PERCEPTIONS OF ONTARIO'S FIRST UPCOMING DRUG INFORMATION SYSTEM (DIS): NARRATING THE STORY OF CONSUMERS, PRESCRIBERS AND DISPENSERS

PERCEPTIONS OF ONTARIO'S FIRST UPCOMING DRUG INFORMATION SYSTEM (DIS): NARRATING THE STORY OF CONSUMERS, PRESCRIBERS AND DISPENSERS

By

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Abstract

Introduction: eHealth Ontario and the Ministry of Health and Long Term Care (MOHLTC), with funding from Canada Health Infoway, are considering introducing a Drug Information System (DIS). This system will introduce and integrate ePrescribing, eDispensing and electronic data interchange (two-way electronic order communication between physicians via electronic medical records (EMR) systems and pharmacists via pharmacy management systems (PMS) regarding medications), which could radically change the current process of prescribing/dispensing medicines.

Objectives: To gather perceptions of family physicians, community pharmacists and patients on the DIS being implemented in Ontario; and to assess awareness of the DIS. Before such an expensive large-scale system is implemented, areas of concerns should be identified to maximize utilization of the system.

Study Design: Three different group-specific electronic and paper questionnaires (family physicians, community pharmacists and patients).

Setting: Family physicians, community pharmacists and patients. The aim was to receive **35** questionnaire responses from each group from Waterloo, Hamilton, Guelph and the Greater Toronto Area in Ontario.

Methods: A Literature search was conducted to study the current two-way electronic order communication systems and perceptions of prescribers, dispensers and patients on ePrescribing or eDispensing within primary care. Group-specific questionnaires, used with consent from a Scottish study, were altered and tailored for Ontarians, and distributed to all 3 groups via convenience and snowball sampling. Study findings were compared to the same Scottish study.

Results: The 'adjusted' response rates were 82% (patients), 72% (community pharmacists) and 60% (family physicians). All three groups were in favour of DIS being implemented in Ontario. Generally only the pharmacist group had any knowledge of DIS before this survey. Most respondents agreed that patient care would improve with the implementation of DIS.

Conclusion: Implementation of the DIS in Ontario is perceived as a good idea amongst all pharmacists, family physicians and patients. However, eHealth Ontario and MOHLTC need to increase awareness amongst all three, but mostly consumer and prescriber groups of the potential benefits of the DIS in order for them to accept and adapt to this new system.

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List of Abbreviations

ADE	Adverse Drug Event
CHC	Community Health Centre
DIS	Drug Information System
DPV	Drug Profile Viewer
EDI	Electronic Data Interchange
EMR	Electronic Medical Record
eDispensing	Electronic Dispensing
ePrescribing	Electronic Prescribing
EPS	Electronic Prescription System
ER	Emergency Room
HIAL	Health Information Access Layer
MOHLTC	Ministry of Health and Long-Term Care
n.s	Non-significant
ODB	Ontario Drug Benefits Program
OTC	Over the counter
PHIPA	Personal Health Information Protection Act
PMS	Pharmacy Management System
Q	Question

1.0 Introduction

1.1 WHAT IS A DIS AND THE RATIONALE FOR IMPLEMENTING IT

A drug information system (DIS) is the two-way electronic order communication system between physicians and pharmacists that integrates ePrescribing, eDispensing and electronic data Interchange (EDI) of patient medications. Ontario is actively engaged on a project to introduce a DIS, beginning in 2012. Canada Health Infoway is funding eHealth Ontario for the creation of the DIS[1]. This DIS will support jurisdictional projects that will result in interoperable systems that enable authorized healthcare providers to access, manage, share, and safeguard patients' medication histories[1].

According to the Pan Canadian Standards, a DIS has four generations[16]. The first generation of DIS is defined as the data repository populated by claims information[16]. Provinces such as British Columbia, Alberta and Prince Edward Island were some of the first provinces in Canada to implement the first generation of a provincial DIS[16]. The second generation of DIS is defined as a drug repository in place for all drugs and all people with access available to the drug profile to physicians, pharmacists and hospitals (especially emergency departments) [16]. DIS generation 2 enables authorized pharmacists and prescribers to securely view online a patient's medication profile including prior and current medications[16]. It can also allow enhanced medication reconciliation and drug interaction alert checking. Many provinces are now either undergoing an implementation or have already updated to the second generation of DIS.

According to the Pan Canadian Standards, DIS generation 3 is defined to have features such as online ordering of a patient's medication that can be sent to any pharmacy by the physician; online viewing of a patient's medication profile by a physician or pharmacist regardless of the location - e.g. the profile will include prior prescriptions, current medications; electronic retrieval of prescriptions by pharmacists to fill the prescription; and online decision support tools for physicians and pharmacists - e.g. drug interaction alerts to avoid medication errors[16.]

DIS generation 4 will be the final generation of DIS and will include a built-in clinical decision support system for both the prescribers and dispensers[16]. Ontario will be the first province to not only directly implement a third generation of DIS but also include some functionality from the fourth generation.

Many jurisdictions in Canada that have already implemented DIS generation 1 are currently in the process of updating to generation 3. Those that have no DIS are in the process of implementing either DIS generation 2 or DIS generation 3. To date, none of the jurisdictions within Canada have implemented a two-way communication between

prescribers and dispensers. Thus the users have not been able to observe its promising and potential benefits as predicted by CHI.

The following figure displays the main concepts of what Canada Health Infoway is targeting to achieve in a DIS. The figure has been inspired by their model and is only a representation of the main components comprising a DIS.

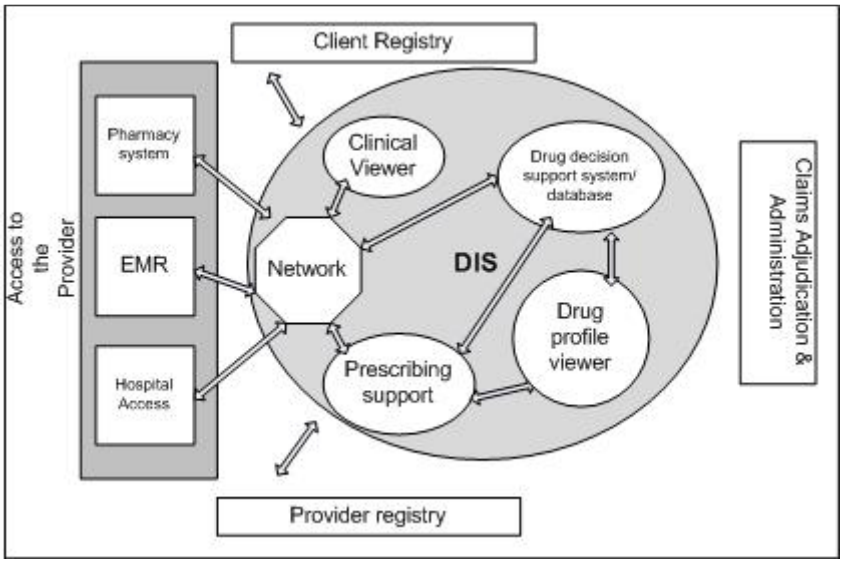

Figure 1: Canada Health Infoway's perception of a drug information system
Source: Drug Information Systems in Canada - from Theory to practice (Canada Health Infoway, 2010)

According to Canada Health Infoway, a DIS consists of the central database, the DPV (Drug Profile Viewer), a clinical viewer, prescribing viewer and a networking component. The networking component will provide DIS access to the provider and client registries, 'maybe' to claims adjudication and administration system and most importantly to the healthcare providers in pharmacies, primary care clinics and perhaps even in hospitals. Figure 2 and 3 illustrate a more simplified version of the DIS communication pathway that will exist once the DIS is implemented.

It is extremely important to understand the layers or the built in features of the DIS before one can fully understand its benefits. Ontario's porposed DIS is planned to have five different types of layers.

1.2 ONTARIO'S PROPOSED DIS AND ITS FEATURES

Ontario has defined an all drugs, all people approach that captures medical information for all people who receive services in Ontario, regardless of their residency. The Ontario Drug Benefit (ODB) Program provides coverage to eligible recipients and access to more than 3,200 drug products[34]. However, before implementing such a large-scale system as the DIS, the views of key stakeholders should be determined to identify areas of concern and to maximize the utilization of this system.

Overall, Ontario's DIS (targeted for 2012) is planned to have five different types, or layers, of related DIS technologies shown in the following Figure 2[16].

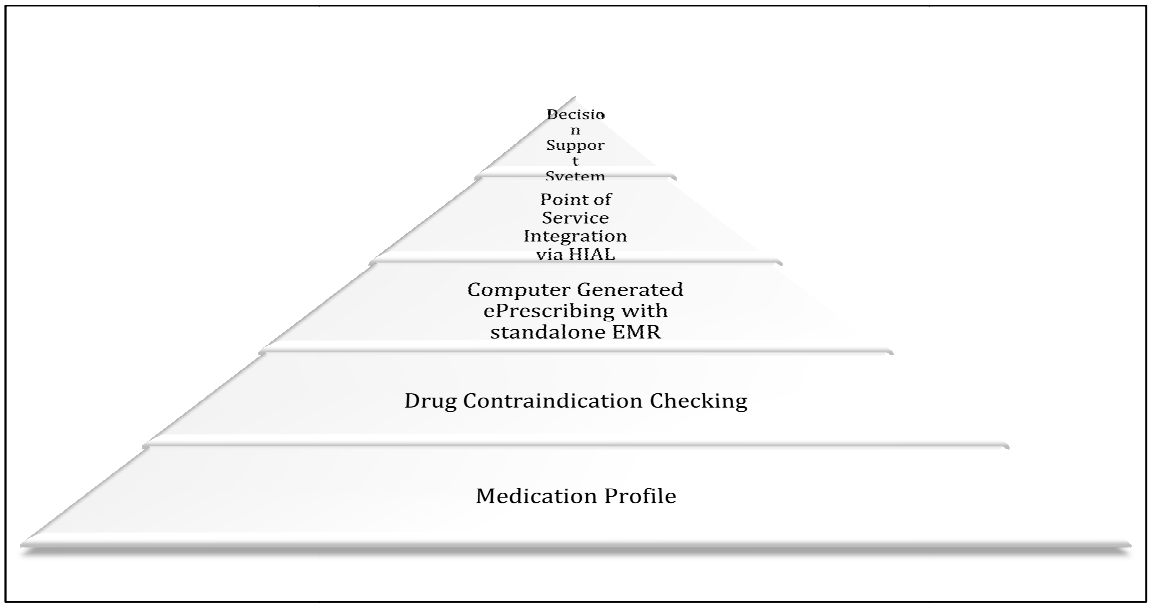

Figure 2: Pyramid diagram displaying layers of DIS
Source: National Impact of Generation 2 Drug Information System Technical Report (Deloitte Analysis, 2010)

The **first layer of the DIS** will consist of the 'medication profile'; a database or drug repository of drugs dispensed to patients[16.] This may or may not exclude over the counter (OTC) drugs and any natural or herbal drugs depending on the DIS project time and financial investments required. The **second layer of the DIS** will have 'drug contraindication checking'. This may include software that tests for drug-allergy and drug-to-drug interaction generating alerts[16]. The second layer will, however, be integrated with PMSs, claims software and EMR systems in primary practices[16]. The **third layer** will continue with more advanced features of the DIS such as 'computer generated ePrescribing with standalone EMR systems[16]. This feature has the ability to generate legible prescriptions, prescriptions that may or may not be printed for patients[16.] The computer-generated ePrescribing will be integrated with drug contraindication checking in the medication profile[16.]

The **fourth layer** of the DIS is planned to have a 'point of service integration', integration between the DIS and PMS; DIS and EMR; and DIS with the central data repository or central information system[16]. All electronic transmission of data back and forth to this central data repository will be connected through the eHealth Ontario Health Information Access Layer (HIAL) [16]. Additionally, the DIS will also have a portal, which will allow access to the DIS through a secure connection via the HIAL.

The final **fifth layer** of the DIS will be its advanced decision support system[16.] The decision support will be based on formulary compliance and evidence based medication prescribing tailored to patient specific circumstances[16.] For the purpose of better understanding these layers, a basic pyramid diagram has been constructed to show the various layers of the DIS (see Figure 2).

The following Figure 3 represents assumptions strictly on the IT stucture of the DIS. This figure is only based on the current understanding of the two way communications within DIS made only for the purpose of this thesis.

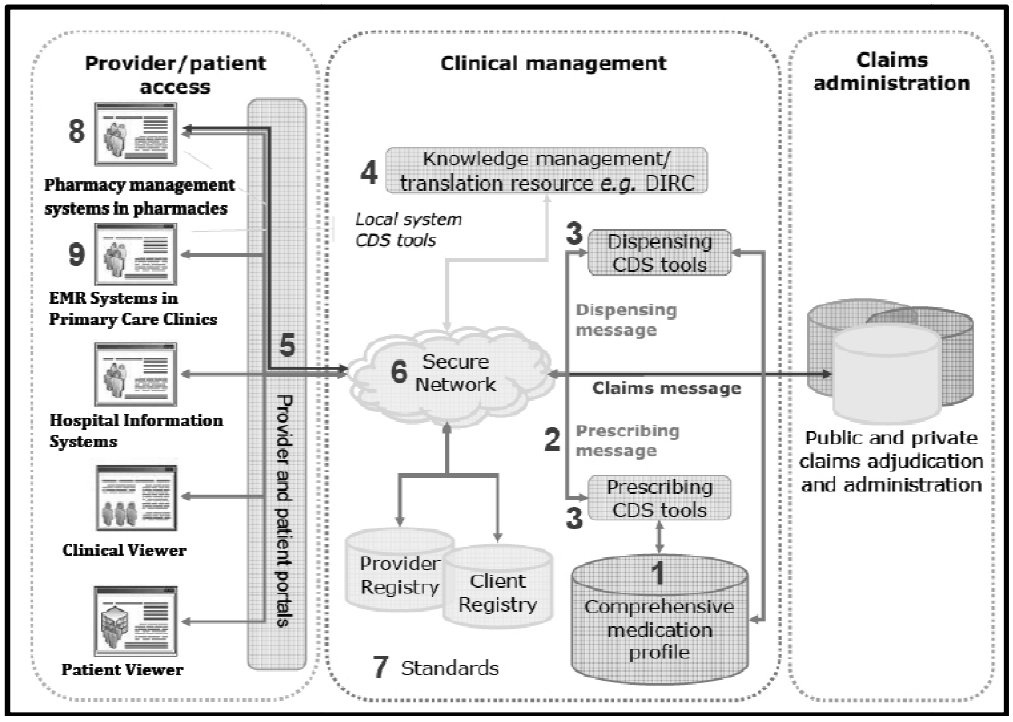

Figure 3: Ontario's potential Drug information system (DIS)
Source: Adapted from Drug Information Systems in Canada - from Theory to practice (Canada Health Infoway, 2010)

Once the layers of the Ontario's upcoming DIS have been undertood, it is much easier to understand the rationale and timeline behind implementing such an expensive system.

1.3 ROLLOUT SCHEDULE FOR ONTARIO'S DIS

Ontario's 2009-2012 eHealth Strategy supports medication management as one of its clinical priorities[1]. In 2010, eHealth Ontario reviewed its strategy and confirmed the importance and priority of a DIS to suggest patient care in Ontario[1]. Within the medication management system, four solutions will be developed and extended to include Ontario's DIS. The solutions that will leverage and extend current successful medication management efforts are the ePrescribing demonstration project, DIS, DPV and systemic treatment computerized provider order entry (CPOE) [1.]

eHealth Ontario is committed to achieve the solution they intend to procure and implement a provincial DIS that includes a comprehensive drug history, drug utilization review tools (decision support) and ePrescribing[1]. To achieve this, they are hoping to create a comprehensive medication record for all Ontarians by tracking all pharmacy dispensing transactions. Their aim is to give clinicians access to patients' drug profiles and prescribing guidelines when ordering prescriptions and enable them to submit a request for refills online, receive automated adherence alerts and find reliable drug information[1].

1.4 REASONS FOR IMPLEMENTING DIS

Canada Health Infoway's (CHI) decision to support DIS jurisdiction is based on seven main factors: reduction in ADEs; reduction in medication abuse; timely access to information; an improvement in the provider efficiency, communications and net costs; improvement in drug cost management; increase in medication compliance; and increase in satisfaction from stakeholders such as physicians, pharmacists and patients [16].

ADEs by far are the highest cause of morbidity and mortality that potentially can be improved with the implementation of a DIS. According to Baker et al., adverse drug events (ADEs) are unintended injuries or complications that are purely a consequence of healthcare management mistake, mismanagement, or both instead of being caused by normal progression of a patient's disease[15]. These ADEs can sometimes be fatal or cause chronic disability, prolonged hospital stays, or both. Most of the ADEs can be prevented outside of hospitals (outpatients) through the implementation of a DIS[15]. The U.S. Agency for Healthcare Research Quality reported that incidence rates of ADEs vary from 0.02% to 0.07% per 100 admissions amongst hospitals that have conducted ADE studies [66; 67; 68; 69; 70]. According to Canada Health Infoway (2010), for every 1,000 Canadian hospital admissions, 75 people suffer an ADE; for every 1,000 patients with ambulatory encounter, 20 have an ADE; for every 1,000 patients discharged from hospital, 90 suffer an ADE; for every 1,000 laboratory tests performed, up to 150 tests are unnecessary; for every 1,000 emergency room (ER) visits, 320 patients are identified with an information gap, resulting an average increase stay of 1.2 hours; and for every 1,000 Canadians

recommended for influenza protection, 370-430 would not get vaccinated[19].

For each medical prescription, the DIS will check for allergy alerts and drug-to-drug interactions against the patient's complete medication profile[1; 19]. These systems will drastically reduce the number of ADEs by providing physicians and pharmacists with information to support appropriate and accurate prescribing and dispensing[1]. British Columbia's Pharma Net accounted for 55 million prescriptions with 29 million potential drug interactions that resulted in 30,000-prescription changes[73; 16]. A Newfoundland and Labrador DIS-study identified duplicated therapy in 7.2% of seniors, out of which 64.7% had at least one or more inappropriate drugs, duplicate therapy or a potential of a drug-to-drug interaction[41; 16]. The Canadian National Survey of Pharmacists reported a 45.8% average improvement in ability to reduce drug related problems with the introduction of a second generation DIS[74; 16].

In addition to the ADEs, prescription medication abuse is also one of the prime concerns for prescribers in both primary care clinics and hospitals[16]. The term prescription drug abuse usually refers to any misuse or non-medical use of a controlled pharmaceutical drug[75]. Evidence suggests that Canadians are one of the heaviest consumers of psychotropic medication in the world[76]. A broad range of individuals abuse prescription drugs and their reasons vary widely. However, the available evidence suggests that, in general, adolescents, older adults, women, and Aboriginal people are at elevated risk to abuse prescription drugs[77]. The National Institute on Drug Abuse reported that 16.2 million US citizens over the age of 12 have taken prescription pain relievers, tranquilizers, stimulants or sedatives for nonmedical purposes at least once in a year[71; 16]. A jurisdictional DIS is forecasted to reduce medication abuse by closely monitoring fraudulent drug transactions. According to a survey report on the "*Illegal use of Prescription Drugs in Newfoundland and Labrador*", 90.7% of pharmacists and 83.5% of physicians felt that a pharmacy network would reduce prescription drug abuse[72; 16]. In 2010, The Canadian National Impact reported that the current annual benefits with the introduction of DIS and reduction of medication abuse were estimated at $71 million[16].

With timely access to a patient's complete and accurate medication profile healthcare providers can make quicker and better informed clinical decisions[72; 16]. Other advantages such as improvement in the patient and provider satisfaction also increase with access to a jurisdictional DIS. Thus, providers are looking towards solutions that will enhance and improve their workflow and care for their patients.

With the implementation of a DIS, provider productivity benefits are also expected to grow over time[72; 16]. According to the Canadian National Impact Survey, pharmacists can expect an estimated 10% and 15% increase in productivity in their practice through the use of a generation 2 DIS and generation 3 DIS solutions respectively[16; 72]. In addition, current annual provider productivity benefits, estimated at $139 million are expected to continue as improvements are made with system integrations into primary

practices; access is provided to all users; solution technology is better integrated into clinical workflow; and solution use is optimized[16; 72].

Drug costs are one of the greatest drivers of increasing healthcare expenditures across Canada. According to the Prince Edward Island Benefits Evaluation Study, not only do DISs help pharmacists manage drug costs better during their daily tasks but these data are also invaluable in comprehending and managing drug costs at the health system level[39]. Canadian jurisdictions that have implemented a second generation of DIS have observed modest benefits associated with drug cost management[16]. According to the Canadian National Survey of Pharmacists, approximately 80% of the pharmacists reported that the ability to access and use a DIS contributed to the ability to manage drug costs[72]. Data from the 2005-06 Henry Ford Medical Centre suggests that ePrescribing, one of the critical aspects of DIS, promotes increased generic and lower cost alternative medications, resulting in a 5-year return of interest for an organization with generation 2 DIS estimated at $14 million[16].

Other advantages of a DIS indirectly include increased medication compliance as a result of decreases in ADEs. A UK study (1997) on self- reported medication non-complaince in the elderly suggested that 13.7% of the seniors reported noncompliance, with 10.7% reporting undercompliance and 4.3% reporting over-compliance[78]. A meta-analysis of 11 reports confirmed that 22.7% of ADE hospitalizations were a result of patient noncompliance[2; 16]. Patient adherence to medications has been associated with 62% lower costs for hospital admissions, 13% lower for outpatient visits, 5% fewer ER visits and 49.8% lower overall total healthcare costs[3, 16].

Systems similar to the Ontario DIS have been implemented outside of Canada but they differ in their form and functionality and do not comply with the Pan Canadian Standards. This is why opinions of stakeholders outside of Canada are not directly applicable to a Canadian DIS System. However, limited electronic systems have been implemented in Ontario that, have been proven to be successful in improving the patient quality of care. Their high success rates encourage the implementation of the DIS in Ontario.

