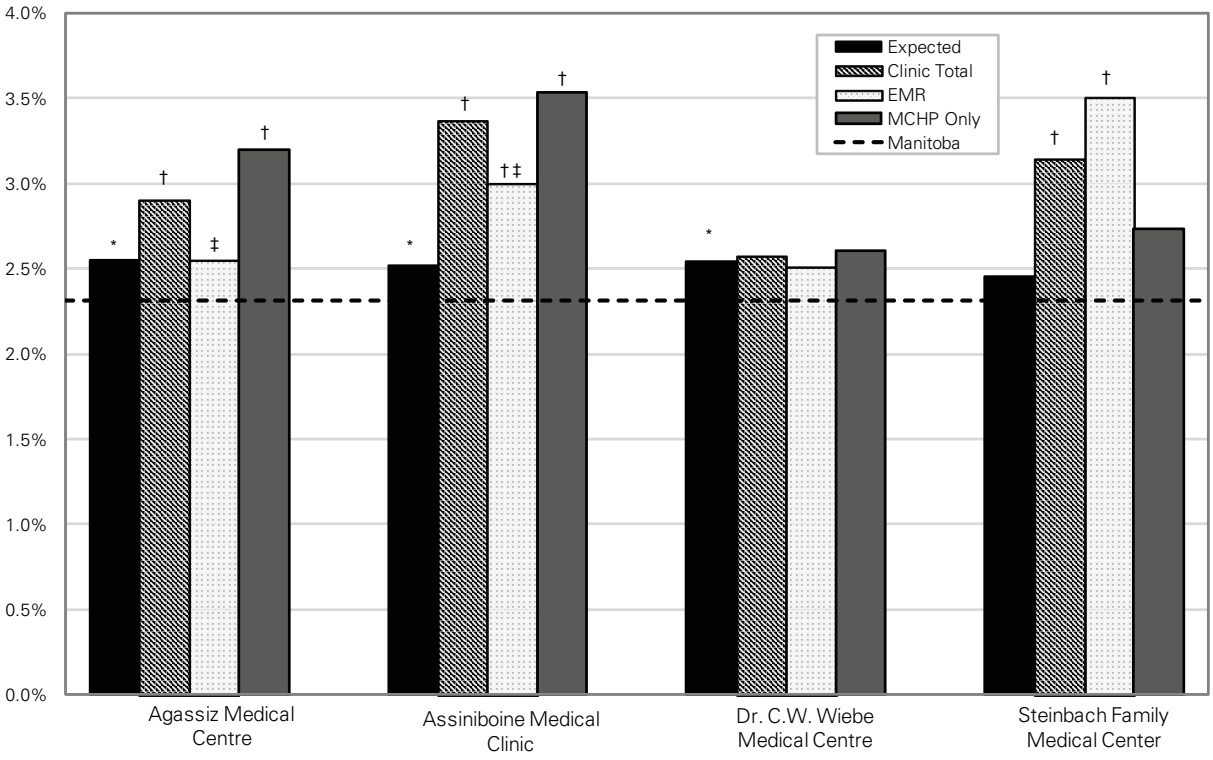
Definition: Patients newly diagnosed with depression (i.e., ICD–9 billing code for depression) during the study period (no diagnosis in the year prior to the start of the study period) and who filled a new prescription for an ***antidepressant*** *within two weeks of the diagnosis.*

Table 4.11: Patients Newly Diagnosed with Depression

	Clinic Total	EMR	MCHP Only
Agassiz	618	242	376
Assiniboine	1,769	517	1,252
Dr. C.W. Wiebe	890	362	528
Steinbach	1,208	728	480
Manitoba: 29,171			

Source: Manitoba Centre for Health Policy, 2010

Figure 4.14: Patients Newly Diagnosed with Depression Who Filled a Prescription for an Antidepressant within Two Weeks of Diagnosis: 2005/06–2007/08
Age– and sex–adjusted



*significantly different from Manitoba (p<.05)
†significantly different from Expected (p<.05)
‡significantly different from MCHP only (p<.05)

Source: Manitoba Centre for Health Policy, 2010

The prevalence of depression varies considerably between the various groups. For the Assiniboine clinic, the Expected rate is higher than the provincial rate. Agassiz's Expected rate is also higher than the provincial rate; the EMR rate is similar to the Expected rate. Both the Clinic Total and the EMR rates for Steinbach are considerably higher than the Expected rate, which is actually similar to the provincial rate. All the rates at the Dr. C.W. Wiebe Clinic are similar (only the Expected rate is significant).

Antidepressant Follow–Up Care (Outcome)

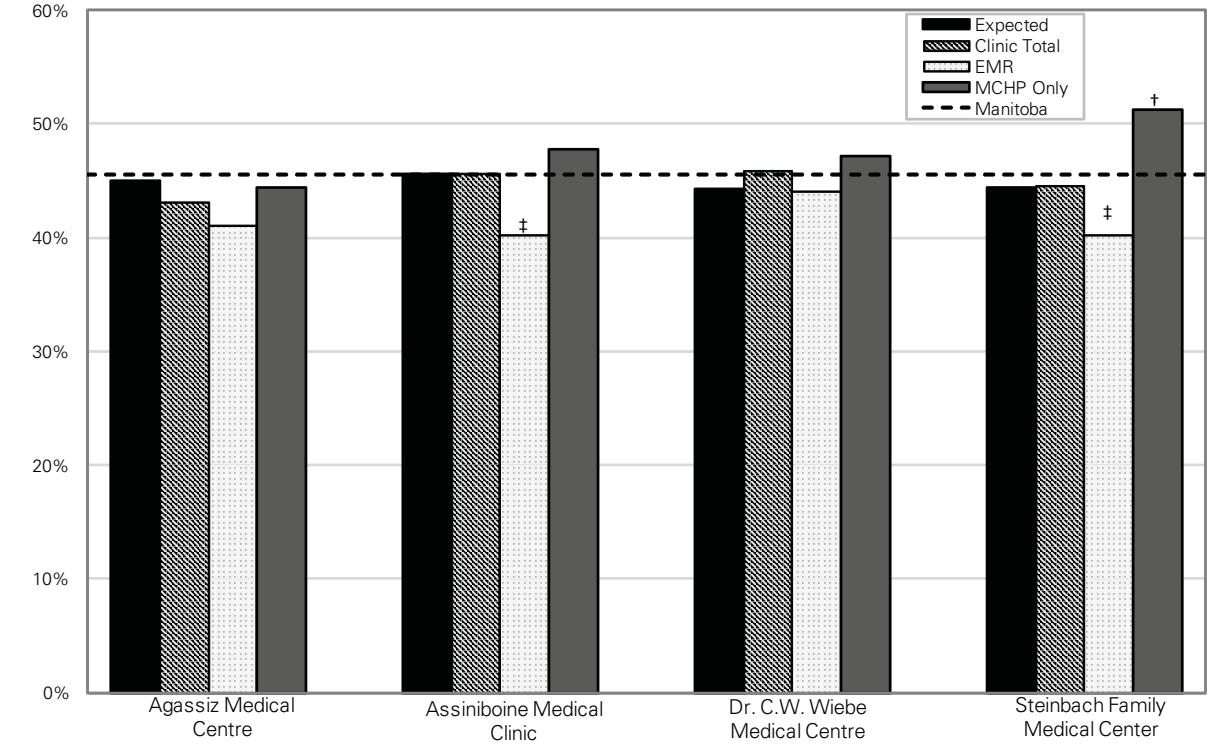
Definition: Patients diagnosed with depression who made three subsequent ambulatory visits within four months of the prescription being filled (any diagnosis, any physician) during the study period.

Table 4.12: Patients with Depression Who Had Three Follow–Up Ambulatory Physician Visits within Four Months of Filling a Prescription for an Antidepressant

	Clinic Total	EMR	MCHP Only
Agassiz	266	98	168
Assiniboine	822	207	615
Dr. C.W. Wiebe	409	157	252
Steinbach	534	292	242
Manitoba: 13,303			

Source: Manitoba Centre for Health Policy, 2010

Figure 4.15: Patients with Depression Who Had Three Follow–Up Ambulatory Physician Visits within Four Months of Filling a Prescription for an Antidepressant: 2005/06–2007/08
Age– and sex–adjusted



*significantly different from Manitoba (p<.05)
†significantly different from Expected (p<.05)
‡significantly different from MCHP only (p<.05)

Source: Manitoba Centre for Health Policy, 2010

The MCHP Only rates are higher than the EMR rates at the Assiniboine and Steinbach clinics but are similar at the other clinics. At Steinbach, the MCHP Only is also significantly different from the Expected rate.

Asthma Care

Asthma Prevalence

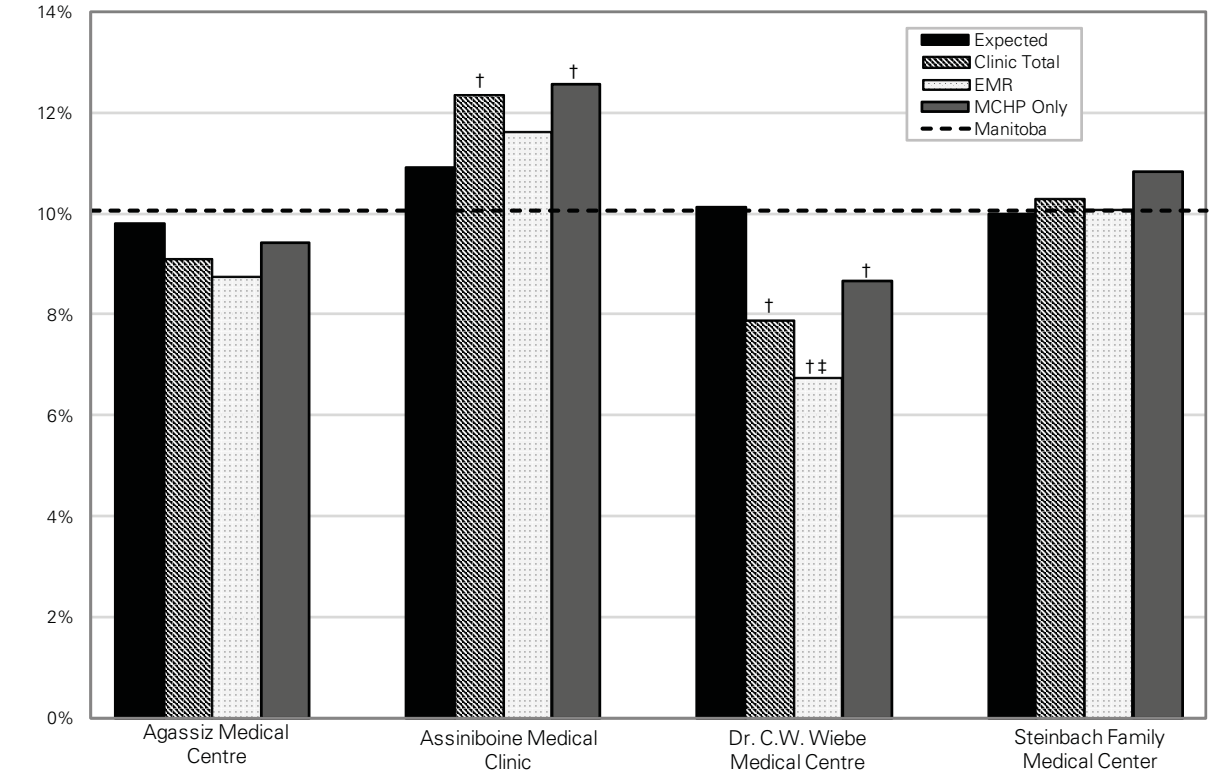
Definition: Patients with a diagnosis of asthma in either one or more hospital separations or in two or more medical claims, OR two or more prescriptions for asthma drugs during the study period; excludes chronic obstructive pulmonary disease.