1.5 HIGH SUCCESS RATE OF LIMITED ELECTRONIC SYSTEMS IN ONTARIO BEFORE DIS IMPLEMENTATION ENCOURAGES THE NEED FOR DIS IN ONTARIO

Although Ontario does not yet have a functioning DIS, the huge success of projects such as the Drug Profile Viewer (DPV) and the Electronic Prescribing Demonstration Pilot Projects seem promising and encourage the need for a DIS in Ontario.

1.5.1 DRUG PROFILE VIEWER (DPV)

Since October 2005, the DPV system has been available to hospital-based healthcare providers. The initial phase of the DPV system deployment was limited to hospital ERs [17; 43; 44; 45]. A second phase was added to the DPV expansion within other departments of hospitals. Expansion to community health centers (CHC) and to specific pharmacists has also been considered as an easily deployed, low cost opportunity option to further assess the benefits of providing medication data to a provider[17].

The DPV provides information on patients who are supported through the Ontario Public Drug program. Eligible recipients for the DPV include, persons 65 years and older; residents of long-term care homes; persons receiving professional services under the home care program; persons receiving social assistance or disability benefits; persons eligible for benefits under the Trillium Drug Program, which provides coverage to Ontario; and residents who have high prescription drug costs in relation to their incomes[18; 43; 44; 45.]

Use of the DPV in the Toronto General and Toronto Western Hospitals according to DPV Benefits Evaluations Study (2010) has reduced at least one discrepancy from 28.3% to 5.2% and at least one clinically significant discrepancy from 7.6% to 0.9% in patients[19]. In addition, a Deloitte Study confirmed that errors occurred 67% of the time in prescription medication histories before the implementation of the DPV[19].

1.5.2 ELECTRONIC PRESCRIBING DEMONSTRATION PILOT PROJECTS

Two sites, advanced in the use of EMR systems, were selected for the ePrescribing project in 2009: the Group Health Centre in Sault Ste. Marie and Georgian Bay Family Health Team in Collingwood. The College of Nurses of Ontario, College of Physicians and Surgeons of Ontario and the Ontario College of Pharmacists continue to be valuable ePrescribing partners and supported the project with advice regarding regulatory issues[20].

Other than DPV and ePrescribing Project, many other jurisdictions in Canada have already implemented a DIS generation 1. Their success rates are also taken as a positive signal to implement a DIS in Ontario.

1.6 HIGH SUCCESS RATE OF PREVIOUS DIS GENERATIONS IN OTHER CANADIAN PROVINCES ENCOURAGES THE NEED FOR DIS IN ONTARIO

Canada Health Infoway financed an independent pan-Canadian study in 2010 on the current standing and the benefits of DIS generation 2 and any ePrescribing activity. The following table represents the usage of DIS generation 2 across Canadian jurisdictions[14]. Areas that are marked as not applicable (N/A) are still either in the process of implementing the second generation of DIS or will directly skip to generation 3. Currently, British Columbia's system is most advanced with respect to the second generation of DIS implementation. Except Ontario, most of the provinces have successfully implemented DIS generation 2 that are widely accessed by their pharmacists.

Group assessed	National	British Columbia	Alberta	Saskatchewan	Manitoba	Ontario	Prince Edward Island
Community Pharmacy	32%	100%	97%	100%	100%	N/A	100%
Community Prescribers	N/A	28%	N/A	N/A	N/A	N/A	N/A

Table 1: Usage of generation 2 DISs across Canadian Jurisdictions
Source: "The Value of drug information systems to the evolving practice of pharmacy" (Canada Health Infoway, 2010) [14]

With only a limited implementation at the pilot sites, and other provinces, gaining views on the DIS itself has been difficult. Systems similar to the Ontario DIS have been implemented outside of Canada but they differ in their form and functionality and do not comply with the Pan Canadian Standards. This is why opinions of stakeholders outside of Canada are not directly applicable to a Canadian DIS System. However, there is sufficient background literature on EDI systems outside of Canada that explain the critical roles played by physicians, pharmacists and patients and how their roles interplay with the use of an ePrescription system. Although the Ontario DIS is not similar to the systems outside of Canada, perceptional information and other evidences (discussed in detail under literature review) on these systems could help determine the general needs of Ontario stakeholders and help prepare for a DIS that will be implemented provincially.

2.0 Literature Review

It is critical for Ontario to gain perceptions of all stakeholders (physicians, pharmacists and patients) before and during the implementation of such a costly large-scale system and to identify areas of concern to maximize its utilization. The views of stakeholders after the implementation of a DIS (although not directly related to this project) are equally crucial to compare the changes and learn lessons after the DIS implementation.

A thorough litersature search was conducted to study perceptions, statitical evidences and current technological standings of ePrescribing systems outside of Canada that could help determine the general needs of Ontario stakeholders.

2.1 LITERATURE ON HOW **PRESCRIBERS** PERCEIVE EDI WITH DIS AND OTHER EPRESCRIBING TOOLS OR THEIR COMPONENTS

Primary care physicians are the most important stakeholders in delivering the best quality of care to the patients. Their percetions and intake on the DIS before, during and after the implementation are critical in building a DIS.

2.1.1 BEFORE IMPLEMENTATION

Unfortunately, most literature focuses on perceptions and recommendations of physicians after the implementation of an ePrescribing or a two-way EDI system. Very few articles provide actual perceptions before the implementation of a system.

A Scottish study (2003), whose results have been compared to the results of this study, reported that family physicians expected improvements with "repeat prescribing, fewer lost prescriptions and reduction in fraud"[5]. They report that almost half of physicians expected an improvement in patient care with the implemented EDI while the other half "*did not know*"[5]. More than half of the physicians perceived that this EDI system would reduce their workload and more than three quarters of the physicians were hoping that their electronic system would reduce their staff workload[5].

Physicians were also concerned about the consequences and drawback of such systems[5]. Some physicians felt that the systems may lead to technical problems such as system crash or data corruption causing a delay in work while others exhibited more concern regarding the financial investment required to install such a large scale project[5].

A Swedish study (2004) interviewing physicians at the ERs of the South Stockholm Hospital describes physicians' perceptions of possibilities and obstacles prior to implementing an ePrescribing system[24]. The study reported that physicians had high expectations of learning more pharmacology once they had access to the automatically

generated interaction alert system and producer-independent information of drugs[24]. Before the implementation of their ePrescrbing system called the 'Janus System', physicians mostly relied on their personal knowledge for drug interactions such as 'checking' or 'verifying' with paper records, which consumed their time[24].

Many physicians thought that the ePrescribing system would improve accessibility to choose drugs from a "Smart List"[24]. When searching for a drug, it was also helpful for the synonymous drugs to appear with the recommended ones highlighted[24]. All physicians expressed that the duplication of administrative work associated with prescribing was the most time consuming task. There was a unanimous agreement that a more sound system with in-depth training was required to master the use of the Janus System[24].

Physicians also felt that with the introduction of an electronic system, pedagogical contact with the patient diminished[24]. Physicians use paper to explain treatment options to their patients, which may be difficult to do so on computer. Physicians also feared that if the Janus system recommended drugs that patients do not like the system might present compliance challenges and risk patient's consumption of medication[24].

In a US study (2008) discussing the merits of ePrescribing drug alerts in primary care most survey responders were least likely to override allergy-related drug alerts but overrode drug-drug interaction alerts most of the time or always[26]. Responders were annoyed by the drug-drug interaction alert for a drug that was no longer being administered to the patient[26; 27; 28]. Physicians recommended running drug alerts against a current drug regimen instead of the entire medication history to reduce the volume of warnings[26].

2.1.2 DURING THE PROCESS OF IMPLEMENTATION

A US study (2009) assessing the value of ePrescribing in ambulatory care found that most of the participant's decision to adopt ePrescribing was mostly driven by financial incentives offered by insurers[28]. Most valuable attributes of ePrescribing systems that physicians found were convenience of altering medication doses, renewing prescriptions, ensuring legibility and transferring prescriptions to inside and out-of-community pharmacies[28].

One aspect such as loading medication lists into the system can become a major task with many issues[6]. In one US study (2007), because many family physicians had not maintained and updated their patient information (during the ePrescribing implementation process), they had to review the lists all over again and consult the patients to fill in the missing information[6]. Interoperability is also one of the major drawbacks when transferring to an ePrescribing system. The study reported that none of the physicians were able to access their patients' comprehensive list of medications prescribed outside of their practices[6]. Most of the ePrescribing systems described in this study were found to be stand-alone systems that were only able to communicate with other computers solely within the practice[6].

Another US study (2010) reported that practicing physicians who had exclusive access to an EMR system were 1.5 times more likely to adapt to regular use of ePrescribing than physicians with standalone systems[4]. These same physicians with an EMR system were also almost twice as likely to use advanced features of ePrescribing[4]. The study reported that the adoption of ePrescribing occurred less often in smaller practices compared to larger physician practices[4]. The highest rate of adoption (91.5%) was reported in staff that worked in health maintenance organizations as compared to physicians in solo practices who reported the lowest rate (30%) of ePrescribing adoption[4].

A Netherlands study (2004) described limited success of their DIS, despite the cultural factors and the differences between physician values and beliefs regarding their work[21].

In both a UK study (2009) and a US study (2009) respectively, family physicians have often reported prescribing alerts as a source of frustration rather than being assistance in care[27; 28]. Concerns regarding current prescribing prompts, mainly the low specificity of pop-up messages are perceived as unhelpful and often ignored by most physicians[27; 28].

A Swedish study (2009) demonstrated a relationship between the country of residence of physicians and their attitudes towards ePrescribing. They used a web survey to collect data on ePrescribing from Swedish and Austrian physicians. Of the Swedish physicians, 92% regarded ePrescribing as time saving, 88% as being safer and 96% as providing better quality of care for patients when compared to less supportive but mainly positive review from Austrian physicians[47].

A US study (2005) reported that the physicians who believed that their patients liked ePrescribing used the ePrescribing system more than those who only perceived the system to be helpful for the organization[29].

2.1.3 AFTER IMPLEMENTATION

Another Australian study (2003), on the family physicians showed physicians' perceptions of the deficiencies and strengths of their DIS known as the pharmaceutical decision-support systems were determined[23]. The family physicians found drug interaction alerts in the DIS unhelpful and annoying and often they skipped them altogether. Nevertheless, they acknowledged that alerts could sometimes be helpful in known cases of patient allergies especially when certain drugs were contraindicated[23].

A US study (2008) evaluated factors influencing physician use of clinical electronic information technologies. Physicians in practices with high levels of organizational trust and those that took a business approach to practice decision-making had a higher rate of adopting ePrescribing[25]. Physicians in 'practices that value cultures' with physician autonomy also had a higher rate of ePrescribing adoption[25].

2.2 LITERATURE ON HOW **PHARMACISTS** PERCEIVE EDI WITH DIS AND OTHER EPRESCRIBING TOOLS OR THEIR COMPONENTS

Pharmacists play an important role in primary care for many Ontarians. The pharmacists often have insufficient or unclear information to support good outcomes for their patients because they do not often communicate with prescribing physicians. As most prescriptions in Ontario are hand-written, a pharmacist who receives an illegible prescription may try to decipher what is being prescribed with negative outcomes[1]. Pharmacist perceptions and intake on the DIS before, during and after the implementation of the DIS are equally critical in building a DIS.

2.2.1 BEFORE IMPLEMENTATION

The Scottish study (2003) reported that pharmacists in Scotland were strongly in favour of the implementation of an EDI[5]. Pharmacists felt that electronic transfer of prescriptions to them could enhance their role as a health professional[5, 7]. Although almost three quarter of pharmacists agreed that such a system would increase their workload, most pharmacists felt that this system would be beneficial and improve patient health[5].

Similar to physicians, some pharmacists were concerned about the technical drawbacks of the system[5, 7]. A number of pharmacists felt that ePrescribing would not permit flexibility for patients and would be unnecessary because the current technology was sufficient for the healthcare system[5].

In a Canadian study (2008), pharmacists identified five processes, which could affect their professionalism: "*analytical capabilities of the pharmacists and physicians, dissemination of knowledge, integration of process tasks, process automation, and elimination of intermediaries*" [7].

Concurrently, their study also suggested that by strictly regulating professional practice of pharmacists, ePrescribing would improve disciplinary enforcements[7].

In another US study (2007) on measuring the effects of CPOE in clinical pharmacy practices, pharmacy leaders had specific concerns such as incorrect drug doses due to confusion with dosage displays; incorrect prescribing of medication caused by look and sound alike errors; and losing prescriptions because of malfunctioning of CPOE orders[32]. Pharmacy leaders also perceived that CPOE implementation would increase pharmacist participation in clinical decisions, evolve the pharmacy role as a technology expert and increase pharmacist participation in the development of electronic medication order sets[32].

2.2.2 DURING THE PROCESS OF IMPLEMENTATION

A US study (2008) and a Swedish study (2010) respectively collected perceptions of community pharmacists and pharmacist technicians. Pharmacists viewed technology

more positively than their technical counterparts on key aspects such as patient safety, effectiveness and efficiency[31; 48]. However, pharmacists with the introduction of ePrescription and eDispensing scored patient communication lower when compared to the communication with paper systems [31]. Prescribing errors were the most common disadvantage perceived by pharmacist and pharmacist technicians[31]. Many pharmacists also complained that the patients arrived at the pharmacy even before ePrescriptions were received or right after they were received. This did not give the pharmacists sufficient time to electronically dispense medications to satisfy pateints[31].

Studying the effects of ePrescribing for community pharmacists unveiled that pharmacists spent 45% more time correcting problems with ePrescriptions than they had spent on handwritten prescriptions[8]. A US study (1998) also depicted that about 50% of the ePrescriptions had to be cancelled and retyped in the computer system[8]. Newer systems may have overcome this problem.

As a result, quality of ePrescribing is dependent on both the characteristics of the technology such as compatibility with the pharmacy computer system and how the technology is utilized, and how the whole process of ePrescription is executed by the pharmacists[7].

2.2.3 AFTER IMPLEMENTATION

With the implementation of a DIS and the increasing emphasis on medication therapy management and preventative care, the pharmacist role is also rapidly adapting to share roles played by other healthcare providers[14]. With the rollout of the DIS in Ontario, pharmacists will be able to better collaborate with other healthcare providers. They will be able to leverage their professional knowledge to improve patient care and safety as well as prevent harmful drug interactions[14].

The Deloitte report, "*National Impact of GEN 2 DIS Technical Report*", described major findings of the Pan-Canadian electronic survey developed to address questions regarding the usage of existing DIS systems and changes in the roles pharmacists traditionally play at their pharmacies[16]. Pharmacist productivity was observed to increase by 9.6% on average in provinces with a DIS. An increase of 12.6% occurred with mature DISs while a 3.1% increase was observed in provinces with newer, less integrated DISs[16].

2.3 LITERATURE ON HOW **PATIENTS** PERCEIVE EDI WITH DIS AND OTHER EPRESCRIBING TOOLS OR THEIR COMPONENTS

For patients and consumers, the DIS will provide them with their medication history as well as track and record their medical data for personal use[1]. Unfortunately, little information is available on the perceptions of patients before or after the implementation of an ePrescribing, eDispensing or two-way electronic communication system.

2.3.1 BEFORE IMPLEMENTATION

The Scottish study (2003), whose results have been compared to the results of this study, reported in their findings that Scottish patients were well aware of the benefits of an EDI system[5]. The patients expected the system to make prescribing and dispensing process more convenient for them resulting in fewer visits to the physicians for repetitive prescriptions, less waiting at the pharmacy, and a reduced chance of running out of repeat prescriptions[5].

Patient concerns were loss of flexibility, loss of personal service and possible confusion for elderly patients[5]. Some studies such as a UK study (2003) have also suggested that not all patients are supportive of pharmacists extending their role with the introduction of an electronic system[9]. Many patients with various illnesses still consulted their family physicians for even small medication and/or prescription advice instead of asking their pharmacists[9].

2.3.2 DURING THE PROCESS OF IMPLEMENTATION

A UK study (2006) compared views of patients' before and after implementation in secondary care of their DIS known as the ePrescribing and drug administration system[30]. Before implementation of this system, some patients perceived the paper based system to be working effectively[30]. However, other patients perceived the paper based system to be labour intensive. They also raised concerns about medication checks to determine whether prescribed medication was still required or whether there were any delays in administering medication[30]. With the implementation of an electronic system, patients feared that the staff would hold the new system responsible for any mistakes. The patients were also concerned that clinic staff would reduce their interaction with patients[30]. Mostly, patients believed that the introduction of an electronic system was to save time and increase efficiency in addition to reducing errors[30].

After the implementation of their ePrescribing system, patient views were mostly positive about the new system. Several patients perceived the system to be advantageous for the staff whose primary language was not English[30]. The patients also felt the system saved time and increased patient safety[30]. Most patients were still confused about the electronic system and did not think that the system benefitted them directly[30].

A Swedish study (2005) reported that ePrescriptions were picked up faster than paper prescriptions[10]. Another US study (2009) on pharmacy order-processing time reported a 97% reduction in time from composition to verification and a 90% time reduction from pharmacy receipt of the order to its completion by the pharmacist after the implementation of a CPOE system[11].

2.3.3 AFTER IMPLEMENTATION

An Irish study (1989) and a Swedish study (2004) on the effects of ePrescriptions reported an increase in the number of unclaimed prescriptions after the implementation of an integrated hospital computer program[12]. On the other hand, A Swedish study (2004) on unclaimed prescriptions after ePrescription-related information reported that primary non-compliance was low after ePrescribing[13].

In one UK study (2003), a group of patients chose not to make use of the eDispensing system and medication drop-off services because they found it convenient and preferred to collect their prescriptions themselves to confirm that their medications were correct[9]. The same study described another group of patients that preferred not to have face-to-face contact with the physicians or community pharmacists for repeat prescriptions[9]. They preferred to use mail order services to receive their repeat prescriptions. This group of patients, however, used telephone services to obtain advice if needed[9].

2.4 SUMMARY OF THE THREE GROUPS' PERCEPTIONS

All perceptions found in various studies were unique to each target population. Community pharmacists, family physicians and patients each have their own respective issues, concerns or feature considered to be advantageous for a respective ePrescribing or EDI system. However, some studies that sought to study perceptions of all three groups found common ground amongst all three.

A Singaporean study (2009) evaluating user satisfaction with an ePrescription system in primary care group revealed that 85% of family physicians were satisfied with the detection of prescribing errors and the availability of receiving alerts for drug allergy and drug interaction[33]. Simultaneously, over 70% the pharmacy staff was also satisfied with the new prescription system[33]. However, only 57% of respondents from both groups were satisfied with the review function of the new ePrescription system[33].

More than 70% of physician and pharmacist respondents agreed that sufficient training was required before the system was installed and that the necessary measures were established if the system ever shut down[33]. Most of the physicians, pharmacists and patients agreed that ePrescription system reduced the number of prescription errors and medical interventions[33; 31].

Implementation of two-way communication and ePrescribing require extensive communications with pharmacists, patients and physicians to introduce new workflow processes[35]. Most practices that have implemented ePrescribing in their primary care practices used professional champions who were pharmacists or family physicians to help the rest of the work staff adapt to the new workflow changes[35]. According to all three groups, successful implementation and the practice of ePrescribing requires practice transformation[35].

All three groups in the Scottish study have raised security and confidentiality issues associated with prescription related information[5]. Patients reported on being concerned about the unauthorized access by healthcare workers including pharmacy staff [5]. Similarly, physicians have also expressed concern for patient confidentiality and the effects of wider access to patient information on the physician-patient relationship[5]. Pharmacists, however, recognize that security of prescription-related information within the primary care clinics would need to be addressed[5]. All three groups have also expressed concerns on computer hacking, misuse of prescribing information for commercial gain and authentication of the 'sender' and 'recipient' of a two-way ePrescribing and eDispensing system[5].

A US study (2011) that explored experiences of physicians and pharmacists with ePrescribing reported that healthcare providers in primary care practices and pharmacies were generally satisfied with electronic transmission of new prescriptions despite challenges such as interoperability, lack of training and time to get accustomed to the new

system[57]. With the implementation of a huge change such as introduction of ePrescribing and eDispensing in the DIS, factors such as system, processes, time, professional roles, etc, will be impacted[37].

It is not sufficient to just introduce DIS and expect the benefits of this change to take place. Creating a change within the healthcare industry consumes hard work and structure around the impacted setting and its stakeholders to actually make this new change successful. Thus the aim and the objectives of the study are to ascertain the critical factors required for Ontario and its healthcare for a smooth transition to an electronic system called the DIS.

3.0 Methods

3.1 AIM, OBJECTIVES AND OUTCOMES

Before implementing such a large-scale, Ontario-wide DIS, the views of key stakeholders (prescribers, dispensers and patients) should be determined to identify areas of concern to maximize the utilization of the system.

This study is intended to target the perceptions of patients, family physicians, and community pharmacists of Waterloo, Guelph, Hamilton and the Greater Toronto Area. It will focus particularly on opinions of the type of data that should be transferred from a doctor's office to a community pharmacy, any issues of access to specific data, and any security and privacy concerns patients may have for their data. Once the views of the Ontario stakeholders are analyzed, the study findings will be compared to the findings of the Scottish Study[5] (2003) to look for any emerging patterns or difference of opinions between the two group-specific populations.

3.1.1 OBJECTIVES OF THE PROJECT

The specific objectives of the project are to:

- Identify and explore key issues and opinions of patients and consumers on the proposed DIS;
- Identify and explore key issues and opinions of community pharmacists on the proposed DIS;
- Identify and explore key issues and opinions of family physicians on the proposed DIS;
- Identify, compare and contrast key issues and opinions of all three groups (family physicians, pharmacists and consumers and patients) on the proposed DIS;
- Compare and contrast key findings and opinions of the Ontario population with the Scottish population from the Scottish study[5] on the implementation of the DISs.

3.1.2 PROPOSITION:

Before implementing such a large-scale, Ontario wide DIS, the views of key stakeholders (prescribers, dispensers and patients) should be determined to identify areas of concern and to maximize the utilization of this system.

3.1.3 OUTCOMES OF THE PROJECT

The primary outcome of this project is to describe perceptions of family physicians, pharmacists and patients on the DIS being implemented in Ontario. The second outcome is to assess general awareness of this two-way electronic communication between prescribers in primary practices and dispensers in community pharmacies in Ontario. Finally, the third outcome is to compare the findings with the Scottish Study[5] (2003) whose surveys were altered to be used for this study with their consent.