Table 4.13: Patients with Asthma

	Clinic Total	EMR	MCHP Only
Agassiz	1,966	828	1,138
Assiniboine	5,973	1,704	4,269
Dr. C.W. Wiebe	2,848	991	1,857
Steinbach	4,052	2,113	1,939
Manitoba: 126,675			

Source: Manitoba Centre for Health Policy, 2010

Figure 4.16: Patients with Asthma: 2005/06–2007/08
Age– and sex–adjusted



* significantly different from Manitoba (p<.05)
† significantly different from Expected (p<.05)
‡ significantly different from MCHP only (p<.05)

Source: Manitoba Centre for Health Policy, 2010

The prevalence of asthma is statistically different in both the Assiniboine (higher than both the provincial and Expected rates) and Dr. C.W. Wiebe clinics (lower than the Expected rate). The within–clinic comparisons are not different for Agassiz and Steinbach, while the asthma prevalence for the EMR populations is lower at C.W. Wiebe.

Asthma Treatment (Outcome)

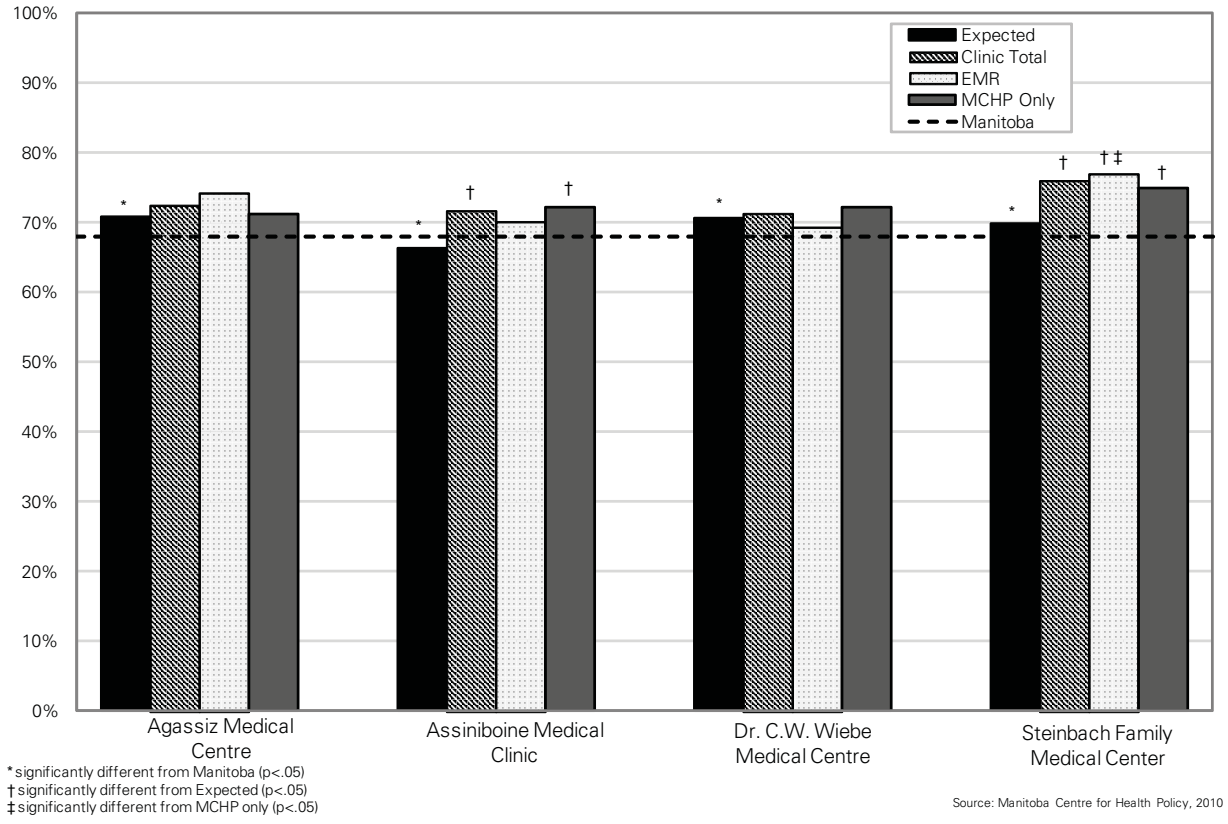
Definition: Patients with asthma who received three or more prescriptions for bronchodilators (reliever drug) in a year and received at least one prescription for an inhaled corticosteroid or leukotriene antagonist (preventer drug).

Table 4.14: Asthmatic Patients Who Had At Least One Prescription for Long–Term Control of Asthma

	Clinic Total	EMR	MCHP Only
Agassiz	1,437	619	818
Assiniboine	4,272	1,164	3,108
Dr. C.W. Wiebe	2,045	687	1,358
Steinbach	3,080	1,629	1,451
Manitoba: 87,050			

Source: Manitoba Centre for Health Policy, 2010

Figure 4.17: Asthmatic Patients Who Had At Least One Prescription for Long–Term Control of Asthma: 2005/06–2007/08
Age– and sex–adjusted



The rates for the asthma prescription outcome are statistically different for both the Assiniboine and Steinbach clinics. At Assiniboine, the Expected rate is below the provincial rate. For Steinbach, the Expected rate is at the provincial average.

Benzodiazepine Prescribing for Community–Dwelling Adults Aged 75 and Older

Definition: Community–dwelling patients aged 75 and older who filled prescriptions for greater than a 30–day supply of one benzodiazepine or a prescription for more than two different benzodiazepines.

Table 4.15: Community–Dwelling Patients Aged 75 and Older

	Clinic Total	EMR	MCHP Only
Agassiz	2,246	961	1,285
Assiniboine	7,004	1,437	5,567
Dr. C.W. Wiebe	3,680	1,025	2,655
Steinbach	2,615	1,532	1,083
Manitoba: 96,212			

Source: Manitoba Centre for Health Policy, 2010

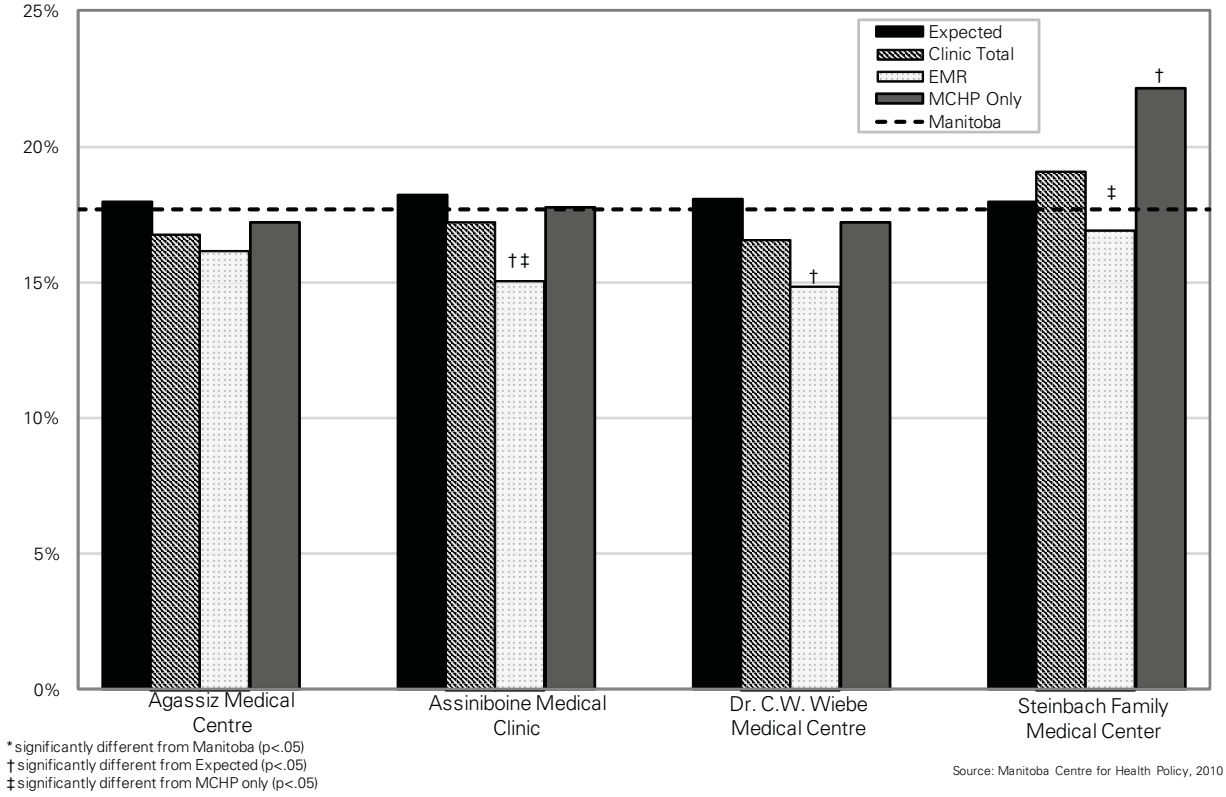
Table 4.16: Community-Dwelling Patients Aged 75 and Older Who Filled Prescriptions for more than a 30-day Supply of Benzodiazepines or a Prescription for more than two Benzodiazepines

	Clinic Total	EMR	MCHP Only
Agassiz	379	157	222
Assiniboine	1,190	213	977
Dr. C.W. Wiebe	614	151	463
Steinbach	493	258	235
Manitoba: 17,026			

Source: Manitoba Centre for Health Policy, 2010

Small numbers of community–dwelling seniors fill prescriptions for **benzodiazepines**, so few of the apparent differences in Figure 4.18 reach statistical significance. The EMR rate is below the MCHP Only and Expected rates for the Assiniboine clinic. The EMR rate is lower than Expected at the C.W. Wiebe clinic. The EMR rate is lower than the MCHP Only rate at the Steinbach clinic while the MCHP Only rate is higher than the Expected rate.