3.2 LITERATURE REVIEW

MEDLINE, PubMed, Cochrane Library, Google Scholar, the McMaster Library, Hamilton Health Sciences Library and the World Wide Web were searched to produce a comprehensive literature review of any data (both academic and corporate) related to EDI, DIS, ePrescribing, eDispensing and any data related to electronic transfer of prescription related information.

Search terms used to find articles included 'ePrescribing and eDispensing', 'electronic prescribing and electronic dispensing', 'electronic data interchange', 'drug information system', and 'two-way electronic order system'. Fifty-eight articles were found with the search terms 'ePrescribing' or 'electronic prescribing' and 'eDispensing' or 'electronic dispensing'. A number of articles retrieved using these search terms focused either on evaluating ePrescribing as a technological system or eDispensing as a technological system, which is why most of them were rejected. About twenty articles that discussed the perceptions of these systems were included for further screening.

Twenty-one articles were retrieved with the search term 'electronic data interchange'. From these twenty-one articles, only five that discussed perceptions on the EDI systems were selected as the rest of the articles either spoke about the policies for EDI systems, technological evaluations on EDI systems or heavily focused on drug interactions and alerts. Twenty-two commercial and industry researched articles were retrieved with the search term 'drug information system'. All these articles focused on the provincial DISs within Canada, which were included in the study as they spoke about either the successful implementation of a provincial DIS within Canada or their successful adoption by pharmacists and physicians within that jurisdiction.

The articles that were included in the study were further screened to make sure they only focused on the 'perceptions' of either a 'two-way electronic drug information system', an 'ePrescribing' or an 'eDispensing' system. Overall, only forty-five articles, all in English, were selected for the literature review of this project.

3.3 INCLUSION CRITERIA

The study population was taken from the Waterloo, Hamilton, Guelph and the Greater Toronto Area. Amongst prescribers, family physicians in primary care practices were eligible. Amongst dispensers, only community pharmacists were eligible. Amongst the patient and consumer population, only patients above the age of 20 who have received prescription medications were eligible.

3.4 EXCLUSION CRITERIA

Hospital related pharmacies were not eligible. Community pharmacies without a PMS were not eligible to participate in the questionnaires. Any family physicians either without any knowledge on an EMR system or an equivalent electronic system were not eligible.

3.5 STUDY QUESTIONNAIRES

All three group-specific study questionnaires were taken from the Scottish study[5] (2003) by the consent of the authors (see appendices for questionnaires). The language of the content was altered and tailored, which could be understood by Ontario's population. Any questions that did not meet the criteria of Ontario's DIS or were too advanced for Ontario's upcoming system or were not appropriate for how prescribing and dispensing are practiced in Ontario were omitted. Depending on the content, some questions were reframed and 2 questions on general views of the DIS were added to each group-specific questionnaire.

3.6 CONTENT OF THE QUESTIONNAIRES

All three group-specific questionnaires (attached in Appendices 1, 2, 3) were divided into subsections or subcategories based on the specific group.

The patient questionnaire (Appendix 1) was divided into six main categories beginning with the patient's use of prescriptions and community pharmacies, repeat prescribing, sharing patient information, their most preferred DIS model, ePrescriptions in general, and demographics. The patient questionnaire had 30 questions. The content on the questions ranged from assessing patient views on visiting pharmacies to their family physician's office, their perceptions on the proposed changes with the implementation of DIS, and whether they would be prepared to change their routine visits to their pharmacies and physician clinics once the DIS would be in place. The format of the patient questionnaire was mostly multiple choice, however, some questions allowed for comments.

The pharmacist questionnaire (Appendix 2) was divided into ten main categories beginning with patient choice of pharmacy, pharmacist access to DIS, electronic communication with family physicians, pharmacist review of patient medication, repeat prescriptions, advance dispensing of prescriptions, security within the pharmacy, training and support, advantages and disadvantages of ePrescriptions, and most preferred model of DIS and general opinions of DIS. Overall, the pharmacist questionnaire had 63 questions.

The content on the questions varied from the patient questions. The pharmacist questionnaire had more in-depth questions specific to the daily routine of a pharmacist's work schedule and how their roles as a healthcare provider will alter with the implementation of the DIS. Pharmacist opinions were asked on patients' selection of pharmacy, aspects of patient information they find most useful in assessing patient health, and the most reliable source of this information. Other questions focused on the views pharmacists have on electronic communication with family physicians and patient information they would be willing to send through DIS, pharmacist views on the possibilities and potential advantages and disadvantages of DIS, and pharmacist views on new services such as repeat prescription collection service, and advance dispensing of medications. Some sections were dedicated on the more important aspects of DIS such as security measures and training and financial responsibility of the DIS.

Similar to other questionnaires, the format of the pharmacist questionnaires was multiple choice, however, a comment section was provided at the end of either each subsection or a detailed question.

The family physician questionnaire (Appendix 3) was divided into six main categories, beginning with current physician computer use, funding ePrescriptions, pharmacist access to patient information, advantages and disadvantages of DIS, implementation of a DIS, repeat prescribing, and general opinions of DIS. Overall, the family physician questionnaire had 53 questions.

It was not as detailed as the pharmacist questionnaire but the content of the questions varied from the physician's current use of EMR systems when prescribing medications to how they felt about the pharmacist access to patients' medical information. The questions asked focused on the physicians' views on security measures of the DIS, training and funding responsibility of the DIS, possibilities and potential advantages and disadvantages of the DIS, and on new services such as repeat prescription collection service.

The format of the physician questionnaire was also multiple choice and there were comment sections at the end of either each subsection or a detailed question.

All three questionnaires concluded with three common questions of whether they perceived the implementation of the DIS as a good principle in Ontario; if they were aware of the implementation of the DIS prior to filling out this questionnaire; and to assess their general interest in this study area.

3.7 METHODOLOGICAL ISSUES ADDRESSED

Once the language and the content of the questionnaires were tailored to the needs of Ontario's population, each of the group-specific questionnaires was sent to group-specific professionals (physicians, pharmacists and patients) to test its reliability and validity

before the questionnaires were sent to the ethics board for clearance. Face validity was assessed by making sure that the professionals were able to logically understand the content in the questionnaires; and able to respond without any problems or hesitation. The answers received from each group-specific questionnaire with their comments were further compared to assess descriptive, content and theoretical validity. Content was altered or a question was omitted if the feedback received implied completely different understanding of the same content between the group-specific professionals.

3.8 ETHICS BOARD

Once the questionnaires were edited, all questionnaires and supporting documents were sent for ethics clearance. The study received its ethics approval through the Office of Research Ethics at the McMaster University.

3.9 INITIAL PLANS OF DISTRIBUTING AND CIRCULATING QUESTIONNAIRES

Initial plans to convey the questionnaires to the target population were to contact both family physicians' and community pharmacists' professional organizations. However, this was not possible due to time and budget constraints. Pharmacy and primary care clinic postal addresses or any other forms of contact information were not provided due to privacy reasons. This is why none of the questionnaires were mailed and the Dillman method could not be employed.

All sampling was based on convenience and snowball methods. Initially, the period to distribute questionnaires and receive responses was set for one month. However because of the low response rate, this period was extended to over 2 months. All three questionnaires were distributed and made accessible to the stakeholders from August 11, 2011 to October 31, 2011. More details on the study groups are included below. The study sought to have 35 completed questionnaires from each of the three groups.

3.10 PROJECT POSTERS

Two posters and 1 fact sheet (see Appendices 7, 8, 9) were designed for stakeholders to explain the study in more detail and for advertising purposes. The posters were delivered to pharmacies and walk-in clinics in the geographic location being studied. If someone in these settings had volunteered to distribute consumer questionnaires these were also delivered. Additionally, all the posters were also made available on the website.

3.11 COVER LETTERS

Several group-specific cover letters were prepared and sent as emails to stakeholders to increase the response rate and ask for them to volunteer and to spread the word to potential participants or both (see Appendix 10).

3.12 PROJECT WEBSITE

A project website was constructed to describe the project. All questionnaires, posters and background information on the study were also available on the website at http://www.disperceptionsurvey.info/index.html for those who would have preferred to receive more information or complete the questionnaires electronically rather than having the questionnaire sent through email. Once participants filled out the questionnaires online, they emailed them to the email address provided in the questionnaires or faxed them to the fax number provided.

3.13 PRESCRIBER SURVEY

Initially, the plan was to contact and network with individual primary practices with EMR solutions in Hamilton and the Greater Toronto Area (if contact information was provided) and request them to complete questionnaires online or on paper if requested (a paper copy would have been provided). As the contact information was not provided by organizations such as the Ontario Medical Association or College of Physicians and Surgeons of Ontario because of security and confidentiality purposes, this was not possible.

Family physicians were contacted through personal acquaintances, some of who were also chosen as representatives of a demographic location. They were asked to be responsible for distributing questionnaires in that location.

Family physicians that were contacted through personal acquaintances received both paper questionnaires and electronic questionnaires via email.

Representatives were chosen from Hamilton, Waterloo, Guelph and the Greater Toronto Area that distributed prescriber questionnaires via email. These contacts often distributed further questionnaires through snowball sampling to other family physicians that met the inclusion criteria. Altogether, 40 questionnaires were distributed. The representatives were individuals that were either in contact with family physicians or were physician champions themselves. The representative chosen from Hamilton distributed approximately 18 questionnaires to physicians at the McMaster Family Health Team and various primary care clinics. Representative from Guelph and Waterloo distributed approximately 7 questionnaires to family health teams in Waterloo and Guelph. Representative in contact with the Markham and Oakville family health team distributed approximately 10 questionnaires to the physicians from Markham and Oakville collectively. The representative from Toronto distributed approximately 5 questionnaires to the physicians in the downtown Toronto family health team. The chosen representatives were provided with an email template they could use to distribute questionnaires through email. They were also reminded every two weeks to check back with the physicians they distributed questionnaires to.

The principal investigator was responsible for personally collecting all paper questionnaires. Physicians that chose the alternative to filling questionnaires on paper contacted their representative upon the completion of their questionnaires, who then contacted the principal investigator to drive to the primary care clinics to collect the survey responses.

Initially, nurse practitioners in primary care clinics were also included in the inclusion criteria for prescriber questionnaires, because they can also prescribe medications after the passing of bill 139 in Ontario. However, as none of the nurse practitioners were found in any of the contacted primary care clinics, only family physicians were targeted.

3.14 PHARMACIST SURVEY

Initially, the plan was to contact and network with community pharmacies with PMS solutions in Hamilton and the Greater Toronto Area (if contact information was provided) and request them to complete questionnaires online or on paper if requested (a paper copy would have been provided). This was not possible because the contact information was not provided due to security and confidentiality.

Community pharmacists were contacted through personal acquaintances, some of which were also chosen as representatives of a demographic location responsible for distributing questionnaires in that location.

Community pharmacists that were contacted through personal acquaintances received both paper questionnaires and electronic questionnaires via email. The aim was to achieve pharmacist survey responses through 2 representatives from McMaster University and many personal contacts from the Waterloo, Hamilton and the Greater Toronto Area.

Representatives were chosen from Hamilton, Waterloo and the Greater Toronto Area that distributed dispenser questionnaires via email. Those who filled in the questionnaires further distributed the questionnaires through snowball sampling to other community pharmacists that met the inclusion criteria. The representatives that helped with the distribution of surveys were individuals that were either in contact with community pharmacies or were pharmacist champions themselves.

The representative chosen from Hamilton distributed approximately 25 questionnaires to pharmacists at the Hamilton and District Pharmacists' Association and various other community pharmacies. Representative from Guelph and Waterloo distributed approximately 5 questionnaires to pharmacies in Waterloo and Guelph. Representative in contact with the Markham and Oakville family health team distributed approximately 5 questionnaires to the pharmacists working in collaboration with the physicians from Markham and Oakville collectively. The representative from Toronto distributed

approximately 5 questionnaires to the pharmacists in downtown Toronto community pharmacies.

The chosen representatives were provided with an email template they could use to distribute questionnaires through email. They were also reminded every two weeks to check back with the pharmacists they distributed questionnaires to. Some pharmacists chose to email or fax the questionnaires directly to the contact information provided, while others chose to send it back to the representatives who then forwarded it to contact information provided.

The principal investigator was responsible for personally collecting all paper questionnaires. Pharmacists that chose the alternative of filling questionnaires on paper contacted their representative upon the completion of their questionnaires, who then contacted the principal investigator, to drive to the community pharmacies to collect the survey responses.

Convenience sampling was also used to personally distribute approximately 10 paper questionnaires to community pharmacies within the geographical areas (such as Oakville and Mississauga) that may be interested in filling out surveys. The responses were either collected after 2-3 weeks or they were faxed back on the fax number provided.

3.15 CONSUMER SURVEY

Initially, the plan was to contact and network with individual primary care clinics and community pharmacies within Hamilton and the Greater Toronto Area (if contact information was provided) to distribute paper questionnaires to their patients, who could complete the questionnaires online or on paper (provided with a return postage envelope). This was not possible, as most of the clinics and pharmacies were not permitting to distribute questionnaires through their offices due to security and confidentiality.

The Oakville Family Health Team and only interested community pharmacies in the Hamilton and the Greater Toronto Area were asked for their support by distributing consumer surveys to patients visiting their pharmacies or clinics. The aim was to get a representative convenient sample on patient population through pharmacies and walk-in clinics. Due to the strict protocol, only two pharmacies in the Oakville area and one walk-in clinic approved to distribute surveys from their locations.

A total of 35 paper questionnaires were distributed amongst community clinics and pharmacies within the Hamilton and Greater Toronto Area. These questionnaires were collected back from time to time, depending on the number of responses received at a particular location.

The website was also included in all patient surveys and advertised on Facebook. In addition to the 35 questionnaires distributed amongst clinics, another 15 were distributed amongst personally known consumers around the community. Upon receiving a

completed questionnaire, all consumers received a $5 gift card to Tim Hortons Coffee Shop. A separate fact sheet and poster for consumers was also attached and distributed along with the surveys (see Appendix 7).

3.16 CONSENT FORMS

Consent forms (required by the Ethics department) were attached to the study so that the study participants could give their consent as they began to fill the questionnaire. eSignature was mostly done by checking a tick box.

Once the questionnaires were returned, all consent forms and requests for further information were detached to be stored and locked in a filing cabinet in the CRL Building at McMaster University. All the data from the questionnaires were organized into systematic and descriptive data.

Questionnaires were to be disqualified if the potential participant did not give their consent by signing in the consent form at the beginning of the survey. Each participant only filled questionnaire once and they were not contacted once the questionnaire was submitted. Participants were able to withdraw from filling out the questionnaire at any time or not submitting the questionnaire after filling it if not desired.

3.17 PROJECT MANAGEMENT

As the principal investigator, regular meetings were held with the supervisor of the study to report progress on the thesis project and with other thesis committee members, if required. Reminders to all potential participants were sent every two weeks who were contacted though email either by the representatives or the principal investigator.

3.18 DATA MANAGEMENT

The data from all the surveys were coded at data entry into three separate group-specific Microsoft Excel files. Upon the completion of databases in Excel, the files were exported to Interpool Stata 9 software. The data were analyzed using descriptive statistical methods such as frequencies, means, and standard deviations. Inferential statistics were used to determine the associations between different variables using chi square test and test of proportions. Stat Plus software was also used to compile descriptive statistics.

The data were also analyzed to look for common concerns or issues, trends or patterns identified for any stakeholders. Once the views of stakeholders (prescribers, dispensers and patients) were organized into systematic and descriptive data, all findings were compared to the findings from the Scottish Study[5]. Once the analysis was completed all data were locked away on McMaster's security server.

Databases were updated as responses were received. Once the databases were created for each group-specific questionnaire to generate results, they were further analyzed to compare them between each group within the study. Chi square tests and test of preferences were also executed to compare the results with the Scottish Study between the group specific populations of Ontario and Scotland. Results generated from simple descriptive statistics within each group-specific questionnaire sections such as 'demographics', 'security', 'advantages and disadvantages', etc. were compared to the Scottish study to look for similarities, differences and for any emerging trends between the populations.

The authors of the Scottish study provided complete data results of the group-specific questionnaires from their study. These results were compared on a group-to-group level and an overall level for similar survey questions.

4.0 Results And Discussion

4.1 RESULTS

Although the aim was to receive 35 questionnaires from each group, a total of 37 consumer questionnaires, 23 physician questionnaires and 36 pharmacist questionnaires were analyzed. Most of the surveys were filled online either through the website or via email and emailed back to the principal investigator. Tables containing the raw data for each group for this study can be seen in Appendices 4, 5, 6.

4.1.1 PATIENT QUESTIONNAIRES

4.1.1.1 RESPONSE RATE

A total of 45 electronic and paper questionnaires were distributed amongst community clinics and pharmacies within the Hamilton and Greater Toronto Area. A total of 37 questionnaires were completed and received. Many consumers (n = 15) chose to complete the questionnaires online.

4.1.1.2 DEMOGRAPHICS

Full demographic details given in Table 2:

Age group		**n=37**	**Percentage**
20-29 years		13	35%
30-39 years		7	19%
40-49 years		7	19%
50-59 years		6	16%
60-69 years		4	11%
70 years and over		0	0
Missing		0	0
Sex	Male	9	24%
	Female	28	76%

Table 2: Demographics of patient responders

Demographics (Q27, Appendix 1) revealed that consumers in the age group of 20-29 years are the largest group to respond (35%) to the surveys. The group 30-39 years and 40-49 years had a same response rate (19%). Age group of 60-69 years was 11%

followed by the age group of 50-59 years (16%). More than three-quarter of the respondents were female (76%).

All of the patients had received prescriptions for themselves (Q1, Appendix 1). About half of the patients (49%) had prescriptions dispensed at least once in three months followed by at least once a year (30%). Only 19% of the patients had their prescriptions dispensed in less than a year.

Table 3 (Q2, Appendix 1) shows that most of the consumers (68%) paid only their dispensing fee while their work or other insurance covered the rest of the medication charges. About a fifth of the consumers (20%) revealed that they paid full prices for the medications.

How much do patients usually pay for their prescriptions?	**Percentage (n=37)**
I pay dispensing fee and my work or other insurance pays the rest	68%
I pay full prices for my drugs (I have no insurance coverage)	19%
I am a senior and I pay $6.11 per prescription with a $100 deductible per year	8%
I am a senior and I pay $2 per prescription (Ontario Drug Benefit)	0%

Table 3: How much do patients usually pay for their prescriptions

4.1.1.3 USE OF COMMUNITY PHARMACIES

About 32% (n=12) of the patients (Q3, Appendix 1) 'always used the same pharmacy' to have their prescriptions dispensed. Most of the patients (43%) usually chose the same pharmacy while 24% (n=9) never chose the same pharmacy. There was a statistically significant association (p=0.004) between age group and the choice of using the same pharmacy. That is, patients below the age of 30 years never used the same pharmacy while patients above the age of 40 years usually or always chose to use the same pharmacy.

However, when patients were asked how important it was for them to be able to choose a 'different' pharmacy (Q4, Appendix 1), most of the consumers (43%) preferred the flexibility of having their prescription dispensed based on convenience. For a small portion (22%), it was important to always use the same pharmacy. About 50% of consumers over the age of 50 chose 'not at all important' to use a 'different' pharmacy. While there was a significant association between age group and choice of using the 'same' pharmacy, there was no significant association ($p>0.01$) with age and choice of using a 'different' pharmacy. Patients for whom it was very important to select a different pharmacy all the time (8%) were all under the age of 30 years. About 27% of the patients reported that they would not mind if they had to use the same pharmacy all the time.

Table 4 (Q4, Appendix 1) shows the percentage number of patient respondents that feel it is important for them to be able to choose a different pharmacy each time they have prescriptions dispensed.

How important is it for the patient to be able to choose a different pharmacy each time they have prescriptions dispensed	Percentage (n=37)
Not at all, I will always use the same one	22%
Not important – although I do not always use the same pharmacy, I would not mind if I had to use the same one all the time	27%
Quite important, I like the flexibility of getting my prescription dispensed where convenient	43%
Very important, it would be impossible for me to use the same pharmacy all the time	8%

Table 4: How important it is for the patient to be able to choose a different pharmacy each time they have prescriptions dispensed

If the patient's choice of pharmacy did not have the medications in stock, only 16% (n=6) would choose to not take their prescription to another pharmacy while 30% (n=14) would choose to always take their prescription to a different pharmacy (Q5, Appendix 1).

4.1.1.4 EPRESCRIPTIONS

When asked, if their family physicians or nurse practitioners already used a computer to print out a paper prescription, about 30% (n=11) of the patient respondents noted that their family physician already used a computer to print out paper prescriptions, while more than half of the patients (54%) said that their family physician or nurse practitioner did not use a computer to print out paper prescriptions (Q6, Appendix 1).

Patient respondents were asked if they were annoyed or 'put off' by their family physician typing on the computer during clinic visit (Q7, Appendix 1). None of the patients were annoyed if their family physician or nurse practitioner typed on the computer during their clinic appointment. Half of the patients (51%) were not bothered by not receiving a print out of the ePrescription by their family physician while 35% (n=13) would prefer to receive a copy of the prescription.

4.1.1.5 REPEAT PRESCRIPTIONS

Patient respondents were asked if they received at least one regular (repeat) prescription from their family physician's clinic (Q9, Appendix 1). Half of patients (49%) said they received repeat prescriptions. There was no statistical association between the age and receiving repeat prescriptions. Younger patient respondents (16%) below the age of 40 also received repeat prescriptions. More than half of the patients (57%) that did receive repeat prescriptions said that their prescription usually lasted for 12 months while 30% said that their prescription lasted for 6 months.

When asked if they would like their family physician or a community pharmacy to start a repeat prescription collection service so that their prescription would be sent directly to their pharmacy (Q10, Appendix 1), almost half (46%) of the patients said they would like this service. Age was not statistically associated with the patients who said they would be in favour of implementing this service.

Patients were asked for their opinion if their family physician could write a repeat prescription that would last for 6 months and their pharmacist could dispense their medication every one to two months (Q11, Appendix 1). Most of the patients (91%) with repeat prescription (n=11) strongly agreed that they would like to receive this service.