Figure 4.18: Community–Dwelling Patients Aged 75 and Older Who Filled Prescriptions for more than a 30–day Supply of Benzodiazepines or a Prescription for more than two Benzodiazepines: 2005/06–2007/08
Age– and sex–adjusted



*significantly different from Manitoba (p<.05)
†significantly different from Expected (p<.05)
‡significantly different from MCHP only (p<.05)

Source: Manitoba Centre for Health Policy, 2010

Congestive Heart Failure (CHF): Treatment with an Angiotensin Converting Enzyme Inhibitor (ACEI) or an Angiotensin II Receptor Blocker (ARB)

CHF Prevalence

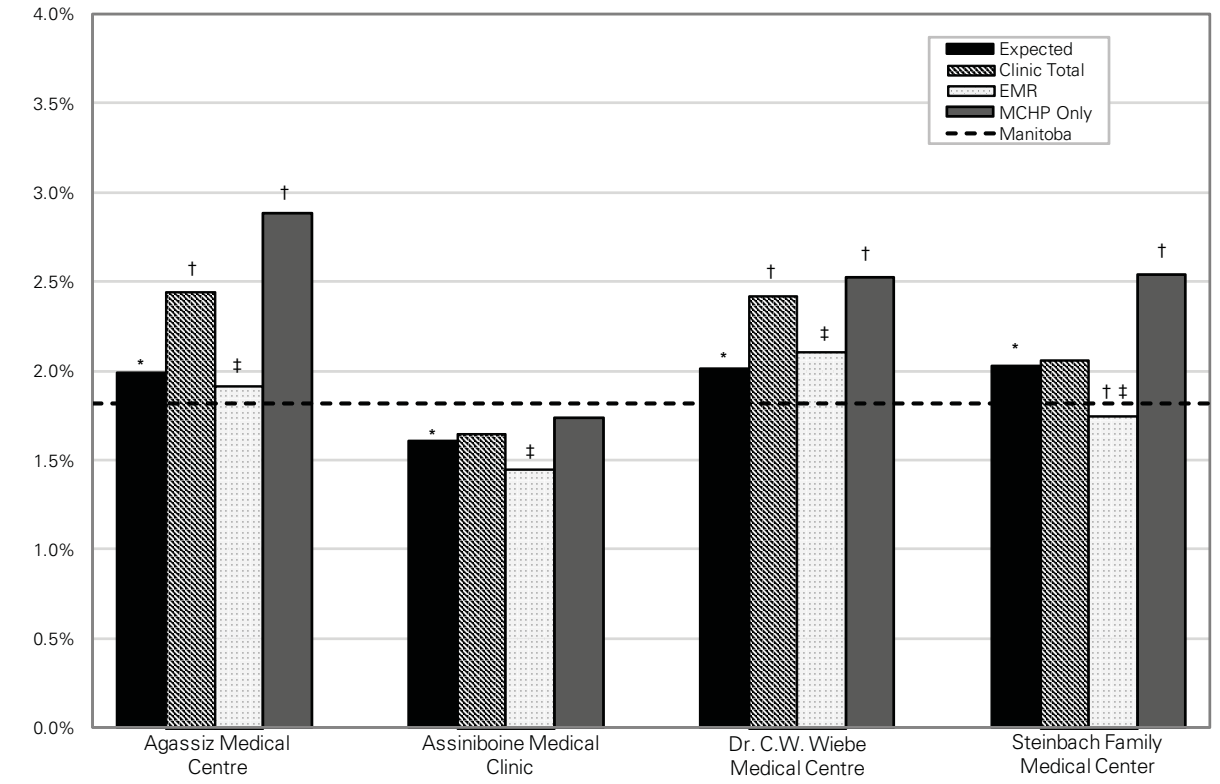
Definition: Patients with at least one diagnosis for CHF in either a hospital abstract or a physician billing claim during the study period.

Table 4.17: Patients with Congestive Heart Failure

	Clinic Total	EMR	MCHP Only
Agassiz	648	226	422
Assiniboine	1,448	284	1,164
Dr. C.W. Wiebe	1,042	269	773
Steinbach	733	362	371
Manitoba: 22,940			

Source: Manitoba Centre for Health Policy, 2010

Figure 4.19: Patients with Congestive Heart Failure: 2005/06–2007/08
Age– and sex–adjusted



* significantly different from Manitoba (p<.05)
† significantly different from Expected (p<.05)
‡ significantly different from MCHP only (p<.05)

Source: Manitoba Centre for Health Policy, 2010

The prevalence of CHF for the three Assiniboine clinic groupings is similar to the Expected prevalence, which is, however, lower than the provincial rate. The three rural clinics have higher Expected prevalence than Manitoba's rate. The rate for the patients in the MCHP Only group is higher than for the EMR group at both the Agassiz and C.W. Wiebe clinics. At Steinbach, the EMR rate is lower than the MCHP Only rate and the Expected rate.

CHF—Initiation of Treatment (Outcome)

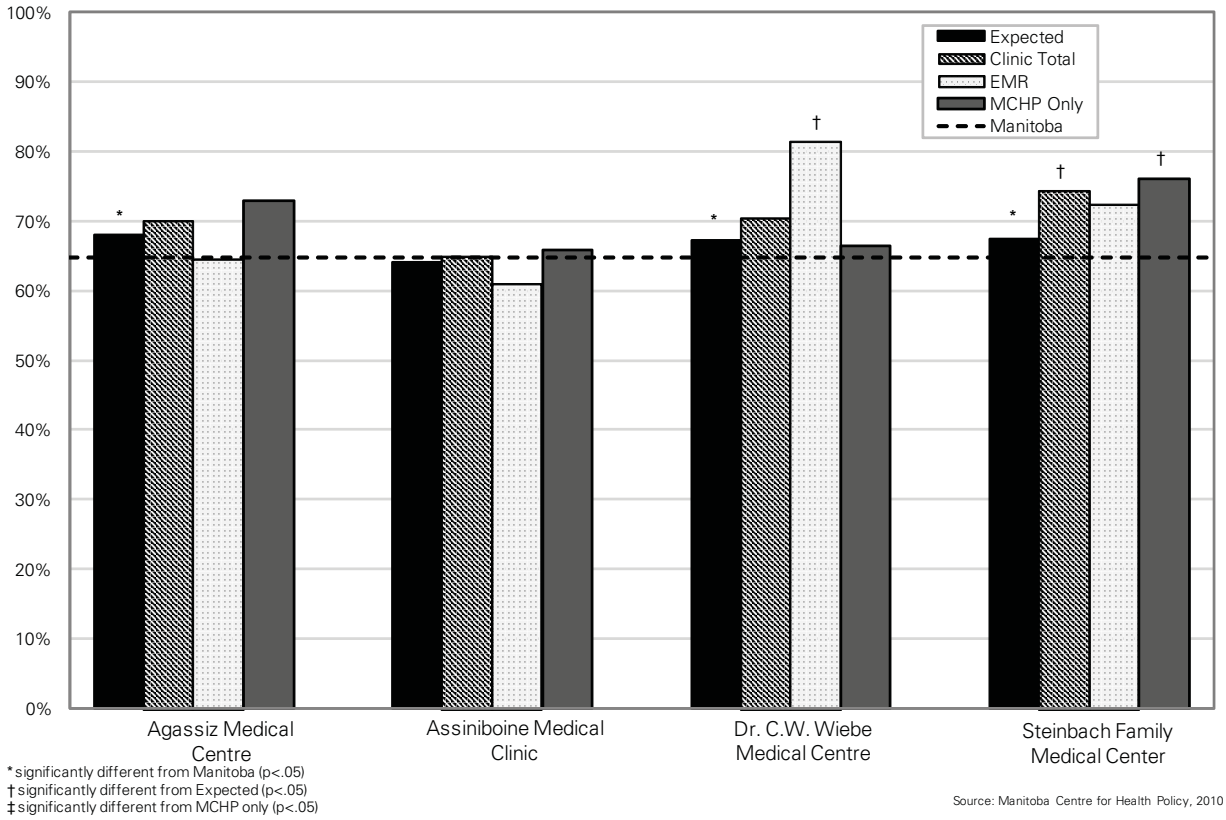
Definition: Newly diagnosed patients (i.e., no diagnosis of CHF in the year prior to the study period) who filled a prescription for either an ***Angiotensin Converting Enzyme Inhibitor (ACEI) or an Angiotensin II Receptor Blocker (ARB)*** *within three months of the diagnosis.*

Table 4.18: Patients Newly Diagnosed with Congestive Heart Failure Who Filled a Prescription for Either ACEI or ARB within Three Months of Diagnosis

	Clinic Total	EMR	MCHP Only
Agassiz	448	143	305
Assiniboine	941	171	770
Dr. C.W. Wiebe	721	216	505
Steinbach	541	258	283
Manitoba: 14,853			

Source: Manitoba Centre for Health Policy, 2010

Figure 4.20: Patients Newly Diagnosed with Congestive Heart Failure Who Filled a Prescription for Either ACEI or ARB within Three Months of Diagnosis: 2005/06–2007/08
Age– and sex–adjusted



* significantly different from Manitoba (p<.05)
† significantly different from Expected (p<.05)
‡ significantly different from MCHP only (p<.05)

Source: Manitoba Centre for Health Policy, 2010

The outcome rate for EMR patients in the Dr. C.W. Wiebe Clinic is significantly better than the Expected rate, which is better than the provincial rate. There are differences between the within–clinic rates for the Steinbach clinic. At the Agassiz Clinic, the only significant finding is that the Expected rate is higher than the provincial rate, but the clinic rates are similar to the Expected rate, as they are for Assiniboine. In Steinbach, the Expected rate is higher than the provincial rate and the total clinic rate is higher than the Expected rate.

CHF—Persistent Use of Treatment (Outcome)