When asked to what extent would the patients be prepared to always visit the same pharmacy if this 'repeat prescription collection service' was actually implemented (Q12, Appendix 1), 88% of those who said they would like this new service strongly agreed that they would continue to like this new repeat prescription service even if it meant always using the same pharmacy.

When specifically asked on how often they would be prepared to visit the same pharmacy for repeat prescriptions only, all patients (n=4) who liked this new system and strongly agreed to using the same pharmacy agreed that they would find it acceptable to return to the pharmacy once a month. Only 41% strongly agreed to this new service but not using the same pharmacy all the time found it acceptable to return to the pharmacy once a month.

Only 16% of the patients found it acceptable to visit the pharmacy once a month during the 6-month period if the repeat prescription service is implemented (Q14, Appendix 1).

Most of the patients with repeat prescriptions were in favour of implementing repeat prescription service with the DIS. It is expected especially with the older patients that the longer the repeat prescription is, the less likely they would want to visit the pharmacy (as there will be no need to visit the pharmacy before the refill time). However, there was no statistical association between how long the patient's repeat prescription lasted and how often they would be prepared to return to the pharmacy to collect a repeat prescription. Figure 4 shows this comparison between how long the patient's current medications would last and how often it was acceptable for them to come to the pharmacy.

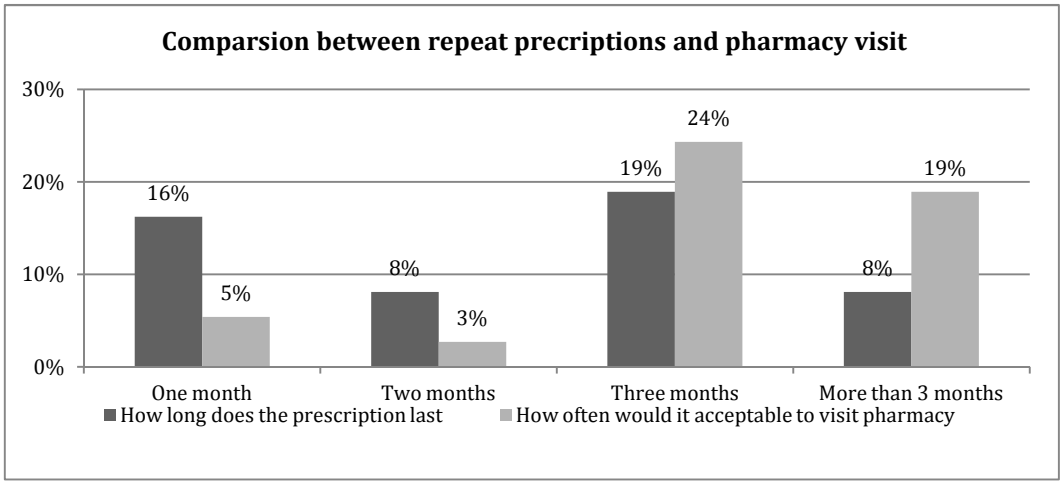

Figure 4: Trend patterns between repeat prescription and acceptable pharmacy visit in 6-month period for patients

When asked if they would like the flexibility to having their repeat medications dispensed anywhere in Ontario, about half of the patient respondents (55%) that did receive repeat prescription said that it would be 'some' or a 'major' advantage to have their repeat prescription dispensed anywhere in Ontario (Q17, Appendix 1).

4.1.1.6 SHARING INFORMATION: DISCUSSING WITH THE PHARMACIST

Patients were asked which aspects of their medical and personal information they would be comfortable discussing with their pharmacist (Q18, Appendix 1). Only 5% (n=2) were not comfortable in discussing any information with their pharmacist. The majority of the patients (95%) were comfortable in discussing the medication they had come to collect. However, more than half (54%) chose not to discuss their test results with their pharmacist. Of these 20 patients, more than half (55%) of the patients were under the age of 40 years. About 38% of the patients also chose not to discuss their lifestyle factors with the pharmacists. Of these 14 patients, 65% were patients under the age of 40 years.

About 82% of the patients (n=30) did not have or did not know if their pharmacy provided a separate area where they can speak privately to the pharmacist without other customers overhearing their conversation (Q19, Appendix 1). When these same 30 patients were further asked if they would be happier to discuss the same medical aspects if they were availed a private area to talk to the pharmacist, only 7% still chose not wanting to discuss any medical information with the pharmacist (Q20, Appendix 1). No statistically significant association was observed between sharing of information with a pharmacist and the presence of a private area available. Similar responses were observed for the discussion of the same medical aspects of patient information if given the choice of a private area.

Table 5 represents the number of patients happy to discuss their patient information anywhere or in a private area. The patients that were willing to discuss their information in a private area were patients that did not know they had or did not have a private area in their pharmacy to discuss their patient information with their pharmacist.

Discussion items on patients happy to discuss their patient information anywhere on or in a private area only		**Happy to discuss anytime Percentage (n=37)**	**Discuss in a private area Percentage (n=30)**
Medical problems you have had in the past		54%	60%
Test results	Blood tests	46%	57%
	Urine tests	46%	57%
	Blood pressure	51%	50%
	Lung function tests	46%	50%

Table 5: Patients happy to discuss their patient information any time or only in a private area

Only a 6% (p>0.05) increase was observed in patients willing to discuss information in a private area when it came to discussing medical problems patients had in the past. An 11% (p>0.05) increase was observed in patients willing to discuss information in a private area with respect to test results such as blood tests and urine tests. Only 7% (p>0.05) of the patients did not want to discuss any information from their medical records with a community pharmacist even if they were provided a private area. However, these percentage differences observed in patient group were not statistically significant for any discussion items (please refer to Table 5).

4.1.1.7 PHARMACIST ACCESS TO MEDICAL RECORDS

Only 11% (n=4) of the patients said that they would not want their community pharmacist to look at any of the their medical records from the EMR system in their family physician's office. The majority of the patients answered they were happy for the pharmacist to access their 'current' medications from EMR systems in their doctor's office when asked if they would be happy for their pharmacists to look at medical records (Q21, Appendix 1). Figure 5 displays the percentage of patient respondents that report on being happy for their pharmacist to access information from the EMR systems in their doctor's office.

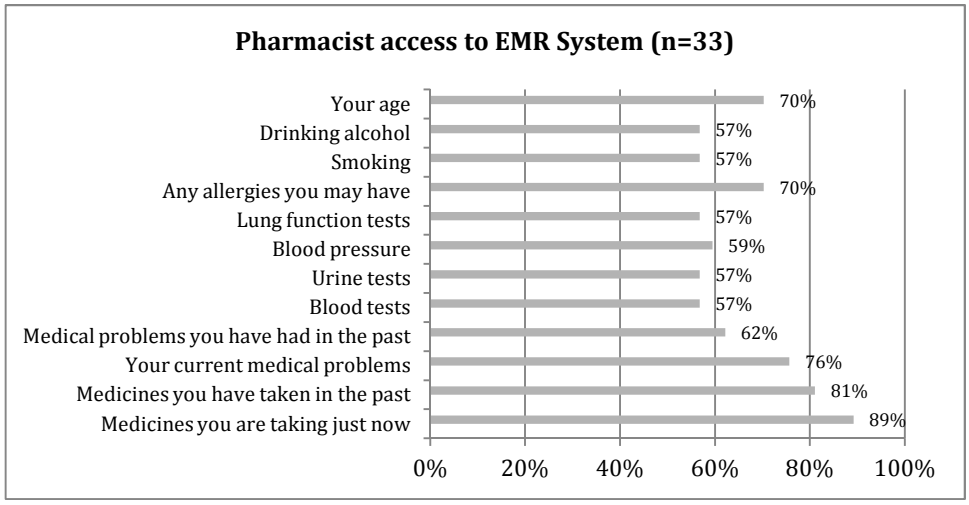

Figure 5: Patients respondents report on being happy for their pharmacist to access information from the EMR system in their doctor's office

When asked if patients would be happy for the pharmacist to access their 'past' medications from EMR systems in their doctor's office, the number dropped to 80% from 89%. There was no statistical association with age; all age groups had similar views on pharmacists accessing their medical records.

4.1.1.8 PHYSICIAN ACCESSING INFORMATION VIA PHARMACISTS

Patients were asked what types of information they would accept their community pharmacist to pass along to their family physician and other clinic staff (Q22, Appendix 1). Only 8% of the respondents said they did not want their community pharmacist to pass any information to their family physician while the rest did not mind. All age groups had similar opinions on physician access to patient information through pharmacists. Figure 6 represents the percentage of patient respondents who did not mind their pharmacists sending their acceptable medical information to their family physicians.

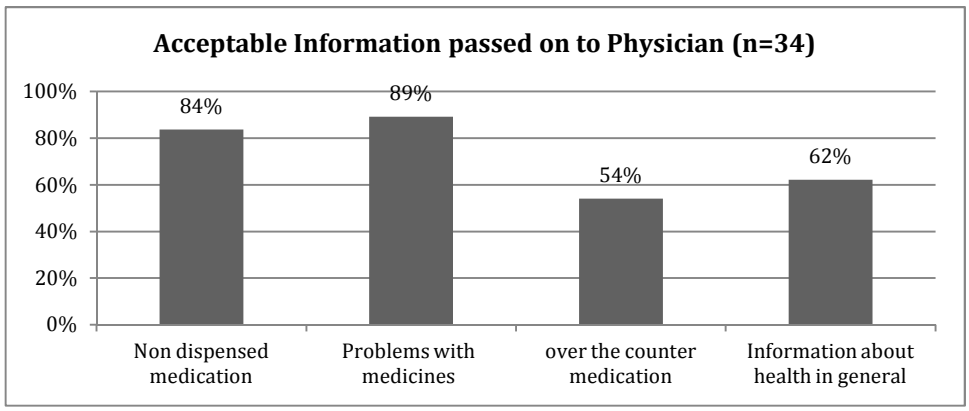

Figure 6: Acceptable medical information by the patients passed onto the family physician by the pharmacists (n = 34)

The majority of the patients found it acceptable for physicians to have access to information such as their problems with medicines through their pharmacists. About 8% (n=3) did not want a community pharmacist to pass any information about them to their family physician.

4.1.1.9 SECURITY AND CONFIDENTIALITY OF MEDICAL INFORMATION

When asked how confident patients were with the security of the DIS (Q23, Appendix 1) about 14% of the patients were not at all confident with the security of the system. Only 27% (n=10) were extremely confident in the security while 59% were somewhat confident. There was no significant association found between age groups and confidence on the security.

4.1.1.10 EXEMPTION OF ODB INFORMATION FROM DIS

The majority of the patients (78%) said that it would be a good idea to automatically include ODB information in the DIS so that their pharmacist does not have to discuss this with the patient when dispensing their prescriptions (Q24, Appendix 1). However, 22% (n=8) of patients felt that automating ODB information in the DIS would not be a good idea. There was no statistical association found between age and number of respondents agreeing to automate ODB information in the DIS.

4.1.1.11 OPINIONS ON THE ONTARIO DIS

When asked if DIS is a good idea in principle (Q26a, Appendix 1), more than three fourth of the patient respondents (86%) agreed that it would be a good idea to introduce the DIS in Ontario.

Figure 7 displays the views of patient respondents on the implementation of DIS by age group. About 30% of the individuals in the age group of 20-29 years said that the DIS was a good idea in principle.

Most of participants in all age groups thought that implementing the DIS was a good idea in principle. Everyone in the age range of 50-69 years thought that implementing DIS was a good idea.

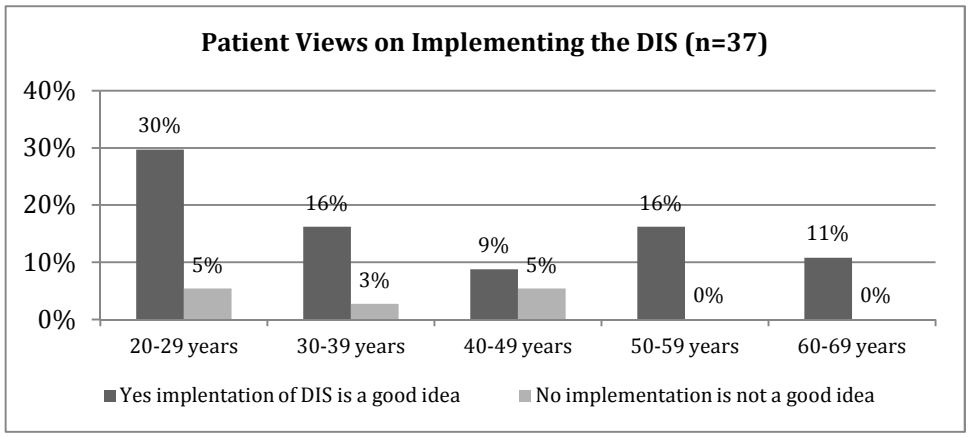

Figure 7: Patient views by age group: whether implementing DIS in Ontario is a good idea in principle

When asked if patients had any information or knowledge on DIS before this study, about three-fourth of the consumers (73%, n=27) said they did not have any knowledge on the implementation of the DIS before this study. The minority of the patients (22%, n=8) did have knowledge on the Ontario DIS before filling out the study questionnaire while 2 of the patient respondents did not know.

4.1.1.12 DIS MODEL PREFERENCES

Three possible models for the Ontario DIS were suggested and patients were asked to rank them in order of preference (Q25, Appendix 1). Table 6 represents the number of times that participants ranked the possible models for Ontario's DIS.

The first choice was that the family physician would directly email the pharmacy of the patient's choice. When the patient would visit their family physician, they could tell their physician the name of the pharmacy they want their ePrescriptions to be sent to. The pharmacist will receive the prescriptions a few minutes after it is sent from the clinic and

have the medication ready for the patient to collect at their convenience. With this model however, once the pharmacy has been chosen, the patient will not be able to change their mind to select another pharmacy.

The second choice for a possible model for the DIS given to the patients was to have a central database that would allow a complete choice of a pharmacy until the last minute. When the patient would ask their family physician for a prescription, the clinician would send this ePrescription to a central database. The patient could then call or visit the pharmacy of their choice. With this model however, the patient will have to wait for their ePrescription to be dispensed just like they have to wait for their paper prescription. With this system, the patient can choose up to the very last minute the pharmacy from which he or she would like his or her prescription dispensed.

The third choice for a possible model for the DIS given to the patients was to have a smart card. With this kind of a model, the patient's prescription information is electronically stored into a smart card, similar to a credit card. At the pharmacy of choice, the patient could then hand in their smart card to the pharmacy staff and the information on the card would be downloaded onto the pharmacy computer. The pharmacist would then dispense patient's prescription in the same way as a paper prescription. Like the database model, this system also allows the patient to choose the pharmacy until the last minute. However, with this model, the patient or their representative will have to visit the pharmacy in person to dispense their medications.

Table 6 presents patient rankings on their most preferred choice of DIS models.

System models for the Ontario DIS	**Rank of choices (n=37)**			
	Rank 1	**Rank 2**	**Rank 3**	**Missing**
	%	**%**	**%**	**%**
Direct email to pharmacy from physician	44%	24%	33%	27%
Complete choice of pharmacy until last minute or a central database	24%	39%	36%	36%
Smart card	32%	36%	30%	36%

Table 6: Patient preferences and rankings for different models of DIS

The highest ranked preference amongst the patients was to have a prescription sent directly via email to the community pharmacy from the family physician's office. About 44% of the respondents ranked it first followed by a 'smart card system', which was the first preference for 32% of the patients. The choice of a 'central database' or 'complete choice of pharmacy until last minute' was the first choice preference for only 24% of the patients.

In terms of second rankings, 'complete choice of pharmacy' or a 'central database' (39%) was the most popular second ranking followed by 'smart card' (36%) and then to have prescription emailed directly to the community pharmacy (24%).

The third preferences were close together. About 36% of the patients ranked 'complete choice of pharmacy until last min' or a 'central database' as their third ranked preference followed by 'direct email to pharmacy from physician' by 33%, and then 'smart card' preferred by only 30% of patient respondents.

To determine the relative ranking of the three models, points were awarded to each preference. Three points were awarded to the first rank, 2 points to the second rank and 1 point to the third rank. Figure 8 represents these rankings.

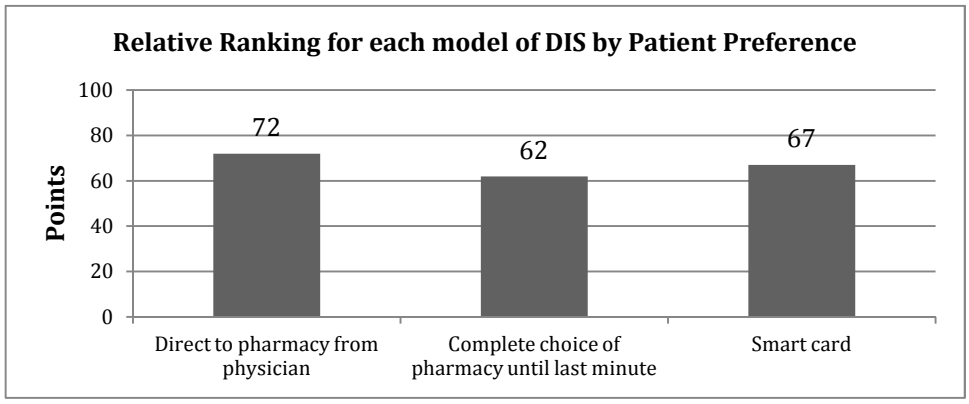

Figure 8: Rankings of each system by consumer preferences

The DIS model which most respondents ranked as their first choice was prescription information sent directly to the pharmacist via email by the physician followed by smart card and then complete choice of pharmacy until last minute or central database ranked third.

'Direct email to pharmacy from physician's office' was the first choice for age groups 30-39 years (57%), 50-59 years (50%) and 60-69 years (75%). The preference, 'complete choice of pharmacy until the last minute' or a 'central database' was 'only' dominant in the age group 20-29 years (46%) while 'smart card' was only a first preference for the age group 40-49 years (57%).

4.1.1.13 SUMMARY OF THE FINDINGS OF THE CONSUMER QUESTIONNAIRE

Almost all of the patients (86%) across all age groups thought that the implementation of the DIS in Ontario would be a great idea. However, about three quarter of the consumers (73%) did not know about the implementation of the DIS and did not have knowledge or information on the DIS before responding to the questionnaire for this study.

The preferred model for the DIS was the one that sends ePrescriptions directly to the pharmacy of the patient's choice from their physician's clinic via an email.

With respect to using the same pharmacy, patients below the age of 30 years never used the same pharmacy and liked the convenience of being able to change their pharmacy while patients above the age of 40 years usually or always chose to use the same pharmacy. Additionally, almost half (46%) of the patients said they would like their family physician or a community pharmacy to start a repeat prescription collection service so that their prescription would be sent directly to their pharmacy.

The majority of the patients (55%) that did receive repeat prescription said that it would be 'some' or a 'major' advantage to have their repeat prescription dispensed anywhere in Ontario. About 82% of the patients did not have or did not know if their pharmacy provided a separate area where they can speak privately to the pharmacist without other customers overhearing their conversation.

Most of the patients were happy for the pharmacist to access their current medications from the EMR systems in their doctor's office. Only 27% were extremely confident in the security of the DIS while 59% were somewhat confident.

The majority of the patients (78%) said that it would be good idea to automatically include ODB information in the DIS so that the pharmacist would not have to discuss this with the patient when dispensing their prescriptions.

4.1.2 PHARMACIST QUESTIONNAIRES

4.1.2.1 RESPONSE RATE

A total of 50 electronic and paper questionnaires were distributed amongst community pharmacies within the Waterloo, Hamilton and the Greater Toronto Area. A total of 36 questionnaires were completed and received. Most pharmacists (n=26) chose to complete the questionnaire online.

4.1.2.2 DEMOGRAPHICS

Full demographic details are provided in the Table 8 below:

		(n=36)	Percentage
Sex	Male	16	44%
	Female	20	56%
Pharmacist Status	Employee	22	61%
	Owner	14	39%
Pharmacy Location	Hamilton	14	39%
	Markham	2	6%
	Mississauga	5	14%
	Oakville	5	14%
	Waterloo	2	6%
	Ajax	2	6%
	North York	1	3%
	Toronto	5	14%
Type of Pharmacy	Large multiple outlets	5	14%
	Single business	31	86%

Table 7: Demographics of pharmacist responders

Approximately half of the pharmacists were women (56%). Most of the pharmacist respondents were from the Hamilton area (39%). More than half of the pharmacist responders (61%) were employees working in community pharmacies while the rest of the pharmacists were self-employed and owners of their businesses as well as the head pharmacists in their pharmacy.

The majority of the pharmacist responders (86%) were from single business pharmacies while only 14% pharmacist responders were employees of large business outlets such as Metro, Rexall, Pharma Plus, Shoppers Drug Mart, Costco, etc.

When asked which pharmacy management system they used (Q49, Appendix 2), 6 systems became evident with Kroll (41%) in the lead, followed by Nexxsys (28%) and Fillware and Flexiplum (8%).

Figure 9 represents the percentages of pharmacists that used various PMSs in their community pharmacies. The system from Kroll (42%) and Nexxsys (28%) were most common.