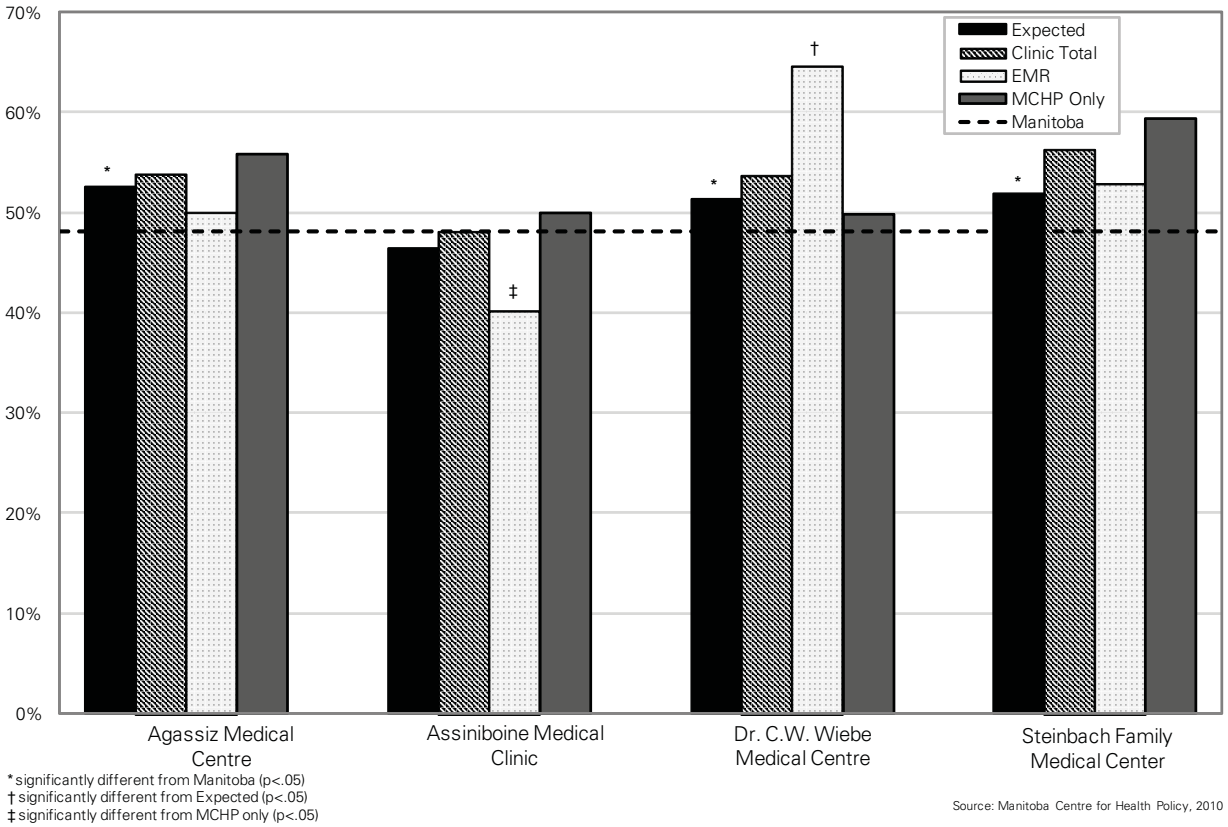
Definition: Patients who filled prescriptions for a drug supply for at least 80% of the study period (Caetano, Lam, & Morgan, 2006).

Table 4.19: Patients with Congestive Heart Failure Who Were Persistent Users of Either ACEI or ARB

	Clinic Total	EMR	MCHP Only
Agassiz	343	110	233
Assiniboine	696	112	584
Dr. C.W. Wiebe	547	171	376
Steinbach	408	187	221
Manitoba: 748,796			

Source: Manitoba Centre for Health Policy, 2010

Figure 4.21: Patients with Congestive Heart Failure Who Were Persistent Users of Either ACEI or ARB: 2005/06–2007/08
Age– and sex–adjusted



* significantly different from Manitoba (p<.05)
† significantly different from Expected (p<.05)
‡ significantly different from MCHP only (p<.05)

Source: Manitoba Centre for Health Policy, 2010

The EMR rate at Dr. C.W. Wiebe Clinic is higher than the Expected rate, which is higher than the provincial rate. The Expected rates for the other two rural clinics are above the provincial rate, but the clinic rates are similar to each other. The EMR is significantly lower than MCHP Only rates for Assiniboine.

Diabetes Care

Diabetes Prevalence

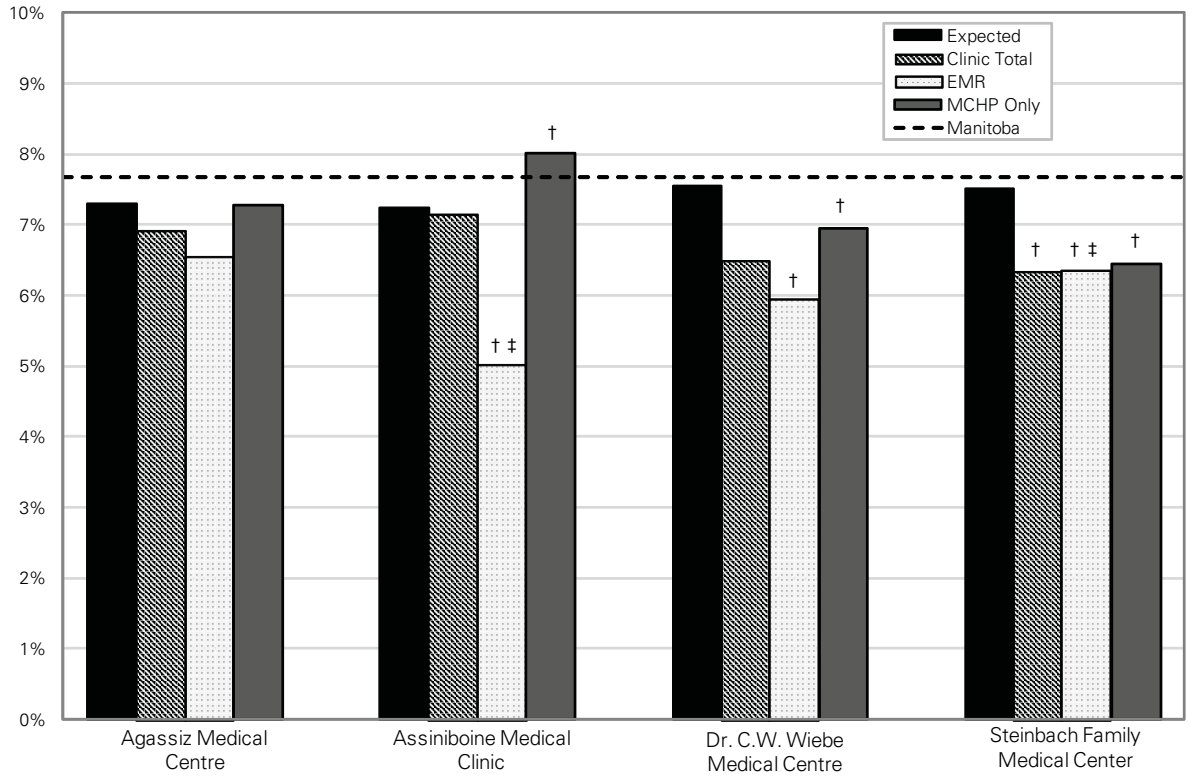
Definition: Patients aged 20–79 with one or more hospital visits OR two or more physician claims OR one or more prescriptions for treatment of diabetes during the study period.

Table 4.20: Patients Aged 20–79 with Diabetes

	Clinic Total	EMR	MCHP Only
Agassiz	1,012	452	560
Assiniboine	3,661	706	2,955
Dr. C.W. Wiebe	1,619	537	1,082
Steinbach	1,598	896	702
Manitoba: 66,681			

Source: Manitoba Centre for Health Policy, 2010

Figure 4.22: Patients with Diabetes: 2005/06–2007/08
Age– and sex–adjusted



* significantly different from Manitoba (p<.05)
† significantly different from Expected (p<.05)
‡ significantly different from MCHP only (p<.05)

Source: Manitoba Centre for Health Policy, 2010

There are no within–clinic statistically significant differences at the Agassiz clinic. At the Assiniboine Clinic, the rate for the EMR patients is considerably lower than Expected and the rate for the MCHP Only patients is above the Expected rate. Most of the rates for both the Steinbach and Dr. C.W. Wiebe clinics are significantly below the Expected rates.

Diabetes Treatment

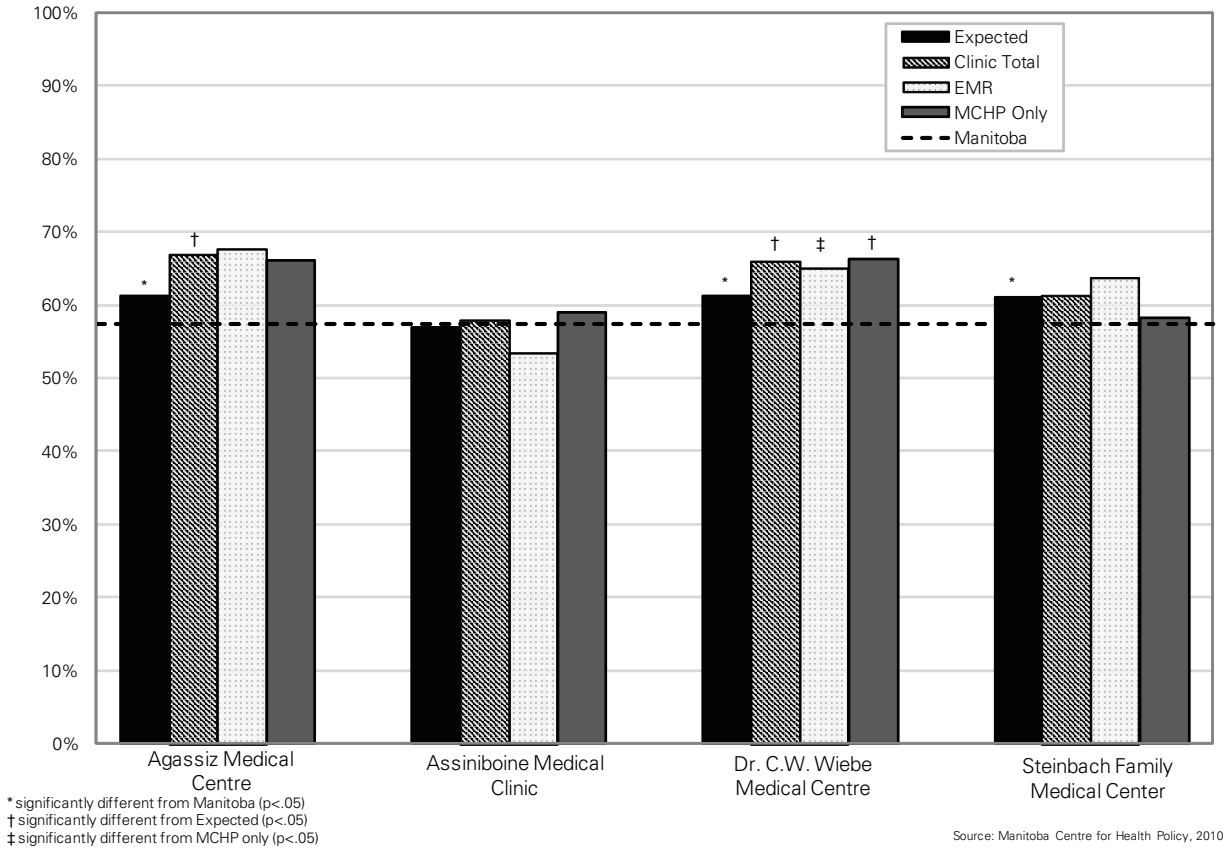
*Definition: Patients with diabetes aged 20–79 who saw either an **optometrist** or **ophthalmologist** at least once during the study period.*

Table 4.21: Diabetic Patients Who Had an Eye Exam

	Clinic Total	EMR	MCHP Only
Agassiz	699	315	384
Assiniboine	2,197	377	1,820
Dr. C.W. Wiebe	1,109	363	746
Steinbach	996	582	414
Manitoba: 38,281			

Source: Manitoba Centre for Health Policy, 2010

Figure 4.23: Diabetic Patients Who Had an Eye Exam: 2005/06–2007/08
Age– and sex–adjusted



* significantly different from Manitoba (p<.05)
† significantly different from Expected (p<.05)
‡ significantly different from MCHP only (p<.05)

Source: Manitoba Centre for Health Policy, 2010

The outcome rates for the Assiniboine and Steinbach clinics are similar to the Expected rates and have no within–clinic differences between populations. The Clinic Total rates for the other two clinics are higher than the Expected rates. At C.W. Wiebe, the EMR rate is lower than the MCHP Only rate.