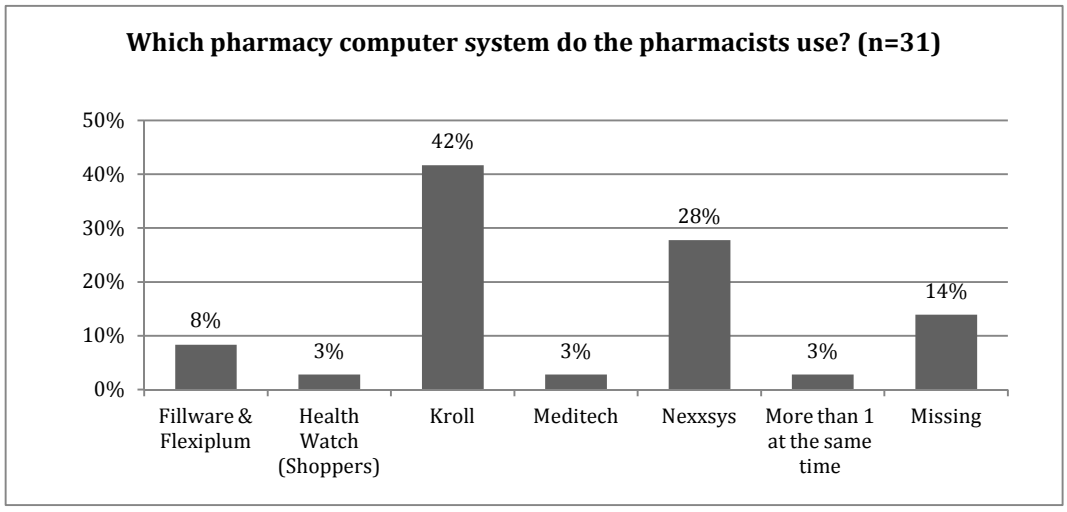

Figure 9: Different PMS used by the pharmacists in their community pharmacies

4.1.2.3 PATIENT'S CHOICE OF PHARMACY

For the patient choice of the pharmacy, where the physicians or nurse practitioners would send prescriptions electronically, pharmacists' opinions varied greatly (Q1, Appendix 2). Most of them (67%) disagreed or strongly disagreed that for physicians or nurses to send ePrescriptions directly to a pharmacy chosen by the patient would be unacceptable to them. Those 25% that did agree or strongly agree (i.e., it would be acceptable to send prescriptions to the pharmacy chosen by the patient) mentioned their concerns and the reasons for their disapproval of this service.

Pharmacists mentioned that many of patients at the time of visit to their physician's office are usually undecided on which pharmacy to choose for dispensing. This could lead to the family physicians or nurse practitioners trying to influence the patient's choice of pharmacy.

Some of the pharmacists emphasized on the importance of maintaining a patient's choice. Other pharmacists were concerned about the increasing burden on the pharmacist if the prescription was accidentally sent to a wrong pharmacy. A few respondents commented that a patient's choice of pharmacy benefitted competition.

4.1.2.4 PHARMACIST ACCESS TO THE PATIENT INFORMATION IN THE DIS

Almost all of the pharmacist respondents (94%) agreed or strongly agreed that they would take the opportunity of playing a greater role in the review of their patient's medication within the DIS (Q16, Appendix 2). They all agreed or strongly agreed (100%) that further review in the DIS would contribute to an improvement in patient's quality of care (Q20, Appendix 2). About half of the pharmacists (47%) also agreed or strongly agreed that their current practice would not allow sufficient time to review patient's medication in more detail than what time is being currently used for review (Q17, Appendix 2).

Furthermore, the majority of the pharmacists also agreed or strongly agreed (66%) that more detailed review of patient medication would only be possible if more time was to be made available to them (Q18, Appendix 2). Seventy percent also agreed or strongly agreed that they would like to be able to charge for the added service of reviewing patient medication in extensive detail (Q19, Appendix 2).

However, when it came to interpreting detailed patient information such as laboratory tests and screening test results, only 25% of the pharmacists agreed or strongly agreed that they are not trained to interpret such data (Q21, Appendix 2). Moreover, 34% also agreed or strongly agreed that community pharmacists should not try to make decisions based on clinical data (Q22, Appendix 2).

Almost everyone (97%) also agreed or strongly agreed that it would be helpful to be able to view the complete medication records of patients who were not their regular customers (Q23, Appendix 2). In fact, the majority of the pharmacists (75%) were even ready to accept any extra liability, which may be associated with increased access to confidential patient information (Q24, Appendix 2). Additionally, most of them (94%) also agreed or strongly agreed that they could provide improved care for the patients if they knew the diagnosis (Q25, Appendix 2).

Pharmacists were asked to rate how useful they would find various aspects of patient information. They were also asked to rate how important the source from where the information was provided would be (Section B, Q3-9, Appendix 2).

Table 9 represents pharmacist views on the usefulness of information for them when dispensing prescription medications.

Usefulness of patient information according to pharmacists	***Values expressed in percentages (n=36)***			
	a) Always useful	**b) Sometimes useful**	**c) Never useful**	**d) Do not know/ Missing**
Sex	83%	17%	0%	0%
Age	92%	8%	0%	0%

Drug allergies		97%	3%	0%	0%
Other allergies		64%	28%	0%	8%
Diagnoses	Only relevant ones	47%	31%	0%	22%
Drug history (*previous 6 months*)		75%	22%	0%	3%
ADEs		81%	17%	0%	3%
Hospital discharge summaries		47%	42%	8%	3%
Screening tests	Cholesterol	19%	47%	3%	31%
	Blood glucose				
	Blood pressure				
Laboratory results	Blood tests	22%	53%	6%	19%
	Urine tests				

Table 8: Usefulness of patient information in the DIS as perceived by pharmacists

Drug allergies were found as 'always useful' for pharmacist respondents (97%) followed by age (92%) and then sex (83%). ADEs were rated as 'always useful' by 81% of the pharmacists (see Table 9).

Table 10 presents what pharmacists feel is the most important source of information to them in dispensing medication.

Useful source of patient information according to the pharmacists		***Values expressed in percentages (n=36)***			
		Medical records	**Ask patient/ representative**	**Both**	**Do not know/ Missing**
Sex		22%	25%	36%	17%
Age		17%	19%	47%	17%
Drug allergies		19%	17%	47%	17%
Other allergies		17%	19%	36%	28%
Diagnoses	Only relevant ones	42%	6%	17%	36%
Drug history (previous 6 months)		47%	3%	28%	22%
ADEs		31%	6%	42%	22%
Hospital discharge summaries		64%	3%	14%	19%
Screening tests	Cholesterol	56%	0%	0%	44%
	Blood glucose				
	Blood pressure				
Laboratory results	Blood tests	58%	0%	0%	42%
	Urine tests				

Table 9: Most useful source of patient information during dispensing according to pharmacists

Pharmacists had mixed views on the more relevant source of information. While obtaining information from 'both' medical records and asking patients was the most

popular category for most aspects such as sex (35%), age (47%), allergies (47%) and ADEs (42%); pharmacists found medical records to be most reliable source of information for diagnoses (42%), drug history (47%), hospital discharge summaries (64%), screening (56%) and laboratory (58%) tests.

4.1.2.5 ELECTRONIC COMMUNICATION WITH FAMILY PHYSICIANS

The majority of the pharmacists (92%) responded that they would be prepared to ask patients for their consent to pass on information on the patient's over-the-counter (OTC) drug purchases to their family physicians (Q10, Appendix 2). However, when asked if they would be prepared to enter such OTC information onto a computer for transfer to the family physicians, the rate of being prepared to pass the information on dropped to 69% (n=25) (Q11, Appendix 2). Most of the pharmacists commented that they were concerned that this OTC information would require screening for completeness before it was passed on, which will take up their time. Pharmacists felt that they would need to be compensated for this work. Some pharmacists said that recording of OTC drug information is already a part of their medication check process with the patient.

When asked if any other information would be useful to transfer electronically via the DIS to the patient's physician, 58% of pharmacists answered yes (Q12, Appendix 2). The information most commonly suggested was drug allergies, ADEs, changes in the dosage of the medication, refill notice, non-adherence issues, suspicions regarding narcotic diversions and duplicate therapy warnings.

When asked if they would like to send this additional information directly to the family physician or through a central database in the DIS, half of the pharmacist respondents (42%) preferred direct messaging while the rest of the half (42%) preferred central database (Q13, Appendix 2). The remaining 6 did not know which option would be optimum.

About 22% of the pharmacists agreed that important information other than the usual information requested by the ODB Program should also be sent to ODB through the DIS (Q14, Appendix 2). The types of additional information suggested were incomes of the seniors and directions for the medication use such as discontinuation of a medication permanently or temporarily.

Simultaneously, 42% of the pharmacists thought it would also be useful to receive information from ODB electronically through the DIS (Q15, Appendix 2). Suggestions included patient narcotic profile updates; laboratory information; duplicated therapy warnings from other pharmacists, particularly narcotic duplications warnings; information related to double doctoring and poly-pharmacy; and eligibility for the senior program, welfare and disability program.

4.1.2.6 ADVANTAGES AND DISADVANTAGES OF THE DIS AND EPRESCRIPTIONS

The pharmacists were asked to rate 10 possible changes of how much of an advantage or disadvantage did they perceive the DIS would have with its implementation (Section I, Q50-59, Appendix 2). Choices were major advantage, some advantage, unsure, some disadvantage, major disadvantage and no opinion. The percentages of the two advantages and disadvantages choices were summed in Table 11 with most highly rated advantages listed first.

Advantages and disadvantages of features of the DIS (n=36)	**Advantage percent**	**Disadvantage percent**
No need to clarify poorly written prescriptions.	89%	0%
Less keying in of prescription information.	86%	0%
No paper copy of the prescription when dispensing.	86%	0%
Accurate cumulative data available on what has been dispensed from pharmacy.	84%	3%
Less need to contact family physicians by telephone.	84%	3%
Fewer errors on prescriptions	81%	3%
No need to sort and count paper prescriptions at the end of the day.	69%	6%
Earlier payment for dispensed medicines from ODB Program and other insurance programs.	67%	1%
No paper prescription with which to identify patient or representative as rightful recipient of medication.	42%	31%
Downloading of prescriptions onto the pharmacy computer may take a few seconds.	41%	17%

Table 10: Advantages and Disadvantages of the DIS according to pharmacists

Not needing to clarify poorly written hand prescription was perceived as the biggest advantage of the DIS (89%). The least liked or perceived as an advantage of the DIS was downloading of prescriptions onto the pharmacy computer taking a few seconds (41%).

Many pharmacist respondents (n=13) were unsure whether they would perceive the 10 described features as advantages or disadvantages. There were many concerns regarding these features. Concerns such as the current lack of computer integration making the described features difficult to evaluate were raised. Other pharmacists commented that the DIS would not change the process of ODB payments - payments would only occur when prescriptions are dispensed and handled electronically. Some pharmacists commented that poorly written prescriptions still occur with ePrescribing or that physicians often choose incorrectly from the drop down menus. Thus, ePrescribing would still need the capability to verify prescriptions, possibly increasing the number of callbacks.

Pharmacists also had comments on features such as automatic count of ePrescriptions in the DIS. Some pharmacists commented that the computer already counted both, hand or ePrescriptions hence felt that the DIS would not help in any way in counting.

Many pharmacists were also concerned about the prescriptions of non-Ontario residents. They commented that not all patients with prescriptions would be from within the province; as well as not all of non-Ontario patients would like ePrescriptions. Other pharmacists commented that some medications might not always be carried at all locations, which meant paper prescriptions could be more convenient as the patient could always carry their paper prescription to the next pharmacy.

4.1.2.7 TRAINING AND SUPPORT

Almost all of the pharmacist respondents (89%) said that training should be provided if the DIS is implemented in Ontario (Q43, Appendix 2). Three-fourth of the pharmacists (75%) said that the training should be provided and paid for by the government (Q44, Appendix 2).

Figure 10 displays the training options presented to the pharmacists. Manuals and distance learning were most popular (58%), followed by help desk or telephone support (50%) and then a training course in their own pharmacy (44%) (Q45, Appendix 2). Pharmacists were allowed to check as many options as they preferred.

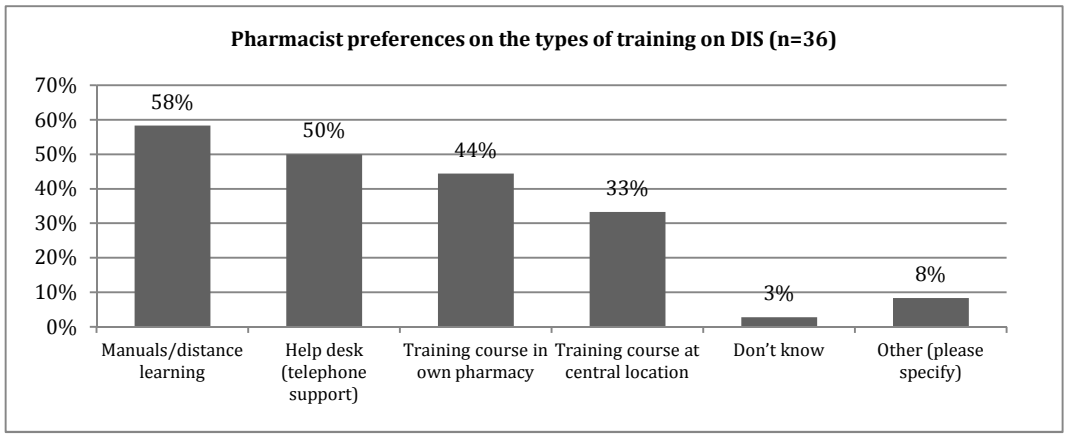

Figure 10: Types of Training preferences for pharmacists once the DIS would be implemented

Figure 11 displays pharmacist preferences on funding for DIS software, hardware and training costs (Q46-48, Appendix 2). Most of the pharmacist respondents (56%) thought that the government should fund software updates.

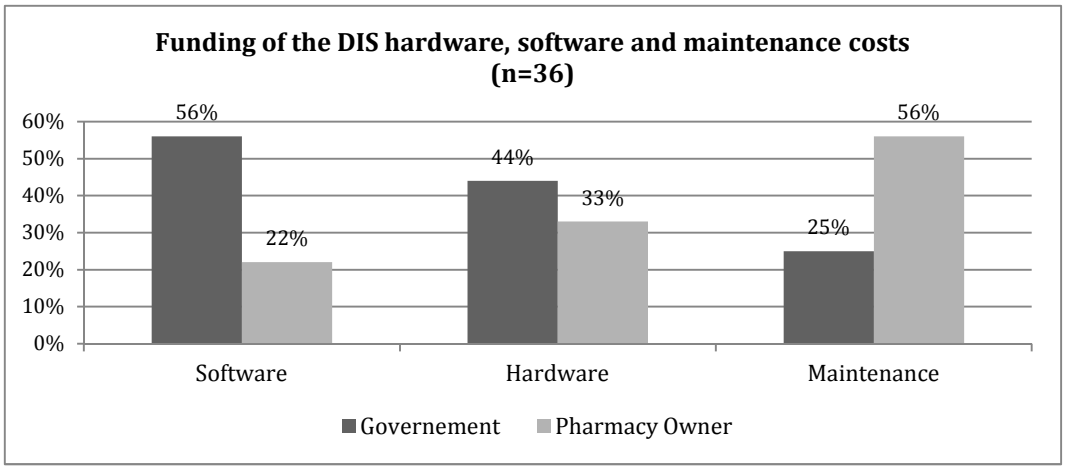

Figure 11: Pharmacist preferences on funding for DIS hardware, software and maintenance

Pharmacist opinions were almost equally divided on the funding for hardware costs. The majority of the pharmacists (44%) voted for the government to pay for the hardware costs associated with the implementation of the DIS. While other pharmacist respondents (33%) thought that the pharmacy owner should be responsible for paying for the hardware costs.

Ongoing maintenance however was thought of as an owner's expense rather than the government's responsibility. A few pharmacist respondents (n=2) said that both the government and the owner should contribute equally for the hardware, software, and maintenance costs associated with the implementation of the DIS. One pharmacist suggested that a well-run pharmacy would make money, which must, in turn, be used to maintain their ability to keep their business functioning. Hence, it would not be the government's role to pay for the DIS costs when the profit would not be shared.

4.1.2.8 SECURITY WITHIN THE PHARMACY FOR THE DIS

Pharmacist respondents were addressed on the security issues posed with the implementation of the DIS. The majority of the pharmacist respondents agreed or strongly agreed with the security measures suggested for the DIS (Section G, Q40-42, Appendix 2). These aspects of security were presented for agreement.

The first aspect was that each of the dispensing staff should log on separately to the computer when using it so that an accurate record can be kept of who accessed, dispensed and endorsed ePrescriptions. The second aspect was that the staff members other than dispensary staff must not have access to the dispensary computers. The third aspect was that the patient medical information available on the pharmacy computer other than the prescription information should only be accessible to qualified pharmacists.

Figure 12 displays the percentage of pharmacists that agreed to these three security measures suggested for the DIS.

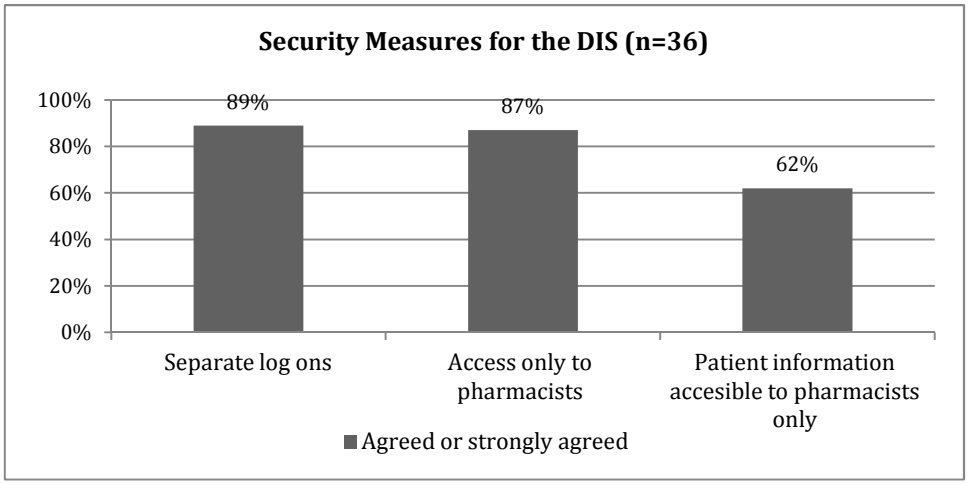

Figure 12: Pharmacist agreement on the suggested security measures for the DIS

The separate log on for staff to monitor and regulate an accurate record of who accessed dispensed and endorsed ePrescriptions was the most popular preference amongst the pharmacist respondents (89%). Patient's medical information available on the pharmacy computer only accessible to qualified pharmacists was the least popular option with 33% disagreement. Some respondents said that access only to prescription information for the rest of the staff would be difficult to regulate with the amount of staff that they currently had. The new DIS may also be perceived to possibly slow down the pharmacists' day-to-day workflow.

4.1.2.9 REPEAT PRESCRIPTIONS

Pharmacists were asked if they would like to get more involved in the management of repeat prescriptions by operating a repeat prescription collection service. This service could allow pharmacists to directly collect prescriptions from a physician's office. About 69% of the pharmacist respondents said they would be in favour of prescription collection service (Q26, Appendix 2). Pharmacists were also asked to rate possible advantages and disadvantages resulting from the implementation of repeat prescribing (Section E, Q27-34, Appendix 2). Choices given to the pharmacists were strongly agree, agree, unsure, disagree, strongly disagree, and no opinion. Table 12 ranks the most highly rated advantages.

Strongly agree and agree were collapsed into one category. Similarly, disagree and strongly disagree were collapsed into one disagree category. Table 12 represents possibilities of DIS that were perceived either as potential advantages or disadvantages of the DIS by the pharmacist respondent group.

Possible advantages and disadvantages of repeat prescribing with the implementation of the DIS (n=36)	Agree percent	Disagree percent
It is important that each installment could be submitted to the ODB Program at the time of dispensing so that reimbursement is not delayed.	92%	0%
Patient care would improve through increased pharmacist intervention	89%	3%
The monthly dispensing interval would have to be flexible to allow for unusual circumstances e.g. patient is going for a 2-month long holiday.	86%	0%
Any improvement in patient care would depend on the patient having each installment dispensed at the same pharmacy.	78%	14%
The computer program should contain barriers to prevent further dispensing before the scheduled date.	67%	27%
This system is likely to reduce wastage caused by dispensing of medication not required by patients.	67%	8%
Using a protocol to interview patients prior to dispensing a repeat prescription would not significantly increase my workload.	25%	50%
Patient care would be worse because the family physician has less involvement in managing the repeat prescription.	11%	73%

Table 11: Advantages and disadvantages on repeat prescribing with the implementation of the DIS according to the pharmacists

The advantage that was rated most popular by almost all pharmacists (92%) with the implementation of the Ontario DIS system was that each installment could be submitted to ODB on time to receive payment on time (Q30, Appendix 2). The two possibilities in the DIS system agreed only by the minority of pharmacists were 'decrease in workload due to a protocol to interview patients prior to dispensing a repeat prescription' and that 'patient care would be worse because of less involvement from the family physician'. More than half of respondents disagreed or strongly disagreed to these two possibilities respectively (50%, 73%).

4.1.2.10 ADVANCE DISPENSING OF PRESCRIPTIONS

Just as the prescription collection service will allow pharmacists to collect prescriptions directly from the physician's office, advanced dispensing will also allow pharmacists to prepare prescriptions ahead of time. The pharmacists were asked whether they agree or disagree with given possibilities that may be potential advantages or disadvantages of advanced dispensing (Section F, Q35-39, Appendix 2).

Choices given to the pharmacists were strongly agree, agree, unsure, disagree, strongly disagree, and no opinion. Strongly agree and agree were collapsed into one category. Similarly, disagree and strongly disagree were collapsed into one disagree category. Table 13 represents possible features of advanced dispensing with the implementation of the DIS that were perceived either as potential advantages or disadvantages of the DIS by the pharmacist respondent group.

Possible advantages and disadvantages of advance dispensing features with the implementation of the DIS (n=36)	Agree percent	Disagree percent
Not having to collect repeat prescriptions from the family physician's office would be more convenient for me.	64%	3%
It would be an advantage if Drug Information System allowed more advance dispensing.	59%	3%
Advance dispensing of this type will result in wastage through patients failing to collect their medication.	50%	25%
Advance dispensing will compromise the quality of care a patient receives.	11%	47%
More advance dispensing would lead to deterioration of the patient/pharmacist professional relationship.	9%	39%

Table 12: Possible advantages and disadvantages of advance dispensing features with the implementation of the DIS

More than half of the pharmacist respondents (59%) agreed that advanced dispensing could be an advantage and should be implemented along with the DIS.

The majority of the pharmacist respondents (47%) disagreed or strongly disagreed that advance dispensing will compromise the quality of care received by the patient or that advance dispensing would lead to deterioration of the patient and pharmacist relationship (39%). Some pharmacists were uncertain whether introduction of this feature would actually help pharmacists in improving their daily work efficiency with respect to dispensing patient medication ahead of time.

Some pharmacist respondents expressed concerns that prescriptions associated with advanced dispensing are often obtained before the patients need their medication. Not all prescriptions need to be filled immediately, thus the concept of advance filling prescriptions assumes that the patient would always run out of their medications before visiting their physician.

Other pharmacist respondents commented that advanced dispensing would likely be beneficial especially when patients were discharged from the hospital. Advance dispensing would allow for seamless care, as it would prevent interruptions in therapy.

4.1.2.11 OPINIONS OF PHARMACISTS ON THE DIS

About 92% of the pharmacist (n=33) responders said that implementation of the DIS would be a good idea in principle (Q60, Appendix 2). Only 2 did not know about the implementation of the DIS before this study. One pharmacist did not think that implementing the DIS was a good idea.

The majority of the pharmacist respondents (n=17, 47%) were aware of the implementation of the DIS before filling out the study questionnaires. Although the majority of the pharmacist respondents were aware of the implementation of DIS before

completing the study questionnaire; 53% (n=18) of respondents had no idea of the DIS implementation or were not sure of the DIS implementation. One pharmacist commented that he only knew of an ePrescription program for narcotic prescriptions to catch fraudulent prescriptions amongst patient groups.

4.1.2.12 DIS MODEL PREFERENCES

Four possible models of DIS were suggested in the questionnaire that pharmacists were asked to rank in order of perceived preference (Q62, Appendix 2). The three suggested models were almost similar to the suggestions made to the patients. The fourth suggestion was an additional choice given to the pharmacist respondents.

The first choice for a possible model for DIS given to the pharmacists was to have a 'barcode' on paper prescriptions. With this kind of a model, the patient's prescription information is electronically allotted a barcode at the family physician's office. At the pharmacy of choice, the patient could then hand in their printed ePrescription to the pharmacy staff and the prescription information verified by the barcode would be downloaded onto the pharmacy computer. The pharmacist would then dispense patient's prescription in the same way as a paper prescription. Like the database model, this system also allows the patient to choose the pharmacy until the last minute. With this model, the patient or their representative must visit the pharmacy to dispense their medications.

The second choice was that the family physician would 'directly email the pharmacy' of the patient's choice. When the patient would visit their family physician, they could tell their physician the name of the pharmacy where they want their ePrescriptions to be sent. The pharmacist will receive the prescriptions a few minutes after it is sent from the clinic and have it ready for the patient to collect at their convenience. With this model however, once the pharmacy has been chosen, the patient will not be able to change their mind to select another pharmacy.

The third choice for a possible model for the DIS given to the pharmacists was to use an existing 'clinic EMR system' or 'related database'. When the family physician would issue an ePrescription to the patient, this ePrescription could be accessed by the pharmacy to download prescription-related data. This model of the DIS would be similar to the model with a central database.

The fourth choice for a possible model for DIS given to the pharmacists was to have a 'central database' that would allow a 'complete choice of pharmacy until the last minute'. When the patient would ask their family physician for a prescription, they would send this ePrescription to a central database. The patient could then call or visit the pharmacy of their choice. With this model the patient will have to wait for their ePrescription to be dispensed similar to their current wait for medication using their paper prescription. With this system, the patient can choose up to the very last minute the pharmacy he or she would like to use.

Table 14 presents pharmacist rankings on their most preferred choice of DIS models.

	Pharmacist percentage rank of choices (n=36)				
	Rank 1	Rank 2	Rank 3	Rank 4	Missing
Models of a DIS	**%**	**%**	**%**	**%**	**%**
Bar code on paper prescription	6%	17%	28%	33%	17%
Email prescriptions directly to pharmacy	25%	8%	33%	25%	8%
Clinic EMR system or related database	14%	47%	8%	14%	17%
Central database	50%	11%	14%	11%	14%

Table 13: Pharmacist preference and rankings for different models of DIS

The DIS model which most respondents (50%) ranked as their first choice was the 'central database' where the family physician can send prescription related data to central database, which can be accessed by the pharmacy, another family practice or the ODB Program. 'Emailing prescriptions directly to the pharmacy' was ranked first by 25% of pharmacist respondents followed by 'clinic EMR system' or 'related database' (14%) and then 'bar codes' on paper prescriptions (6%).

The most popular second ranking was to use a 'clinic EMR system' or 'related database' with 47% (n=17) of votes. 'Bar code' on paper prescription was ranked second by 17% of the pharmacist respondents, followed by 'central database' (11%), and then 'emailing prescriptions directly to pharmacy' (8%).

To determine the relative ranking for the four possible preferences of DIS, points were awarded to each preference. A total of 4 points were awarded to the first rank, 3 points to the second rank, 2 points to the third rank, and 1 point for the fourth. Figure 13 displays the rankings awarded to each of the possible DIS models.

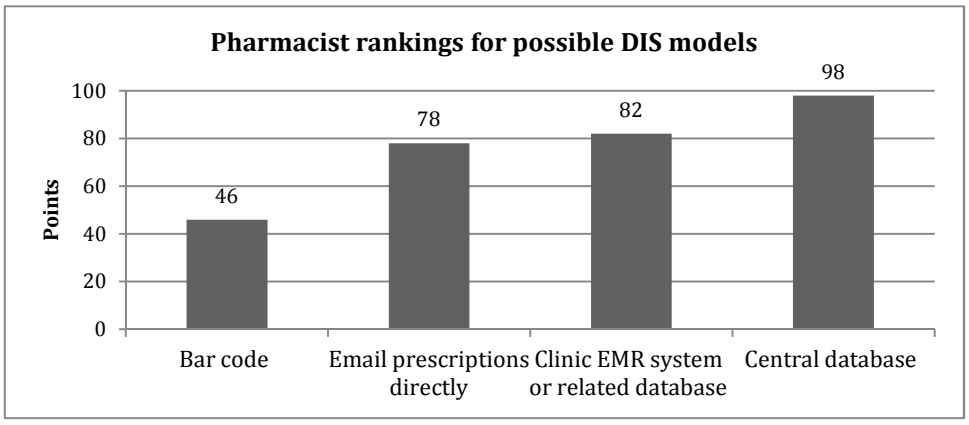

Figure 13: Pharmacist rankings for possible DIS models

The results were similar for the three options: a 'central database', 'clinic EMR system-related database system' and 'direct email' were three closely rated preferences. 'Bar coding' for prescriptions in the DIS was the least popular preference.

4.1.2.13 SUMMARY OF THE FINDINGS OF THE PHARMACIST QUESTIONNAIRE

The majority of the pharmacists thought that the implementation of the DIS in Ontario was a good idea in principle. Almost half of them (47%) had some idea about the implementation of the DIS in Ontario. The preferred model for the DIS was the 'central database', however access to 'clinic EMR systems' and 'direct email prescriptions to pharmacies' were also desirable.

Most pharmacists thought that it is essential for the patient to choose their pharmacy. All pharmacist respondents would like to play a greater role in the review of a patient's medication. However, most of them agreed that this will consume more time and they would like to be remunerated appropriately.

Medical records were the most useful source for obtaining patient information on hospital discharge summaries, screening and laboratory tests, drug history and diagnoses while both medical records and asking a patient or his or her representative were equally useful for obtaining other aspects of information such as sex, age, drug allergies, and ADEs. Most useful information that was always helpful to pharmacists was on drug allergies, followed by age, sex, and ADEs.

The majority of the pharmacists (92%) responded that they would be prepared to ask patients for their consent to pass on their OTC drug purchase information to the patient's family physician.

Pharmacist respondents agreed that training was needed after the implementation of the DIS in Ontario. Pharmacists also agreed that the government should fund all training costs associated with the implementation of the DIS. Furthermore, pharmacists said that the government should also provide funding for the hardware and software costs while pharmacists should pay for the ongoing maintenance.

Pharmacists were favourable to all the security measures such as the separate log on by the pharmacy staff; only dispensary should have access to dispensary computers; and patient information should only be accessible to qualified pharmacists, suggested for the DIS. All pharmacists were concerned about the security and the confidentiality of the DIS in general. However, a few pharmacists commented that with the numerous staff in their pharmacy, it would be impractical for everyone to log on separately.

Most pharmacist respondents agreed to offer a prescription collection service. The advantage most popular and agreed upon by almost all pharmacists (92%) with the implementation of this system was that each installment could be submitted to ODB to receive timely payment.

4.1.3 PHYSICIAN QUESTIONNAIRES

Some physicians chose to email or fax the questionnaires directly on the contact information provided, while others chose to send it back to the representatives who then forwarded it to contact information provided.

4.1.3.1 RESPONSE RATE

Forty electronic and paper questionnaires were distributed amongst community and primary care clinics within the Waterloo, Guelph, Hamilton and the Greater Toronto Area. Twenty-three questionnaires were completed and received. No nurse practitioners completed the questionnaire.

4.1.3.2 DEMOGRAPHICS

Full demographic details are provided in the Table 15. About half of the group was men (52%) and the geographic distribution was broad.

		n=23	%
Sex	Male	12	52%
	Female	11	48%
Clinic Location	Guelph	3	13%
	Hamilton	5	22%
	Markham	3	13%
	Mississauga	2	9%
	Oakville	1	4%
	Toronto	4	17%
	Waterloo	5	22%

Table 14: Demographics of Family Physician responders

4.1.3.3 CURRENT COMPUTER AND EMR USE

The majority of the physician respondents (n=20) said they have an EMR system in their clinic (87%) (Q2, Appendix 3). The EMR systems in the majority of the family physicians' (87%) clinics also included a facility for issuing prescriptions (Q3, Appendix 3).

Family physicians were asked about the extent to which they and their clinic staff use the computer for printing acute prescriptions and repeat prescriptions (Q4 and Q5, Appendix 3).

Figure 14 presents the percentage of physicians and their clinic staff using a computer to print out acute and repeat prescriptions. As repeat prescriptions do not sometimes require a patient visit, they can usually be printed out by the clinic staff if the physician has authorized their clinic to do so. Figure 14 compares the percentage printout of acute prescription 'only' prescribed and printed by physicians and repeat prescriptions that could be printed out by 'both' the physician or the clinic staff.

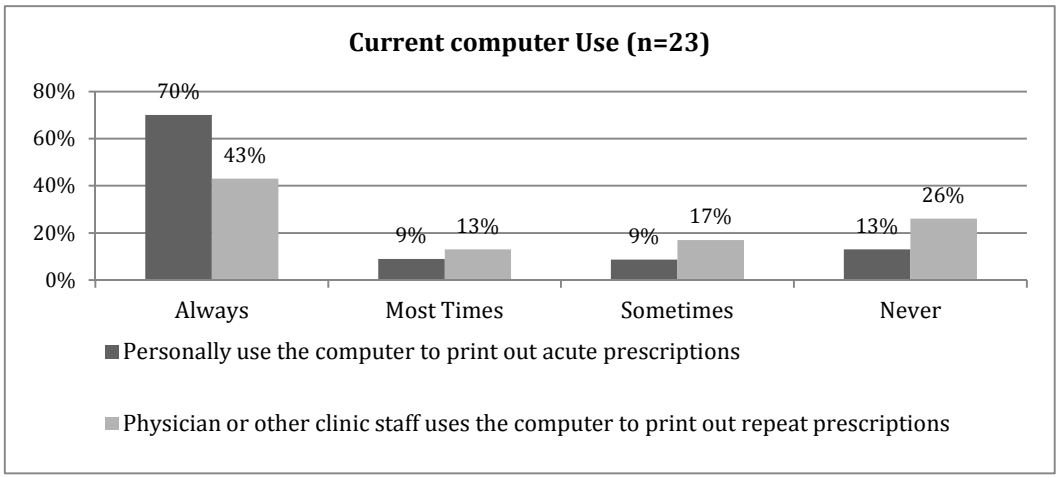

Figure 14: Current computer use by the physician and the clinic staff to printout acute and repeat prescriptions

The majority of the physicians (70%) always used their computer to personally print out acute prescriptions for their patients. However, less than half of the physicians or their staff (43%) used the computer to print out repeat prescriptions.

Physicians were also asked to indicate the type of information that was routinely stored in their EMR system (Q6, Appendix 3). Figure 15 displays the data elements stored in their EMR system.

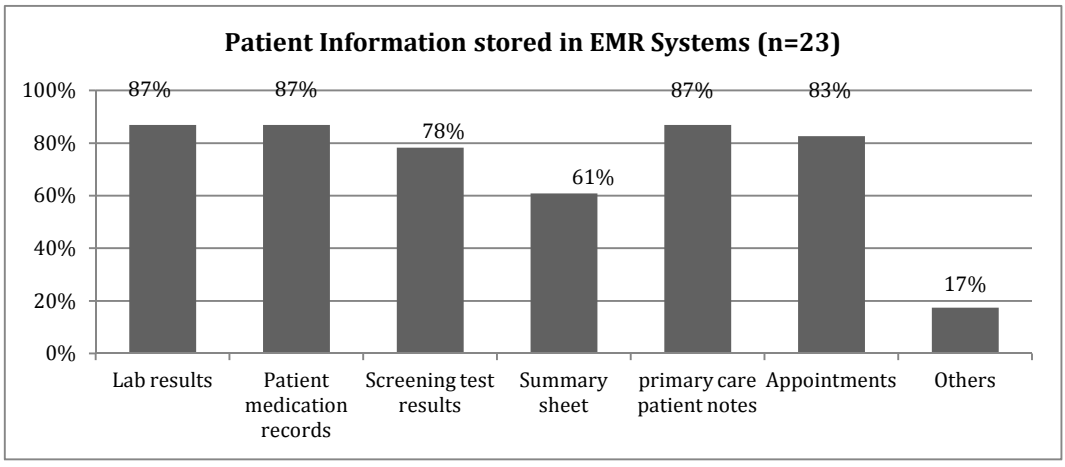

Figure 15: Physician response on patient information stored in their clinic EMR system

EMR systems were evenly used to store laboratory results (87%), patient medication records (87%), and primary care patient notes (87%), followed by appointments (83%).

4.1.3.4 PHARMACIST ACCESS TO PATIENT INFORMATION

Physicians were asked if they ever had a pharmacist working in their clinic for tasks such as patient prescription review, formulary advice, etc. About half of the family physicians (52%) said they never had a pharmacist working in their clinic.

The DIS will ultimately allow electronic transfer of prescription data and it could potentially be modified to allow community pharmacists to gain access to certain types of patient information from clinic records. Physicians were asked for their views on pharmacist access to patient information (Q12-13, Appendix 3). Only some family physicians (n=6, 26%) totally agreed and more than half (n=13, 57%) partly agreed that patient care could improve if the community pharmacists had access to certain confidential information. Some (n=7, 30%) of the physicians were opposed to community pharmacists having any access to any confidential information from EMR systems while almost half of the physician respondents (n=11, 48%) were not opposed to pharmacists accessing patient information through the DIS. Of the twelve physicians who responded they had worked with a pharmacist in their clinic, six were opposed to pharmacists accessing any confidential patient information.

Those eleven physicians that were not opposed to pharmacists accessing patient information were asked to indicate the categories that they found acceptable to be shared with the pharmacists (Q14-29, Appendix 3). Drug history and drug allergies were most acceptable to the physicians to be viewed by pharmacists followed by sex, age, other allergies and ADEs. Very few physicians (less than 20%) found it acceptable to share any of patient test results with the pharmacists.

Table 16 presents the number and percentages of physicians that felt that pharmacists could benefit from having access to the patient's medical information.

Physicians that felt patient care could improve if community pharmacists had access to patient information	**n=23**	**%**
Sex	12	55%
Age	12	55%
Drug allergies	13	59%
Other allergies	12	55%
Relevant diagnoses	10	45%
All diagnoses	4	18%
Drug history	13	59%

Clinic/patient consultation notes	2	9%
ADEs	12	55%
Hospital discharge summaries	3	14%
Cholesterol test results	4	18%
Blood glucose test results	4	18%
Blood pressure test results	4	18%
Blood test results	3	14%
Urine test results	4	18%
Exemption information	8	36%

Table 15: Physician views on categories of patient information that they agree that could be accessible to pharmacists

Some physicians who were opposed to pharmacists accessing patient information listed their concerns regarding pharmacist access to 'all' patient information. They commented that it would be difficult to monitor and regulate strict confidentiality if a patient's personal information would become accessible to many healthcare professionals. Physicians were also concerned that giving access to pharmacists would lead to sale of more pharmaceuticals and provide prescription refills without physically monitoring the patient's condition.

4.1.3.5 ADVANTAGES AND DISADVANTAGES OF THE DIS

Electronic transfer of prescription data to community pharmacists has the potential to bring about various changes in the prescribing process. Family physicians could also receive information about which medicine(s) from other prescribers a patient is using. Family physicians were asked to rate seven possible changes associated with the implementation of the DIS; as to whether they perceived them to be an advantage or disadvantage (Section D, Q30-36, Appendix 3).

Choices given to the physicians were major advantage, some advantage, neither advantage nor disadvantage, some disadvantage, major disadvantage, and no opinion.

Major advantage and some advantage were collapsed into one category. Similarly, major disadvantage and some disadvantage were collapsed into one category. Table 17 represents the seven possible advantages and disadvantages the physicians noted with the implementation of the DIS.

Physician views on potential advantages and disadvantages of features of the DIS (n=23)	**Advantage percent**	**Disadvantage percent**
Information on which prescribed items were not dispensed	83%	4%
Improved patient medication monitoring	82%	4%
Fewer queries from pharmacists concerning illegible/incorrect	82%	0%

scripts		
Collection of data on individual patient OTC purchases from community pharmacies	65%	0%
Ease of collection of data to satisfy clinical governance demands	65%	0%
No paper prescription in your hand to check what you have prescribed	57%	22%
Less personal contact with community pharmacists e.g., fewer telephone calls	52%	13%

Table 16: Physician perceptions on potential advantages and disadvantages of features of the DIS

The physician respondents (n=19) perceived information on non-dispensed prescribed medications as the highest potential advantage, followed by improved monitoring of patient medication and fewer queries from pharmacists on incorrect prescriptions (n=15).

Physicians did not perceive any of the possible features as potential disadvantages of the DIS. Not having a 'paper prescription in their hand' to check what they have prescribed or 'less personal contact with community pharmacists' was only perceived as an advantage by half of the physicians. Otherwise, all other features were perceived as potential advantages by family physicians.

4.1.3.6 IMPLEMENTATION OF THE DIS

Changes to the prescribing system with the implementation of the DIS could mean changes in the primary care working methods. Family physicians were asked about the potential changes they perceived to the daily workflow and work patterns with the introduction of the DIS. This was the only section that had divided views on how the DIS may be implemented and on its emerging effects (Section E, Q37-42, Appendix 3). Some family physicians were unsure of the workflow changes with the implementation of the DIS.

With the implementation of the DIS, patient data that would be entered into EMR systems would be accessible to authorized individuals through the DIS. To update the DIS, physicians will be required to keep their EMR systems updated with complete patient records.

Choices given to the physicians were strongly agree, agree, unsure, disagree, and strongly disagree. Strongly agree and agree were collapsed into one category. Similarly, strongly disagree and disagree were collapsed into one category. Table 18 represents the six possible changes with the implementation of the DIS, either agreed or disagreed by the physician group.

Physician views on the potential changes in prescribing with the implementation of the DIS (n=23)	Agree percent	Unsure percent	Disagree percent
To keep an accurate electronic record of patient visits I would need to enter the data myself	74%	13%	13%
If ePrescriptions are introduced, all those who prescribe should use them	61%	26%	13%
I would be unwilling to try a system I am uncertain of in front of my patients	52%	13%	34%
ePrescribing will reduce staff workload	48%	13%	39%
ePrescribing will reduce physician workload	43%	26%	30%
ePrescribing will reduce prescribing costs	39%	35%	26%

Table 17: Physician perceptions on the potential changes associated with prescribing with implementation of the DIS

Most of the physicians (n=17) agreed that to 'maintain an accurate electronic record of patient visits for the DIS they would need to enter data themselves'. Most of the physicians (n=14) also agreed that 'everyone who prescribed should use ePrescriptions when introduced'; however 6 physicians were unsure of their opinion.

About half of the family physicians (n=12) also agreed that they would be unwilling to try a system with which they were uncertain in front of their patients.

Physician views were evenly divided on whether they would obtain a reduction in clinic staff and physician workload, and clinic prescribing costs with the implementation of the DIS. Figure 16 displays these physician differences in opinions.

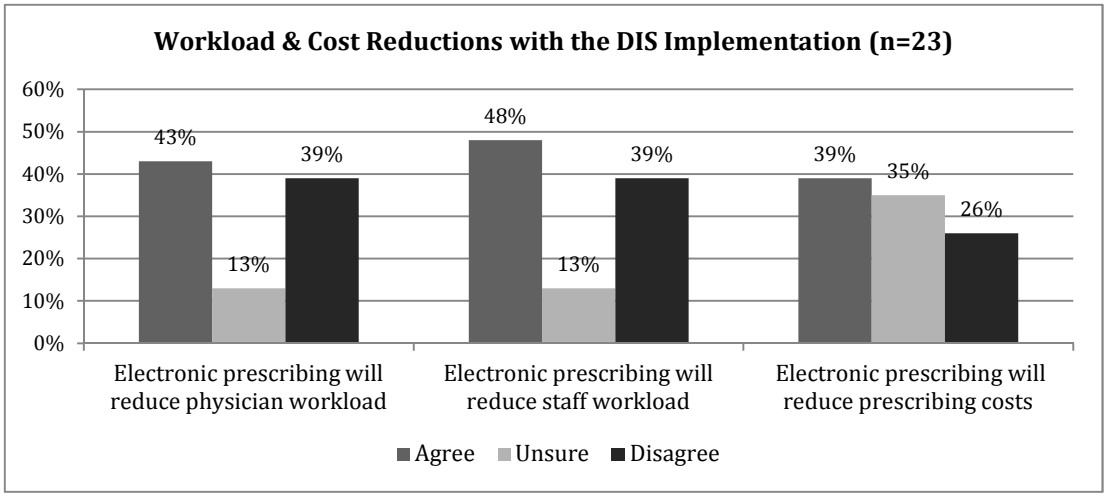

Figure 16: Physician perceptions on the workload and cost reductions with the implementation DIS

Forty-three percent of the physician respondents agreed that ePrescribing would reduce physician workload, while 48% agreed the ePrescribing would reduce staff workload.