Post–Myocardial Infarction (MI) Care: Treatment with Beta–Blockers

Prevalence of Myocardial Infarction

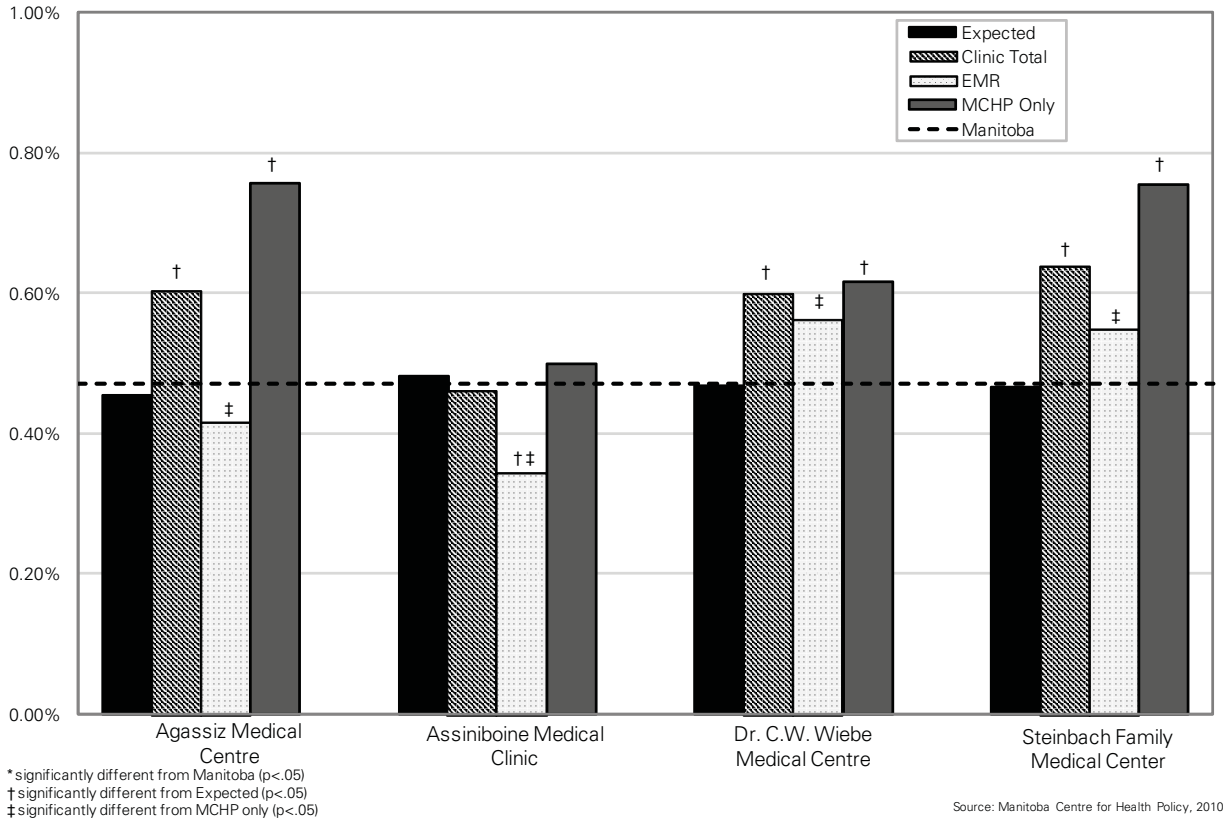
*Definition: Patients discharged alive from hospital after a **myocardial infarction** during the study period or the three years before the study period; excludes those with a diagnosis of chronic obstructive pulmonary disease, asthma, or peripheral vascular disease.*

Table 4.22: Patients Newly Diagnosed with Myocardial Infarction (Eligible for Beta–Blocker Prescriptions)

	Clinic Total	EMR	MCHP Only
Agassiz	141	44	97
Assiniboine	384	69	315
Dr. C.W. Wiebe	237	71	166
Steinbach	222	109	113
Manitoba: 5,946			

Source: Manitoba Centre for Health Policy, 2010

Figure 4.24: Patients Newly Diagnosed with Myocardial Infarction (Eligible for Beta–Blocker Prescriptions): 2005/06–2007/08
Age– and sex–adjusted



The rates for EMR patients are lower than the MCHP Only patients for all four clinics. The total clinic rates are higher than Expected for all three rural clinics. The EMR rate for Assiniboine is lower than the Expected rate.

Post–MI—Initiation of Beta–Blocker Treatment (Outcome)

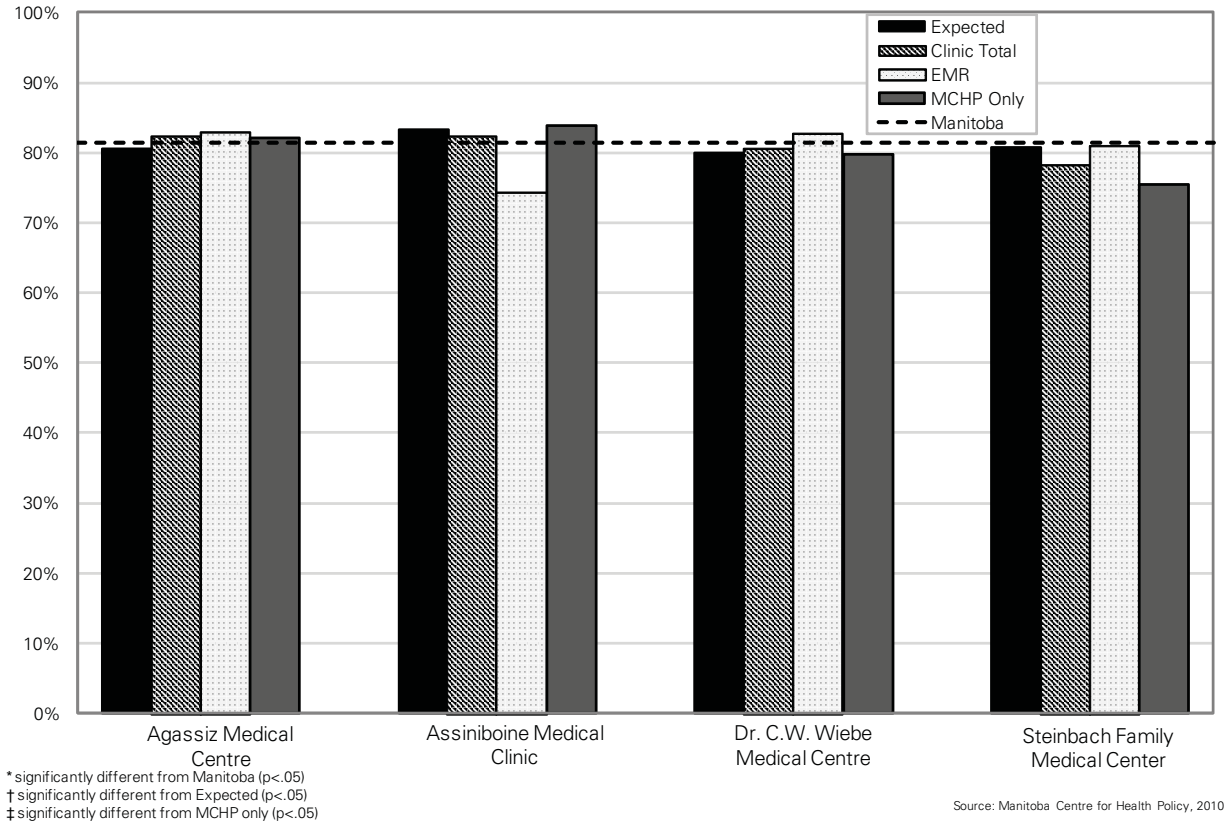
*Definition: MI patients with at least one prescription for **beta–blocker** filled within four months of **hospital discharge** following an admission for an MI.*

Table 4.23: Patients Newly Diagnosed with Myocardial Infarction Who Filled At Least One Beta–Blocker Prescription within Four Months of Hospital Discharge

	Clinic Total	EMR	MCHP Only
Agassiz	114	36	78
Assiniboine	314	51	263
Dr. C.W. Wiebe	189	58	131
Steinbach	175	88	87
Manitoba: 4,839			

Source: Manitoba Centre for Health Policy, 2010

Figure 4.25: Patients Newly Diagnosed with Myocardial Infarction Who Filled At Least One Beta–Blocker Prescription within Four Months of Hospital Discharge: 2005/06–2007/08
Age– and sex–adjusted



* significantly different from Manitoba (p<.05)
† significantly different from Expected (p<.05)
‡ significantly different from MCHP only (p<.05)

Source: Manitoba Centre for Health Policy, 2010

The results do not indicate significant differences between the Expected rates or any of the within–clinic patient allocation groups.

Post–MI—Persistent Use of Beta–Blocker Treatment (Outcome)

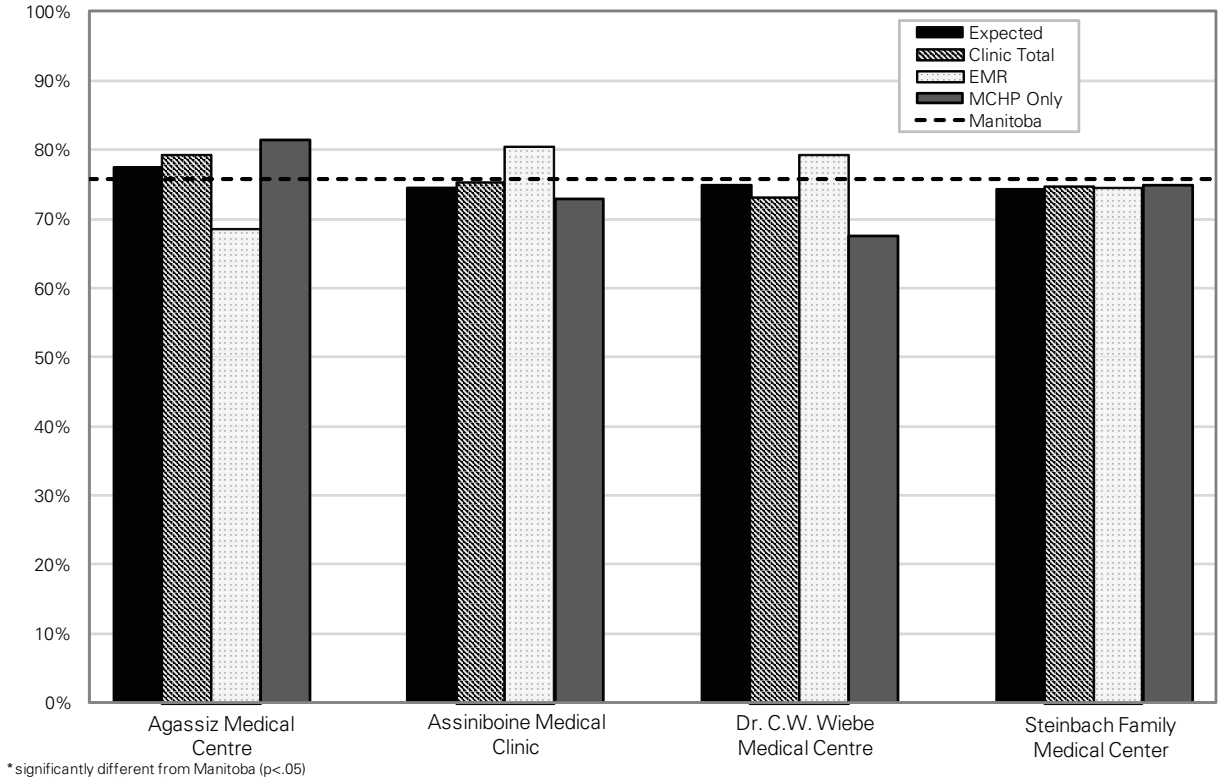
Definition: MI patients with prescriptions for beta–blockers after hospitalization for an MI that were filled for a minimum of 80% of the days between the hospital discharge and the end of the study period.

Table 4.24: Patients with Myocardial Infarction Who Were Persistent Users of Beta–Blockers

	Clinic Total	EMR	MCHP Only
Agassiz	104	35	69
Assiniboine	302	47	255
Dr. C.W. Wiebe	175	52	123
Steinbach	164	86	78
Manitoba: 4,506			

Source: Manitoba Centre for Health Policy, 2010

Figure 4.26: Patients with Myocardial Infarction Who Were Persistent Users of Beta–Blockers: 2005/06–2007/08
Age– and sex–adjusted



*significantly different from Manitoba (p<.05)
†significantly different from Expected (p<.05)
‡significantly different from MCHP only (p<.05)

Source: Manitoba Centre for Health Policy, 2010

Once again, due to the small sample size, there are no statistically significant differences between the clinic populations and the provincial or Expected rates.

Post–Myocardial Infarction (MI) Care: Treatment with Cholesterol–Lowering Drugs

Prevalence of Myocardial Infarction

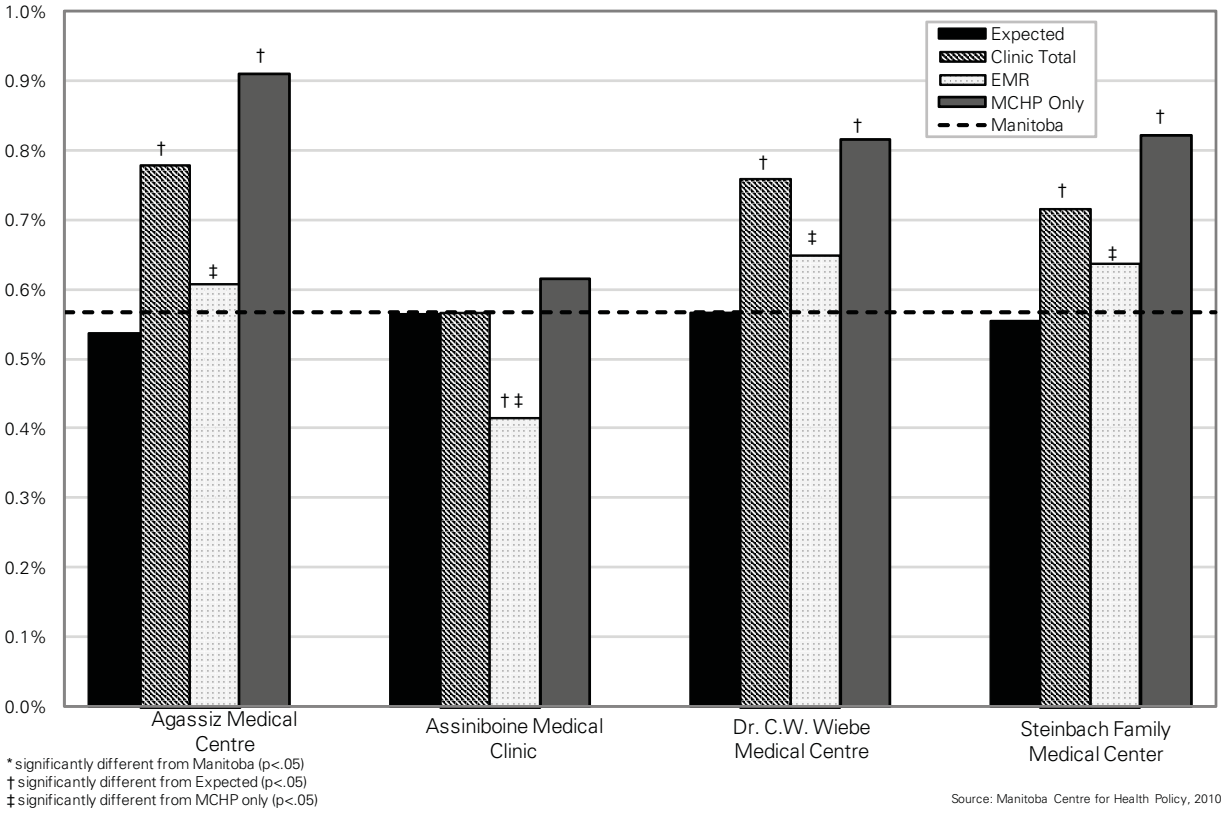
Definition: Patients discharged alive from hospital after an MI in the three years preceding the start of the study period.

Table 4.25: Patients Newly Diagnosed with Myocardial Infarction (Eligible for Cholesterol–Lowering Drug Prescriptions)

	Clinic Total	EMR	MCHP Only
Agassiz	178	63	115
Assiniboine	462	82	380
Dr. C.W. Wiebe	292	82	210
Steinbach	247	125	122
Manitoba: 7,142			

Source: Manitoba Centre for Health Policy, 2010

Figure 4.27: Patients Newly Diagnosed with Myocardial Infarction (Eligible for Cholesterol–Lowering Drug Prescriptions): 2005/06–2007/08
Age– and sex–adjusted



The Expected MI prevalence for all four clinics are similar to the provincial rates. The MCHP Only rates are higher than Expected for all four clinics; the EMR rate is lower than Expected at Assiniboine. The Clinic Total rates are higher than Expected for the three rural clinics. The MCHP Only rate is higher than the EMR rate for all four clinics.

Post–MI—Initiation of Cholesterol–Lowering Treatment (Outcome)

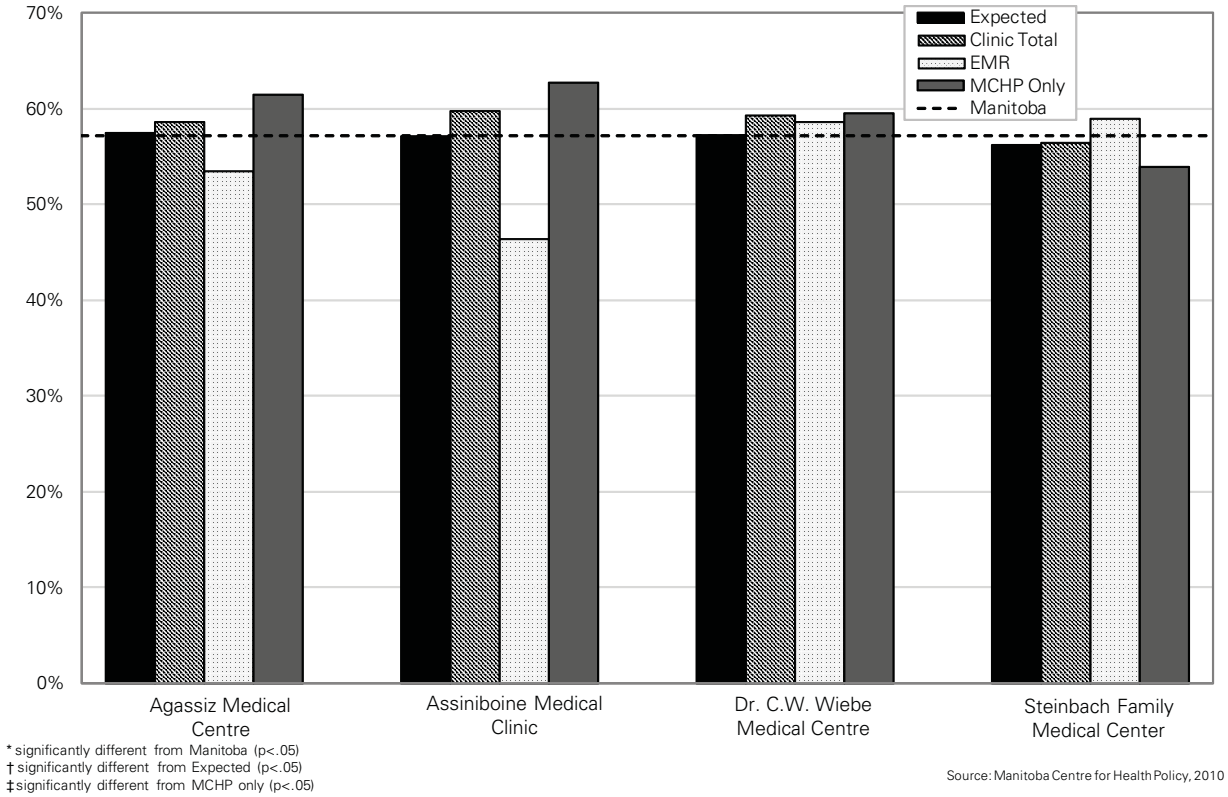
Definition: MI patients with a new prescription for a cholesterol–lowering drug filled within four months of hospital discharge after an admission for an MI.

Table 4.26: Patients Newly Diagnosed with Myocardial Infarction Who Filled At Least One Cholesterol–Lowering Drug Prescription within Four Months of Hospital Discharge

	Clinic Total	EMR	MCHP Only
Agassiz	101	33	68
Assiniboine	274	38	236
Dr. C.W. Wiebe	170	47	123
Steinbach	141	73	68
Manitoba: 4,190			

Source: Manitoba Centre for Health Policy, 2010

Figure 4.28: Patients Newly Diagnosed with Myocardial Infarction Who Filled At Least One Cholesterol–Lowering Drug Prescription within Four Months of Hospital Discharge: 2005/06–2007/08
Age– and sex–adjusted



* significantly different from Manitoba (p<.05)
† significantly different from Expected (p<.05)
‡ significantly different from MCHP only (p<.05)

Source: Manitoba Centre for Health Policy, 2010

Results for initiation of cholesterol–lowering drugs are remarkably consistent for the four clinics and for each population allocation within the clinics.