4.1.3.7 FUNDING FOR THE DIS

Implementing ePrescriptions is likely to require some initial investment, while using and maintaining the system will also have cost implications. Physicians were asked their views with respect to the hardware, software and training costs associated with the implementation of the DIS (Section B, Q7-10, Appendix 3). Many of the physician respondents agreed that the government should provide funding for any hardware or software (57%) as well as training (61%) required with the implementation of the DIS. However, when it came to running and maintenance costs, about half of the respondents (48%) agreed that both the physicians and the government should share funding (see Figure 17).

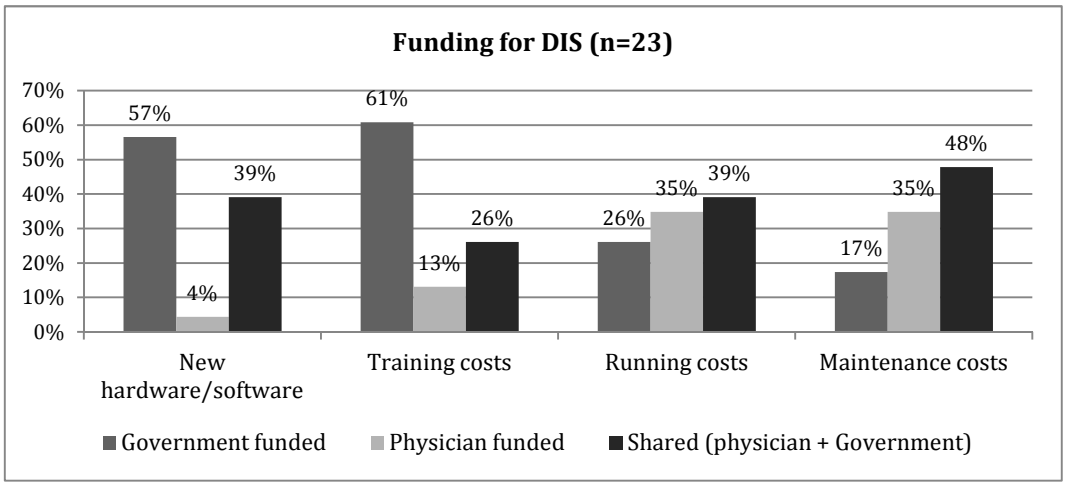

Figure 17: Physician perceptions on who should fund various aspects associated with the implementation of the DIS

4.1.3.8 REPEAT PRESCRIPTION COLLECTION SERVICE

Electronic transfer of prescription data and implementation of the DIS could allow changes in the way repeat prescriptions are issued. Physicians were asked about their perceptions on the introduction of repeat prescribing which would allow pharmacists to play a greater role in managing patients' repeat prescriptions (Section F, Q43-47, Appendix 3).

Choices given to the physicians were strongly agree, agree, unsure, disagree, and strongly disagree. Strongly agree and agree were collapsed into one category. Similarly, strongly disagree and disagree were collapsed into one category. Table 19 represents the five potential features of repeat prescribing with the implementation of the DIS, either agreed or disagreed by the physician group.

Physician views on the potential features of the repeat prescribing service with the implementation of the DIS (n=23)	Agree percent	Disagree percent
No one system would be suitable for all repeat patients	61%	13%
Family physician workload would decrease if such a repeat system was to be implemented	61%	26%
Clinic staff workload would decrease if such a repeat system was to be implemented	52%	30%
Patient care would improve through increased pharmacist intervention	35%	30%
Patient care would be worse because the prescriber has less involvement in managing the repeat prescription	22%	39%

Table 18: Physician perceptions on possible features of repeat prescribing with the implementation of the DIS

The majority of the family physicians (n=14) agreed that no one system of repeat prescribing would be suitable for all patients. Fourteen family physicians agreed that 'family physician workload would decrease' with the implementation of the repeat prescription service.

Physician views on the reduction of workload for clinic staff were also divided. Twelve family physicians agreed that repeat prescribing in the DIS would 'decrease clinic staff workload', while ten were either unsure or did not agree.

The same situation of split perceptions was observed when physicians were asked about their opinions on the improvement of patient care with the introduction of a repeat prescribing service (see Table 19).

Figure 18 displays physician perceptions on the reduction in workload with repeat prescribing with the implementation of the DIS.

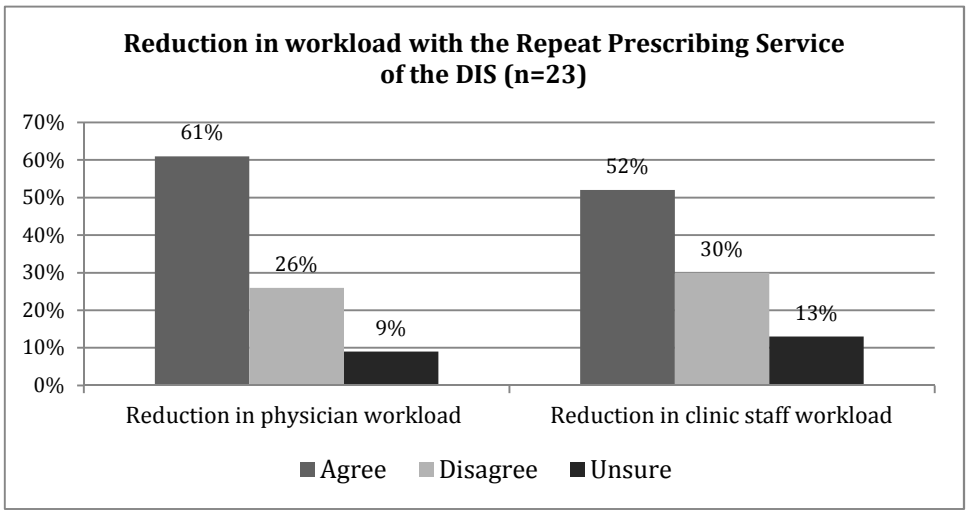

Figure 18: Physician perceptions on the reduction in workload with the implementation of Repeat Prescribing

About 61% of the physician respondents agreed that 'physician workload would decrease' with repeat prescribing while about half (52%) of physician respondents agreed that 'staff workload would decrease' with repeat prescribing service within the DIS.

4.1.3.9 OPINIONS OF FAMILY PHYSICIANS ON THE DIS

The majority of family physicians (83%) said that implementation of the DIS in Ontario was a good idea in principle. About 18% of the physicians either thought that the implementation of the DIS was not a good idea in principle or did not know (Q48, Appendix 3).

Physicians who did think that the DIS was a good idea suggested they could see the potential benefits in the system that included more efficiency and more coordination; better medication tracking especially for narcotic prescriptions and improved effective patient care. Other physicians commented that the DIS could allow for better and more efficient use of resources, reducing costs to patients and to the healthcare system.

Some physician respondents commented that they expect to review prescriptions from other prescribers outside the system with the implementation of the DIS. Physicians also hoped that the DIS would include system alerts if a repeat prescription required refilling and pharmacists would be able to direct patients with chronic conditions who needed repeat prescriptions to visit their physicians every three months.

Because complementary and alternative medicine therapies have often been helpful in treating illness, physicians commented that with the help of the DIS, it would be interesting to be able to track whether the patient was on supplements or pharmaceuticals.

Some family physicians also voiced their concerns with the introduction of the DIS. They commented that implementation of the DIS in clinics that already had an EMR system could add to physicians' workload. Other physicians were more concerned about such technological aspects of the DIS, such as the DIS not being interoperable with existing EMR systems. Physicians also commented that the patients might not like the patient privacy and consent management models associated with the implementation of the DIS.

When asked if they were aware of the DIS being implemented in Ontario, only 17% (n=4) of the physicians said they were aware of this information while, 83% said they did not know (Q49, Appendix 3).

4.1.3.10 SUMMARY OF THE FINDINGS OF THE PHYSICIAN QUESTIONNAIRE

The majority of the family physicians thought that the implementation of the DIS in Ontario was a good idea in principle. Most of the physician respondents (n=20) have been using an EMR system in their clinic with a facility for printing prescriptions (87%). Only 17% were aware of the DIS being implemented in Ontario.

About half of the family physicians (52%) had a pharmacist working in their clinic or had worked with a pharmacist in the past. Most of the family physicians agreed that allowing community pharmacists to access certain patient information would likely improve patient care.

Family physicians unanimously agreed that government should fund new hardware, software and training costs associated with the implementation of the DIS. They also felt that funding should be shared between them and the government for running and the maintenance costs of the DIS.

Physician views were evenly divided on the potential reduction of staff and physician workload as well as a potential reduction in the prescribing costs. The majority of the family physicians agreed that no one system for repeat prescribing would be suitable for all patients. They had mixed opinions whether repeat prescribing would decrease physician and clinic staff workload.

4.1.4 COMPARISON OF PATIENT, COMMUNITY PHARMACIST AND FAMILY PHYSICIAN RESPONSES

Although, the questionnaires were specific to each group and varied in content, some perspectives were still similar. The next section includes comparisons of responses across groups.

4.1.4.1 RESPONSE RATES

Although, the aim was to receive 35 completed questionnaires from each group, total number of questionnaires distributed in each group and the responses received varied. Patients completed 37 questionnaires, pharmacists group completed 36 of 50 questionnaires, and physician group completed 23 of 40 questionnaires.

4.1.4.2 DEMOGRAPHICS

Most of the pharmacy respondents (n=14) were from pharmacies in Hamilton. Most of the family physicians were from clinics in Hamilton (n=5) and Waterloo (n=5).

Patient demographics (Q27, Appendix 1) revealed that consumers in the age group of 20-29 years were the largest group to respond (35%) to the surveys. The group 30-39 years and 40-49 years had a same response rate (19%). More than three-quarter of the respondents were female (76%).

4.1.4.3 AWARENESS OF THE DIS IMPLEMENTATION BEFORE STUDY

Except for half of the respondents in the pharmacist group (47%) that were aware of the upcoming DIS, most patient and physician respondents were not aware of the DIS implementation. Family physicians had the lowest number of respondents with any information on the implementation of DIS (n=4) followed by patients (n=8).

Few respondents in physician, pharmacist and patient groups (9%, 3%, 5% respectively) were either unsure or did not know if they had any information of DIS before this study survey.

4.1.4.4 PRINTING OF EPRESCRIPTIONS

Physicians were asked if they used a computer at all to input patient prescribing data in the EMR systems and print out ePrescriptions instead of using paper prescriptions (Q4, Appendix 3). Similarly, patients were also asked if their physicians used EMR systems to print out their prescriptions, which they could then take to their pharmacy (Q6, Appendix 1). Less than half of the patients (n=11) reported that their physician's gave them a printed prescription compared to more than half of the physicians (n=20) who reported

use of the computer either always, most of the times, or sometimes to print out an ePrescription. Figure 19 displays patient and physician views on printed prescriptions.

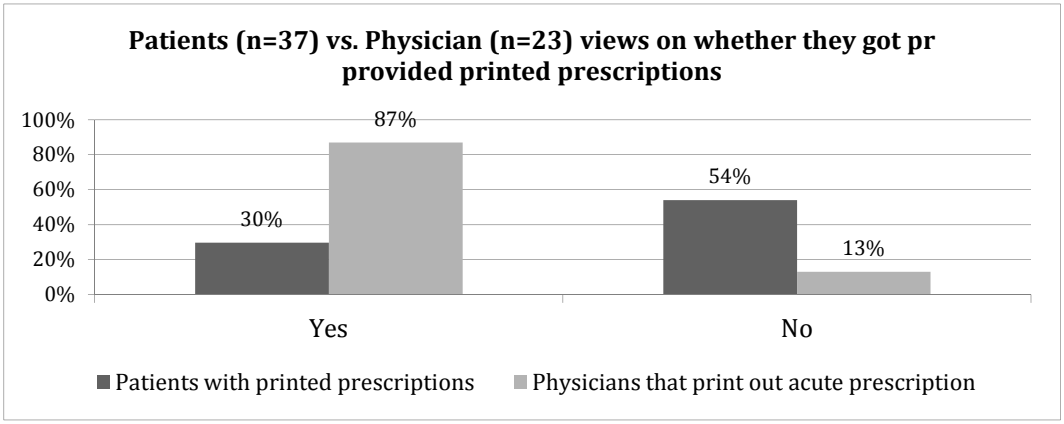

Figure 19: Patients' vs. physicians' views on printed prescriptions

4.1.4.5 FUNDING FOR THE DIS

Both the physician (Section B, Q7-10, Appendix 3) and the pharmacist (Section H, Q43-48, Appendix 2) groups were asked for their views on funding for the DIS. Both pharmacists (50%) and physicians (57%) agreed that the government should fund hardware and software costs. Pharmacists (75%) and physicians (61%) also agreed that the government should fund training costs. Some pharmacists (28%) and physicians (39%) acknowledged that maintenance costs should either be funded by the owner of the pharmacy (for pharmacist group) or shared by both the government and the owner of the primary care clinic (for physician group).

4.1.4.6 PHARMACIST ACCESS TO PATIENT INFORMATION

Physicians were asked for their views on pharmacist access to patients' detailed medical information (Section C, Q12-29, Appendix 3). Alternatively, pharmacists were asked on the same aspects of patients' medical information that they thought were 'always' useful to them (Section B, Q3-9, Appendix 2).

Comparatively a higher percentage of pharmacist respondents reported being in favour of pharmacist access to all 13 aspect of patient information than the physician respondents. A statistically significantly higher number of pharmacists reported the data on sex, age, drug allergies, ADEs and hospital discharge summaries was important for them to view when compared to the physician views on pharmacist access to patient information ($p<0.05$). Please check Table 20 for percentages of physician and pharmacist respondents on pharmacist access to patient information.

patient care data elements	Physician respondents percent (n=23)	Pharmacist respondents percent (n=36)	**Pr test Significance (α= 0.05) n.s= non-significant**
Sex	55%	83%	**p<0.05**
Age	55%	92%	**p<0.05**
Drug allergies	59%	97%	**p<0.05**
Other allergies	55%	64%	n.s
Relevant diagnoses	45%	47%	n.s
Drug history	59%	75%	n.s
ADEs	55%	81%	**p<0.05**
Hospital discharge summaries	14%	47%	**p<0.05**
Cholesterol test results	18%	19%	n.s
Blood glucose test results	18%	19%	n.s
Blood pressure test results	18%	19%	n.s
Blood test results	14%	22%	n.s
Urine test results	18%	22%	n.s

Table 19: Views of Ontario physicians and pharmacists on patient information being available to pharmacists through the Ontario DIS

Most pharmacists said most types of patient information were always useful to them except for laboratory and screening test results. On the other hand, approximately only half of the physician respondents also agreed that patient information on laboratory and screening test results should be made accessible to the pharmacists through the Ontario DIS. Most physicians either perceived the patient's medical information unnecessary for pharmacists or were concerned about patient medication confidentiality.

4.1.4.7 POTENTIAL ADVANTAGES OF THE DIS

Both physician (Section D, Q30-36, Appendix 3) and pharmacist (Section I, Q50-59, Appendix 2) respondents were asked to rate the importance of potential advantages and disadvantages of the DIS. Figure 20 shows the percentage comparison between the physician and pharmacist views.

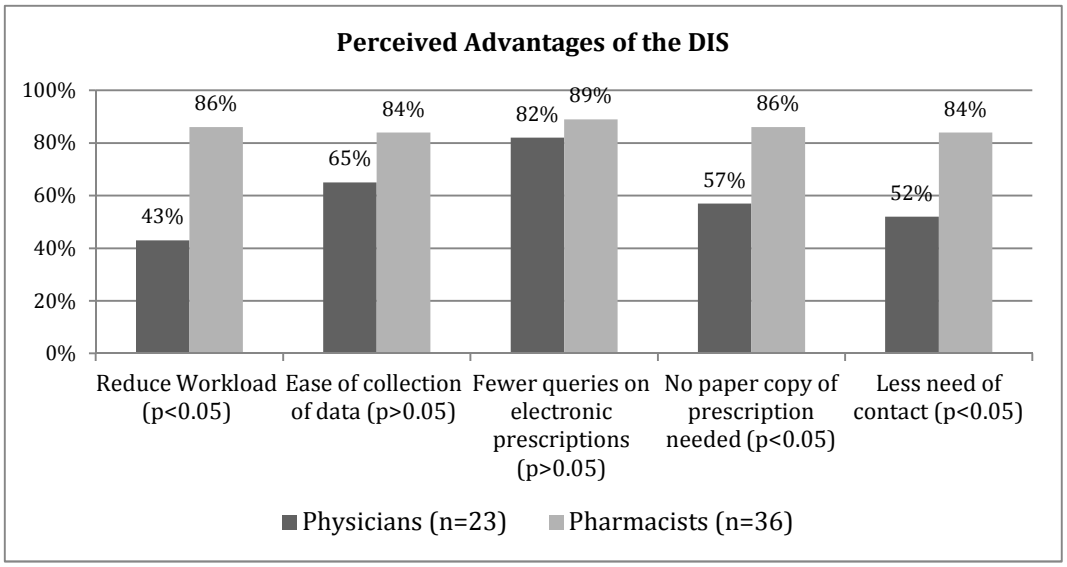

Figure 20: Views of Ontario physicians and pharmacists on potential advantages and disadvantages of the DIS

Both the physician and pharmacist respondents rated 'fewer queries being made on ePrescriptions' as the highest rated potential advantage of the DIS ($p>0.05$). Pharmacists in comparison to the physicians rated all other potential advantages higher. A statistically significantly higher number of pharmacists perceived 'reduction of workload' (86% pharmacists vs. 43% physicians), 'no paper copy of prescription needed' (86% pharmacists vs. 57% physicians), and 'less need of contact with other healthcare professionals' (84% pharmacists vs. 52% physicians) as a perceived advantage of the DIS in comparison to the physicians ($p<0.05$).

4.1.4.8 REPEAT PRESCRIPTION COLLECTION SERVICE

Pharmacists were asked if they would like to operate a repeat prescription collection service (Q26, Appendix 2), a service that allows pharmacists to directly collect prescriptions from physician's office. Patients were asked if they would like their physician's office or community pharmacist to offer this service (Q11, Appendix 1).

More than half of the pharmacists (n=25) were in favour of operating a repeat prescription collection service with the implementation of the DIS while half of the patient respondents (n=17) were in favour of having their community pharmacists or family physicians offer this service to them.

Physician and pharmacist respondents were asked whether 'patient care would improve with increased pharmacist intervention' or would it 'worsen due to less involvement from the prescriber'. Less than half of the physician respondents (35%) agreed that patient care would likely improve with increased pharmacist care but most of the physicians disagreed that patient care could worsen because of less physician intervention with the

prescription collection service. Alternatively, the majority of the pharmacist respondents (89%) believed that 'patient care could improve with the increase in pharmacist intervention' with the exception of a few that agreed, that, patient care could worsen with less involvement from the pharmacists.

4.1.4.9 PHYSICIAN ACCESS TO PATIENT INFORMATION

All three groups were asked about the inclusion of OTC drug information in the DIS. Physicians were asked whether OTC medication purchase information will help them in improving patient care (Q31, Appendix 3). Pharmacists were asked whether they would be prepared to ask patients about their use of OTC drug information and enter it in the DIS to make it electronically available for physicians (Q11, Appendix 2). Patients were asked if they would be willing to share this information with physicians and pharmacists (Q22, Appendix 1).

The majority of the pharmacists (n=33, 92%) were prepared to ask patients about their OTC medication information if OTC medication would be included in the DIS. Only half of the patient respondents (n=20, 54%) however, were willing to share their OTC medication information with physicians, pharmacists or both. More than half of the physicians (n=15, 65%) agreed that OTC medication information would be useful to them in improving quality of patient care and thought the availability of this information as an advantage of the DIS.

The patient group was also asked if they would be willing to share information on prescriptions that have not yet been dispensed. Similarly, the physician group was asked if they would find information on non-dispensed prescribed items to be advantageous in improving patient care. About 84% of patients (n=34) were ready to share this information with physicians. The same percentage of physicians (83%, n= 19) also agreed that this information on non-dispensed medications would be helpful to them in potentially improving the patient's quality of care.

4.1.4.10 COMPARISON OF OPINIONS ON THE DIS

Most of the respondents in all three groups thought that implementing the DIS in Ontario is a good idea in principle: 83% of the family physicians, 92% of the pharmacists, and 86% of the patients.

Physician and patient respondents that did not think that DIS was a good idea were mainly concerned about the security and confidentiality of patient information. Physicians were also concerned that pharmacists might keep issuing repeat prescriptions without the necessary intervention or permission from physicians.

4.1.4.11 PREFERRED MODELS FOR THE DIS

Pharmacists were asked to rank from four suggested models of the Ontario DIS (Q62, Appendix 2) while patients were asked to rank three models (Q25, Appendix 1). Only the 3 common models that were 'ranked first' by both patients and pharmacists have been compared for the purpose of analysis.

Please refer to the pages (52 and 67) for a detailed description of the DIS models for both patient and pharmacist questionnaires.

Figure 21 shows the comparison between the three common DIS models that were ranked first by pharmacists and patients.