Post–MI—Persistent Use of Cholesterol–Lowering Treatment (Outcome)

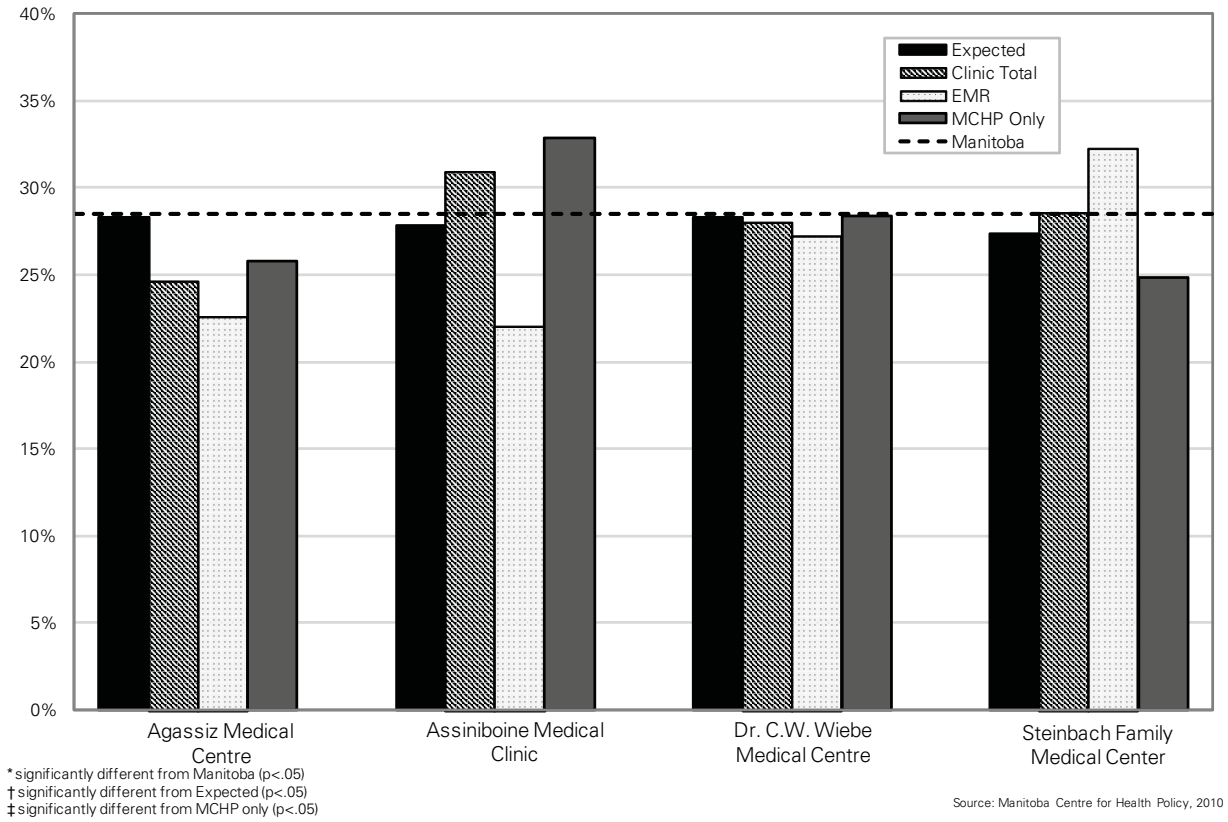
Definition: MI patients with prescriptions for cholesterol–lowering medication after hospitalization for an MI that were filled for a minimum of 80% of the days between the hospital discharge and the end of the study period.

Table 4.27: Patients with Myocardial Infarction Who Were Persistent Users of Cholesterol–Lowering Drugs

	Clinic Total	EMR	MCHP Only
Agassiz	43	14	29
Assiniboine	142	18	124
Dr. C.W. Wiebe	81	22	59
Steinbach Family	71	40	31
Manitoba: 2,118			

Source: Manitoba Centre for Health Policy, 2010

Figure 4.29: Patients with Myocardial Infarction Who Were Persistent Users of Cholesterol–Lowering Drugs: 2005/06–2007/08
Age– and sex–adjusted



*significantly different from Manitoba (p<.05)
†significantly different from Expected (p<.05)
‡significantly different from MCHP only (p<.05)

Source: Manitoba Centre for Health Policy, 2010

Likely due to the small sample sizes, the results for persistent use are not statistically different despite looking different for the clinic populations at Assiniboine, Steinbach, and Agassiz in Figure 4.29.

Chapter 5: Discussion

A number of lessons can be learned from this study. Firstly, there are clearly limitations in both the data extracted from clinic EMRs and the administrative data held in the Repository. One of the potential advantages of the study is to learn how to best use the two data sources together. Unfortunately, the time lag resulting from the single annual data download from Manitoba Health to the Repository prevents a more current analysis of the Repository data.

The EMR extracts are limited in their dependence on the appropriate fields both being available in the EMR and being routinely used by the clinicians. Relevant data that are not entered into the field are not captured in the data extract. Because the QBIF funding is intended to reward quality, it is important to be able to separate changes in the provision of quality care from the documentation of quality care. The use of the EMR to keep track of the indicator outcomes works best when this process fits with the normal care process and data capture is more complete.

For PIN to achieve its goals, a number of changes need to take place. This study focused on two components of the changes that are supported by PIN. Firstly, the study provides context and insight into the measurement of some of the quality indicators (less than half of the indicators used in the broader evaluation can be measured using the Repository data); and secondly, the extent and type of EMR use by clinicians. All EMRs offer the potential to use the information entered into the patient record in a variety of creative ways. Whether it is creating a longitudinal graphical comparison of the patients' blood pressure results or developing evidence–based automatic reminders to prompt care plans, the EMR can provide an advantage over the use of a paper medical chart, but the clinicians must be engaged. This study has shown the extent of the variability in how physicians used their EMRs at the start of the study. Therefore it was difficult to separate true changes in clinical practice facilitated by PIN from changes in EMR charting practice alone. Analysis of real time administrative claims data could potentially provide this insight, but it is not currently available at MCHP.

Changes in the use of the EMRs were apparent (even when not captured in the study data due to the time lag) to the investigators because physicians from all the participating clinics were involved in the regular Advisory Group meetings. They were also part of the ongoing engagement with Manitoba Health throughout the study period. In addition, a new EMR qualification process was introduced by Manitoba Health whereby EMR vendors must meet predetermined standards, such as always including certain EMR fields and having the capacity to extract the data from those fields.

While the results for each indicator are interesting, it is of greater interest to note that there are differences between the EMR–allocated patients compared to the ones identified from the Repository. This was true for many of the indicators. This finding should lead to an exploration of why these differences exist and an attempt to determine ways to ensure that the best possible information is being used to measure the success of PIN. As the PIN Evaluation Committee works to establish a standardized clinic–based definition for patients to include in the EMR abstract, it can use the findings of this study to compare how each of the current definitions have resulted in differences to the MCHP algorithm. This does not imply that the MCHP algorithm is the gold standard to which the clinic EMR patient allocation should aspire, but rather that the comparison between the two approaches provides an opportunity to explore their differences and learn from the comparison.

While this discussion reflects the research and quality measure consequences of determining which patients to include in these indicators, the ultimate concern is the physician's acceptance of accountability for patient care. Clearly, this relationship is best determined in conjunction with the patient. Formal patient enrolment in practices, which involves a mutual commitment by both the patient and provider, has been widely implemented in Ontario and Quebec. In Ontario, more than 70% of the population has enrolled with a primary care physician (Kantarevic et al., 2010). Implementation of some form of patient enrolment in Manitoba would address the concerns raised above as well as promote continuity of care, which has been shown to support quality of care.

There is often value in comparing results across different studies either to validate the results of a new study or to explore the reasons for the differences. We, however, encourage readers to focus on the value of the internal comparisons rather than looking for external comparisons. Most of the EMR definitions used in this study have not been used with clinical data despite their origins in the CIHI published definitions. Operationalizing those definitions frequently resulted in refinements that could have significant impact on the indicator rates and comparisons with external data. Perhaps more importantly, it is well known that patient characteristics such as age, sex, and socioeconomic status have a profound impact on their health status and health behaviors. Comparisons between different populations are thus fraught with built–in errors when these characteristics are not taken into account. We used virtual practices to provide comparable populations for meaningful indicator comparisons to address this challenge.

The provincial rates for our indictors are generally consistent with previous studies using the Repository. Differences are due to different time periods and slight variations in indicator definitions (according to the specific purposes of the studies). For example, atlases often use consistent definitions over time to facilitate comparisons with previous atlases despite refinements in these definitions that other studies have developed.

The lack of any consistent pattern both between clinics (no one clinic seems to provide consistently better or worse care than the others) and across indicators suggests widespread room for improvement amongst the PIN clinics. Because we have shown that the PIN clinics are not consistently worse than the provincial rates or the expected rates for each clinic, we can conclude this room for improvement is to be found across the province. PIN, thus, has the potential to facilitate improved care for many Manitobans as the number of physicians participating in Phase 2 increases. Introducing a system of quality measurement beyond the realm of PIN across all direct service sites would, based on the experience with this study, facilitate this improvement.

Future Research

While the comparisons within clinics provides useful information within the context of the organization of the PIN initiative, use of the Repository data has a potentially larger role to play in measuring two important outcomes. Firstly, one of the goals of PIN is to improve patient access to the **primary care** clinic with which the patient is associated. Improved access should lead to better continuity of care which has been shown to lead to better health outcomes (Katz et al., 2004; Martens et al., 2008). Because the data contained in the EMR extracts is limited to the participating clinics, it provides limited data on the use of other primary care clinics by people identified by the PIN clinics as core patients. This information is, however, available from the Repository and should be used in future evaluations as an indicator of access and continuity of care.

The results of this study should be seen as baseline data for further research in determining whether PIN has lead to improvement in patient care. While the initial hope was for Phase 1 to demonstrate these changes, inconsistencies in the charting practices of many of the participating physicians prior to PIN and in its early implementation, has limited our ability to demonstrate that changes in the EMR extracts are indeed changes in clinical practice, rather than changes in use of the EMR. By allowing the initial period to be included as a baseline where charting practices were standardized, we will be able to measure future changes in practice using both the EMR and Repository. The Repository can then be used to validate the EMR changes over time for those indicators that can be measured by both data sources.

Glossary

Acronyms

ACEI – Angiotensin converting enzyme inhibitor

ARB – Angiotensin II receptor blockers

CHF – Congestive heart failure

CIHI – Canadian Institutes for Health Information

DPIN – Drug Programs Information Network

EMR – Electronic medical record

FFS – Fee-for-service

MCHP – Manitoba Centre for Health Policy

MI – Myocardial infarction

PHIN – Personal health information number

PIN – Physician Integrated Network

RHA – Regional health authority

QBIF – Quality based incentive funding

SAS® – Statistical Analysis Software

Administrative Data

Information collected "usually by government, for some administrative purpose (e.g., keeping track of the population eligible for certain benefits, paying doctors or hospitals), but not primarily for research or surveillance purposes" (Spasoff, 1999). MCHP's research uses administrative data from hospital discharge summaries, physician billing claims, claims for prescription drugs, and other health related data. Using these data, researchers can study the utilization of health resources over time and the variations in rates within and across the provinces.

Ambulatory Visits (Physician)

Any contact between a patient and physician at one of the following locations: physician's office, outpatient or emergency department, clinics, personal care home, the patient's home, or northern/remote nursing stations. Contacts with patients while they are in hospital are not included.

Angiotensin Converting Enzyme Inhibitor (ACEI) and Angiotensin II Receptor Blockers (ARB)

A therapeutic class of drugs commonly used to treat hypertension and other cardiovascular risks.

Antidepressant

Medicines that are used to help people who have depression. 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 (Fransoo et al., 2009). See Table A1.2 for the codes used to identify this medication.

Asthma

A disease in which inflammation of the airways causes airflow into and out of the lungs to be restricted. See Table A1.2 for the codes used to identify this condition.

Benzodiazepines

Benzodiazepines belong to the group of medicines called central nervous system (CNS) depressants. They are used to slow down the nervous system. See Table A1.2 for the codes used to identify this medication.

Beta-Blocker

Beta-blockers, properly known as beta-adrenergic blocking drugs, have been shown to lower the risk of subsequent heart attacks. See Table A1.2 for the codes used to identify this medication.

Childhood Immunization

An intervention to initiate or increase resistance against infectious disease. See Table A1.2 for the codes used to identify this procedure.

Congestive Heart Failure (CHF)

Also called congestive cardiac failure (CCF) or just heart failure, it is the inability of the heart to pump a sufficient amount of blood throughout the body, or requiring elevated filling pressures in order to pump effectively. CHF is an abnormal cardiac condition that reflects impaired cardiac pumping and blood flow. The pooling of blood leads to congestion in body tissue. See Table A1.2 for the codes used to identify this condition.

Diabetes

A chronic condition in which the pancreas no longer produces enough insulin (Type I Diabetes) or when cells stop responding to the insulin that is produced (Type II Diabetes), so that glucose in the blood cannot be absorbed into the cells of the body. See Table A1.2 for the codes used to identify this condition.

Drug Programs Information Network (DPIN) Database

A database containing prescription drug claims from DPIN, an electronic, on-line, point-of-sale prescription drug database. Initiated in 1994, it connects Manitoba Health and all pharmacies in Manitoba to a central database maintained by Manitoba Health. Information about pharmaceutical dispensations is captured in real time for all Manitoba residents (including Registered First Nations), regardless of insurance coverage or final payer. DPIN facilitates payment administration for eligible drug costs, incorporating functions such as real-time adjudication, and collects high-quality data on all prescriptions issued to Manitobans, such as drug, dosage, and prescription date. Note that the prescription's indication (the physician's prescribing intent) is not collected and must be inferred from other data.

Electronic Medical Records (EMRs)

A computerized legal medical record created to allow physicians and other health care providers to easily look through or chart their patients' health information (adopted from Government of Nova Scotia website, http://www.gov.ns.ca/health/eResults/default.asp. Accessed February 18, 2010)

Family Physician

A generalist physician who provides and coordinates personal, continuing, and comprehensive primary care to individuals and families. Such physicians are identified by a code in MCHP's physician data.

Fee-for-Service (FFS)

A method of payment whereby physicians bill for each service rendered, according to a pre-arranged schedule of fees and services. Physicians who are paid on a FFS basis file a claim for each service rendered and are responsible for their operating costs. Other physicians are compensated under an alternate payment plan.

Fiscal Year

For most Canadian government agencies and health care institutions, the fiscal year is defined as starting April 1 and ending the following year at March 31. For example, the 2005/06 fiscal year would be April 1, 2005 to March 31, 2006, inclusive. In this report, for simplicity we have only used the year (i.e., 2005).

Hospital Discharge

A discharge from hospital occurs anytime a patient leaves because of death, discharge, sign-out against medical advice, or transfer.

Hospital Discharge Abstract

A form/computerized record filled out upon a patient's discharge (separation) from an acute care hospital. The abstract contains information from the patient's medical record based on their stay in hospital, such as: gender, residence (postal code), diagnoses and procedure codes, admission and discharge dates, length of stay, and service type (inpatient, day surgery, outpatient).

Manitoba Immunization Monitoring System

MIMS is a population-based monitoring system that provides monitoring and reminders to help achieve high levels of immunization. Immunization status is monitored by comparing the system record and the recommended schedule.

Mammography

A procedure to determine if a woman has breast cancer or a breast tumor; it is commonly used for breast cancer screening. Mammograms can show most breast cancer two to three years before it can be detected through self-exams. See Table A1.2 for the codes used to identify this procedure.

Myocardial Infarction (MI)

A heart attack (myocardial infarction) occurs when an area of heart muscle dies or is permanently damaged because of an inadequate supply of oxygen to that area. See Table A1.2 for the codes used to identify this condition.

Negative Binomial Distribution

A discrete probability distribution appropriate for analyzing count data when an event is relatively rare, but is highly variable over the entire population.

Negative Binomial Regression

Regression analyses for count data that follows a **negative binomial distribution**, which occurs when an event is relatively rare, but is highly variable over the entire population.

Ophthalmologist

A medical doctor who has undergone specialty training to diagnose and treat disorders of the eye. An ophthalmologist is qualified to prescribe medication, prescribe and adjust eyeglasses and contact lenses. and is qualified to perform laser treatment and surgery.

Optometrist

Although not a doctor of medicine, an optometrist is specifically trained to diagnose eye abnormalities and prescribe, supply, and adjust eyeglasses and contact lenses.

Papanicolaou (Pap) test

Used primarily for cervical cancer screening, this test is based on the examination of cells collected from the cervix to reveal pre-malignant (before cancer) and malignant (cancer) changes, as well as, changes due to non-cancerous conditions such as inflammation from infections. See Table A3.1 for the codes used to identify this procedure.

Patient Allocation

The process of allocating all patients who have seen a physician to the one most responsible for their care during the study period. This is necessary in order to define the physician's practice population. In this study, we used the plurality approach.

Physician Integrated Network (PIN)

"PIN is a Manitoba Health primary care renewal initiative that focuses on fee-for-service (FFS) physician groups. Its goal is to facilitate systemic improvements in the delivery of primary care" (PIN website: http://www.gov.mb.ca/health/phc/pin/index.html. Accessed June 7, 2010).

Physician Claims

Claims (billings) that are submitted to the provincial government by individual physicians for services they provide. Fee-for-service physicians receive payment based on these claims, while those submitted by physicians on alternate payment plans are for administrative purposes only. The physician claims data file is part of the **Population Health Research Data Repository**.

Plurality Approach to Patient Allocation

A method that assigns patients exclusively to their most responsible health care provider. In one method, the most responsible physician was the one who provided more of their visits than any other physician. When more than one physician provided equal numbers of visits, the patient was assigned to the physician with the greatest visit costs; and in the case of a second tie, total costs were used. Calculation of total cost included direct care (i.e., visits) and indirect care (i.e., referrals for other services and consults).

Population Health Research Data Repository (Repository)

A comprehensive collection of administrative, registry, survey, and other databases 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 health care and profiles of health and illness, facilitating inter-sectoral research in areas such as health care, education, and social services. The administrative health database, for example, holds records for virtually all contacts with the provincial health care 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 steward of the information in the Repository for agencies such as Manitoba Health.

Preventive Care

Medical services delivered by physicians that are directed at prevention or early detection of disease.

Primary Care

"In Manitoba, one of the core services provided by the Primary Health Care system. It includes assessment, diagnosis, and treatment of common illnesses generally provided by family physicians and nurses" (Manitoba Health, 2006).

Primary Care Physicians

Family physicians/general practitioners who serve as a patient's first contact.

Quality Based Incentive Funding (QBIF)

Funding provided to clinics for meeting quality targets on selected clinical process indicators (Manitoba Health website: http://www.gov.mb.ca/health/phc/pin/fund.html. Accessed on February 18, 2010).

Tariff

The fee schedule for each service provided by a physician.

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Appendix

Table A1.1: Codes Used to Define the Indicators

Indicator	Codes
Preventive Care	
1. Cervical cancer screening	**Tariffs** 9795, 8498, 8470, 8495, 8496 **Hysterectomy**: ICD 9-CM 68.3 - 68.9; ICD-10 CA 1RM87, 1RM89, 1RM91
2. Childhood immunizations	**DPT (x4), HiB (x4), Polio (x3):** **Tariffs:** 8802, 8804, 8806, 8807 **MMR (x1) Tariffs** 8670, 8621
3. Influenza vaccination for adults aged 65 and older	**Tariffs** 8791, 8792,8799
4. Breast cancer screening	**Tariffs** 7098, 7099, 7104, 7110, 7111
Acute and Chronic Disease Management	
5. Antibiotic prescription management	**ATC code** J01
6. Antidepressant follow-up	**Depression**: ICD-9-CM 296, 311 **Antidepressants**: ATC codes N06AA, N06AB, N06AF, N06AG, N06AX
7. Asthma care	**Asthma**: ICD-9-CM 493, ICD-10 CA J45 **Asthma Drugs:** ATC codes R03A, R03B, R03C, R03D
8. Benzodiazepine prescribing for community-dwelling adults aged 75 and older	**ATC code**: N05B
9. Congestive heart failure (CHF): treatment with an Angiotensin Converting Enzyme Inhibitor (ACEI) or an Angiotensin II Receptor Blockers (ARB)	**CHF:** **Hospital diagnosis:** ICD-10 CA 150 **Medical diagnosis:** ICD-10 CA 428 **ACEI/ARB:** ATC codes C09A, C09B, C09C, C09D
10. Diabetes care	**Diabetes**: **Medical diagnosis:** ICD-9-CM 250 **Hospital diagnosis:** ICD-10 E10,E11,E12, E13,E14 **Optometrist/Ophthalmologist:** MD Bloc 051, 053
11. Post-myocardial infarction care: beta-blocker prescribing	**MI:** ICD-9-CM 410, ICD-10 CA I21, 122 ***Excluding*:** **Asthma:** ICD-9-CM 493, ICD-10 CA J45 **COPD:** ICD-9-CM 491, 492; ICD-10 CA J41-J44 **Peripheral vascular disease:** ICD-9-CM 443, 459; ICD-10 CA I73, I79.2, I87, I9 **Beta-blocker:** ATC codes C07AA, C07AB
12. Post-myocardial infarction care:	**MI**: ICD-9-CM 410

Source: Manitoba Centre for Health Policy, 2010

Table A1.2: Manitoba's Routine Childhood Immunization Schedule (as of January 2001)

AGE	DaPTP*	Hib*	MMR
2 months	**X**	**X**	--
4 months	**X**	**X**	--
6 months	**X**	**X**	--
12 months	--	--	**X**
18 months	**X**	**X**	--

*DaPTP and Hib are given as "one needle"

D or d	-	diphtheria	M	-	measles (red measles)
aP	-	accelular pertussis (whooping cough)	M	-	mumps
			R	-	rubella (german measles)
T	-	tetanus			
P	-	polio			
Hib	-	haemophilus influenzae type B			

Source: Routine Childhood Immunization Schedule (as of January 2001)**.** Communicable Disease Control Unit, Manitoba Health and Healthy Living, May 2001

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