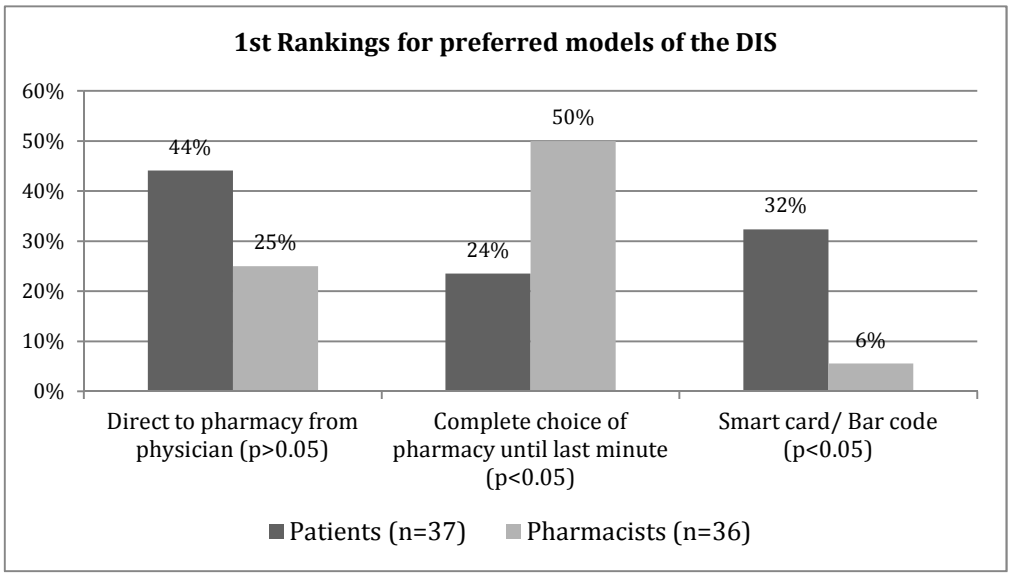

Figure 21: Comparison of 1st Rankings for preferred DIS models by both patient and pharmacist respondents

While patient respondents ranked the 'direct email from physician's office to pharmacy' option as the most preferred model for the DIS, half of the pharmacists chose the 'complete choice of pharmacy until last minute' (central database) as their top preference. Only a few patient respondents (n=8) chose the 'central database' as their first preference. A statistically significantly higher number of pharmacists chose 'central database' as their most preferred DIS model when compared to the patient group (24% patients vs. 50% pharmacists, $p<0.05$). Similarly only 25% (n=9) pharmacists ranked 'direct email from physician's office' as their most preferred choice for the DIS. Using 'smart card' or 'bar code' on paper prescriptions was not a popular choice for both the patient and the pharmacist groups. However, a statistically significantly higher number of patients chose the DIS preference of 'smart card' or 'barcode' when compared to pharmacists (32% patients vs. 6% pharmacists, $p<0.05$).

4.1.4.12 SUMMARY OF THE FINDINGS ON THE COMPARISON OF THREE GROUP PERCEPTIONS

The majority of respondents in all three groups agreed that implementation of the DIS in Ontario is a good idea in principle. However, only half of the pharmacist respondents (47%), some patients (22%), and very few physicians (17%) were aware of the implementation of the DIS before the study.

Most physicians (87%) reported to have used their computer either always, most of the times or sometimes to print out an acute prescription. In comparison, only 30% of the patients reported that their physician printed out an ePrescription for them.

Most of the physicians and pharmacists agreed that government should not only fund the hardware and software costs required for the implementation of the DIS but also for any training needed. While pharmacists thought that the owner of the pharmacy should pay for the maintenance costs, physicians said that both the clinic owner and government should share the maintenance costs.

Most physicians perceived that pharmacist access to medical information was 'not' always necessary for improving the quality of patient care compared to most pharmacists who believed that pharmacist access to most medical information is 'always' useful in improving the quality of patient care.

Both physicians and pharmacists perceived 'reduction of queries on ePrescription' through the DIS as potentially a major advantage of the DIS.

More than half of the pharmacists were in favour of a repeat prescription collection service while only 19% of patients strongly supported this idea. Inclusion of OTC drug information was perceived to be helpful by both physicians and pharmacists, and most patients had no reservations in sharing this information.

4.1.5 COMPARISON OF FINDINGS WITH THE SCOTTISH STUDY

Findings of the results from this study were compared to the findings of the results from the Scottish study[5].

The Scottish study was conducted on a national level. The investigators of the study distributed a higher number of questionnaires to all three groups in comparison to this study. The Scottish study not only received more questionnaires responses than our study but the rate of receiving responses was much higher than our study with many more responses from all three groups.

Please note that the DIS is a Canadian collective term used for EDI, ePrescribing and eDispensing. Since the comparison is being made to a system outside of Canada where the DIS is referred to as the EDI, DIS system in Scotland has been referred to as the Scottish DIS for the purpose of this analysis.

4.1.5.1 COMPARISON OF PRINTED PRESCRIPTIONS BETWEEN ONTARIO AND SCOTTISH CLINICS

There was little difference between the Scottish physician respondents (83%) and Ontario physician respondents (87%) with respect to the rate of printing out acute prescriptions ($p>0.05$). However, a statistically significantly higher number of Scottish patients reported receiving electronic prescriptions from their family physicians in comparison to the Ontario patients (58% for Scotland vs. 30% for Ontario, $p<0.05$).

4.1.5.2 VIEWS ON FUNDING FOR THE DIS BETWEEN ONTARIO AND SCOTTISH RESPONDENTS

Both similarities and differences were observed between the views of the two physician populations with respect to funding issues.

While the majority of Scottish physicians felt that the Scottish government should pay for all the funding costs for hardware and software (90%), maintenance (84%) and training (84%) associated with the implementation of the DIS, Ontario physician respondents had different views. Most Ontario physicians felt that the government should fund the hardware and software (57%), and the training costs (61%). Forty-eight percent of the Ontario physicians believed that both physician owners and the government should share maintenance costs associated with the implementation of the DIS. This difference in views for maintenance costs was found statistically significantly higher for Ontario physicians (48% Ontario physicians vs. 12% Scottish physicians, $p<0.05$).

Additionally, views of the Ontario pharmacists on funding for DIS were compared to Scottish pharmacist population. Other than the maintenance costs, the majority of the Scottish pharmacists believed that government should fund hardware (74%), software (81%), and training costs (89%) associated with the implementation of the DIS. Only

35% of the Scottish pharmacists believed that the government should pay for the maintenance costs. The majority of the Ontario pharmacists believed that the government should pay for the hardware (44%), software (56%), and training (75%) costs. The majority of the Scottish (50%) and Ontario (56%) pharmacists believed that the owner should pay for all ongoing maintenance costs associated with the implementation of the DIS ($p>0.05$).

4.1.5.3 PHARMACIST ACCESS TO PATIENT INFORMATION

The Scottish and Ontario physicians were asked for their views on pharmacist access to patient information in their DISs. The physicians that felt that pharmacist access to patient information should be made available through the DIS were asked to indicate on the survey which categories of patient information they would be happy for the community pharmacists to access (Section C, Q14-29, Appendix 3).

There was no statistically significant difference in most opinions between the Scottish and Ontario physician responders with respect to their views on the importance of pharmacist access to patient information. Comparatively a higher percentage of Scottish physician respondents reported being in favour of pharmacist access to all 13 aspect of patient information than the Ontario physician respondents. A statistically significantly higher number of Scottish physicians reported the data on sex and ADEs was important than the Ontario physicians (55% Ontario physicians vs. 75% Scottish physicians for both sex and ADEs, $p=0.05$).

Table 21 represents that the majority of the Scottish and Ontario physicians (percentage) did not think it was necessary to share blood and screening test results with the pharmacists to improve the quality of patient care ($p>0.05$).

patient care data elements **n.s = non-significant**	Ontario physicians percent (n=23)	Scottish physicians percent (n=145)	**Pr test Significance (α= 0.05)**
Sex	55%	75%	**p=0.05**
Age	55%	74%	n.s
Drug allergies	59%	75%	n.s
Other allergies	55%	64%	n.s
Relevant diagnoses	45%	48%	n.s
Drug history	59%	72%	n.s
ADEs	55%	75%	**p=0.05**
Hospital discharge summaries	14%	19%	n.s
Cholesterol test results	18%	32%	n.s
Blood glucose test results	18%	31%	n.s
Blood pressure test results	18%	34%	n.s

Blood test results	14%	23%	n.s
Urine test results	18%	25%	n.s

Table 20: Views of Ontario and Scottish physicians on sharing patient information with pharmacists in the DIS

The Scottish and Ontario pharmacists were asked for their views on the various aspects of patient information that might be made available to them through their DISs. Pharmacists were asked how useful they thought it would be to have access to these data and the best source of this information (Section B, Q3-9, Appendix 2).

Patient care data elements n.s = non-significant		Always useful patient information			Sometimes useful patient information		
		Ontario pharmacist percent (n=36)	Scottish pharmacist percent (n=148)	**Pr test Significance (α= 0.05)**	Ontario pharmacist percent (n=36)	Scottish pharmacist percent (n=148)	**Pr test Significance (α= 0.05)**
Sex		83%	36%	**p<0.05**	17%	60%	**p<0.05**
Age		92%	70%	**p<0.05**	8%	30%	**p<0.05**
Drug allergies		97%	82%	**p<0.05**	3%	16%	**p<0.05**
Other allergies		64%	49%	n.s	28%	46%	**p=0.05**
Diagnoses	relevant ones	47%	48%	n.s	31%	43%	n.s
Drug history (*previous 6 months*)		75%	69%	n.s	22%	29%	n.s
ADEs		81%	76%	n.s	17%	19%	n.s
Hospital discharge summaries		47%	22%	**p<0.05**	42%	65%	n.s
Screening tests	Cholesterol Blood glucose Blood pressure	19%	7%	n.s	47%	68%	**p<0.05**
Laboratory results	Blood tests Urine tests	22%	5%	**p<0.05**	53%	60%	n.s

Table 21: Views of Ontario and Scottish pharmacist on accessing patient information through the DISs

Table 21 shows that the higher percentage of Scottish pharmacist respondents reported most aspects of patient's medical information as 'sometimes useful', which in comparison, Ontario pharmacist respondents reported as 'always useful'. A statistically significantly higher number of Ontario pharmacists reported sex, age, drug allergies, hospital discharge summaries and laboratory tests as 'always useful' components of patient information ($p<0.05$). A statistically significantly higher number of Scottish pharmacists reported sex, age, drug allergies, other allergies and screening tests as 'sometimes useful' components of patient information ($p<0.05$).

Table 22 shows that a higher percentage of the Ontario pharmacist respondents perceived 'both' medical records and asking a patient representative to be a useful source of patient

information. A higher percentage of the Scottish pharmacists thought medical records were the most useful source for patient information.

Patient care data elements n.s = non-significant		Medical records			Ask patients			Both		
		Ontario pharmacist percent (n=36)	Scottish pharmacist percent (n=148)	**Pr test Significance (α= 0.05)**	Ontario pharmacist percent (n=36)	Scottish pharmacist percent (n=148)	**Pr test Significance (α= 0.05)**	Ontario pharmacist percent (n=36)	Scottish pharmacist percent (n=148)	**Pr test Significance (α= 0.05)**
Sex		22%	36%	n.s	25%	25%	n.s	36%	34%	n.s
Age		17%	55%	**p<0.05**	19%	14%	n.s	47%	27%	**p<0.05**
Drug allergies		19%	63%	**p<0.05**	17%	3%	**p<0.05**	47%	28%	**p<0.05**
Other allergies		17%	49%	**p<0.05**	19%	15%	n.s	36%	28%	n.s
Diagnoses	relevant ones	42%	76%	**p<0.05**	6%	1%	n.s	17%	12%	n.s
Drug history (*previous 6 months*)		47%	77%	**p<0.05**	3%	0%	**p<0.05**	28%	17%	n.s
ADEs		31%	65%	**p<0.05**	6%	4%	n.s	42%	24%	**p<0.05**
Hospital discharge summaries		64%	72%	n.s	3%	3%	n.s	14%	9%	n.s
Screening tests	Cholesterol Blood glucose Blood pressure	56%	72%	n.s	0%	4%	n.s	0%	7%	n.s
Laboratory results	Blood tests Urine tests	58%	70%	n.s	0%	3%	n.s	0%	5%	n.s

Table 22: Views of Ontario and Scottish pharmacist on the most useful source if patient information through the DIS

A statistically significantly higher number of Scottish pharmacists relied on medical records for patient information such as age, drug and other allergies, diagnoses, drug history and ADEs when compared to Ontario pharmacists ($p<0.05$). A statistically significantly higher number of Ontario pharmacists relied both on medical records and patient information for patient information such as age, drug allergies and ADEs in comparison to Scottish pharmacists ($p<0.05$).

Similarly, Scottish and Ontario patients were also asked on their views on the types of information they would be happy to share with their pharmacists if their family physician's office and community pharmacies become linked through the DIS (Q21, Appendix 1). Table 23 shows for all 12 aspects of patient information, a statistically

significantly higher percentage of the Ontario patients would allow pharmacists to access their information through the DIS when compared to a lower percentage of the Scottish patients ($p<0.05$).

A statistically significantly lower number of Ontario patients were opposed to pharmacists looking at their medical information through the DIS as compared to the Scottish patients (11% Ontario patients vs. 38% Scottish patients, $p<0.05$).

Views of the Scottish and Ontario patients on patient care data elements		Ontario patient percent (n=37)	Scottish patient percent (n=494)	**Pr test Significance (α= 0.05)**
I would not want a community pharmacist to look at ANY of my medical records		11%	38%	p<0.05
Medicines you are taking just now		89%	58%	p<0.05
Medicines you have taken in the past		81%	48%	p<0.05
Your current medical problems		76%	39%	p<0.05
Medical problems you have had in the past		62%	29%	p<0.05
Test results	Blood tests	57%	33%	p<0.05
	Urine tests	57%	33%	p<0.05
	Blood pressure	59%	34%	p<0.05
	Lung function tests	57%	31%	p<0.05
Any allergies you may have		70%	40%	p<0.05
Lifestyle factors	Smoking	57%	35%	p<0.05
	Drinking alcohol	57%	35%	p<0.05
Your age		70%	44%	p<0.05

Table 23: Views of Ontario and Scottish patients on the pharmacist access to patient information through the DIS

4.1.5.4 VIEWS ON POTENTIAL ADVANTAGES OF THE DIS

Electronic transfer of prescription data to community pharmacists has the potential to bring about various changes in the prescribing process. Family physicians could also receive information about which medicine(s) a patient is using. Family physicians were asked to rate seven possible changes associated with the implementation of the DIS, and whether they perceived them to be an advantage or disadvantage (Section D, Q30-36, Appendix 3).

Choices given to the Scottish and Ontario physicians were major advantage, some advantage, neither advantage nor disadvantage, some disadvantage, major disadvantage, and no opinion. Major advantage and some advantage were collapsed into one category. Table 24 represents the comparison between seven possible advantages with the

implementation of the DIS perceived as potential advantages of the DIS by the Ontario and Scottish physician group.

Potential advantages of the DIS **n.s = non-significant**	**Ontario physicians percent (n=23)**	**Scottish physicians percent (n=145)**	**Pr test Significance (α= 0.05)**
Information on which prescribed items were not dispensed	83%	91%	n.s
Improved patient medication monitoring	82%	90%	n.s
Fewer queries from pharmacists concerning illegible/incorrect scripts	82%	81%	n.s
Collection of data on individual patient Over The Counter purchases from community pharmacies	65%	77%	n.s
Ease of collection of data to satisfy clinical governance demands	65%	71%	n.s
No paper prescription in your hand to check what you have prescribed	57%	**16%**	**p<0.05**
Less personal contact with community pharmacists e.g., fewer telephone calls	52%	**15%**	**p<0.05**

Table 24: Views of the Ontario and Scottish physicians on the potential advantages and disadvantages of the DIS

Almost the same percentage of physician respondents from both populations perceived the first five features to be potential advantages. The last two features in the table, 'no paper prescription in your hand to check what you have prescribed' (57% Ontario physicians vs. 16% Scottish physicians) and 'less personal contact with community pharmacists e.g., fewer telephone calls' (52% Ontario physicians vs. 15% Scottish physicians) were perceived differently by both groups. A statistically significantly higher number of Ontario physicians perceived these last two features as potential advantages of the DIS versus Scottish physicians who perceived them rather as potential disadvantages of the DIS ($p<0.01$).

DIS may radically change the way pharmacists handle prescriptions. A comparison was made between the potential features of the DIS perceived either as advantages or disadvantages, by the Ontario and Scottish pharmacist respondents.

The pharmacist respondents were asked to rate 10 possible changes of how much of an advantage or disadvantage did they perceive the DIS would have with its implementation (Section I, Q50-59, Appendix 2). Choices were major advantage, some advantage, unsure, some disadvantage, major disadvantage and no opinion. The percentages of the two advantage choices were summed in Table 25 with most highly rated advantage by Ontario pharmacists listed first.

Potential advantages and disadvantages of the DIS **n.s = non-significant**	**Ontario pharmacists percent (n=36)**	**Scottish pharmacists percent (n=148)**	**Pr test Significance (α= 0.05)**
No need to clarify poorly written prescriptions.	89%	96%	n.s
Less keying in of prescription information.	86%	91%	n.s
No paper copy of the prescription when dispensing.	86%	**14%**	**p<0.05**
Accurate cumulative data available on what has been dispensed from pharmacy.	84%	89%	n.s
Less need to contact family physicians by telephone.	84%	86%	n.s
Fewer errors on prescriptions	81%	83%	n.s
No need to sort and count paper prescriptions at the end of the day.	69%	93%	**p<0.05**
Earlier payment for dispensed medicines from ODB/ PSD Program and other insurance programs.	67%	95%	**p<0.05**
No paper prescription with which to identify patient or representative as rightful recipient of medication.	42%	**5%**	**p<0.05**
Downloading of prescriptions onto the pharmacy computer may take a few seconds.	41%	19%	**p<0.05**

Table 25: Views of the Ontario and Scottish physicians on the potential advantages and disadvantages of the DIS

The majority of the pharmacist respondents from both populations perceived most of the features listed in Table 26 as potential advantages of the DIS. However, while 'no need of paper copy when dispensing' (86% Ontario pharmacists vs. 14% Scottish pharmacists, $p<0.05$) or 'no paper prescription required with which to identify patient as a rightful recipient of medication' (42% Ontario pharmacists vs. 5% Scottish pharmacists, $p<0.05$) were considered as potential advantages by the Ontario pharmacist respondents, they were considered huge drawbacks by the Scottish pharmacist respondents.

A statistically significantly higher number of Ontario pharmacists perceived 'no paper copy of prescriptions when dispensing' (14% Scottish pharmacists vs. 86% Ontario pharmacists, $p<0.05$), 'no paper prescription with which to identify patient' (5% Scottish pharmacists vs. 42% Ontario pharmacists, $p<0.05$), and 'downloading of prescriptions onto the pharmacy computer taking a few seconds' (19% Scottish pharmacists vs. 41% Ontario pharmacists, $p<0.05$) as potential advantages of the DIS when compared to Scottish pharmacists.

A statistically significantly higher number of Scottish pharmacists perceived 'no need to sorting out paper prescriptions' (93% Scottish pharmacists vs. 69% Ontario pharmacists, $p<0.05$) and 'earlier payment for dispensed medications from ODB and the PSD' (95%

Scottish pharmacists vs. 67% Ontario pharmacists, $p<0.05$) as possible advantages with the implementation of the DIS when compared to Ontario pharmacists.

4.1.5.5 PHYSICIAN ACCESS TO PATIENT INFORMATION

All three Scottish and Ontario groups were asked about the inclusion of the OTC drug information in the DIS. Physicians were asked whether OTC drug purchase information would help them in improving patient care. Pharmacists were asked whether they would be prepared to ask patients of OTC drug information and enter it in the DIS to make it electronically available for physicians. Patients were asked if they would be willing to share this information with physicians and pharmacists.

Percentage views of all three groups from both populations were found to share similarities. The majority of the Ontario (92%) and Scottish (82%) pharmacist respondents agreed that they would be prepared to ask patients about their OTC drug information and enter it in the DIS to make data electronically available for the physicians.

About half of the patients from both groups (54% for Ontario vs. 45% for Scottish) were prepared to share the OTC drug purchase information with their pharmacists. The majority of the physician respondents, more Scottish physicians (77%) than the Ontario physicians (65%), reported that inclusion of the OTC drug information in the DIS would be advantageous in improving the quality of patient care.

Figure 22 displays the views of the Ontario and Scottish patient groups on the types of information other than their OTC drug information that they would accept their community pharmacists to pass onto their family physicians and other clinic staff.

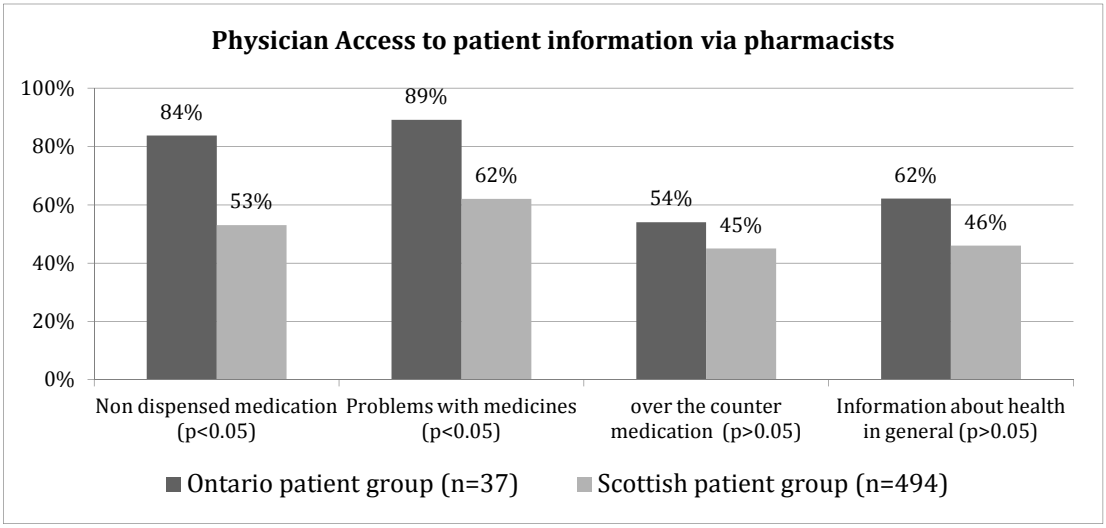

Figure 22: Views of the Ontario and Scottish patient on the physician access to their information through their pharmacists through the DIS

A statistically significantly lower number of the Ontario patient respondents said they did not want their community pharmacists to pass any information at all to their family physicians compared to the Scottish patient respondents (8% Ontario patients vs. 28% Scottish patients, $p<0.05$).

A statistically significantly higher number of the Ontario patients would allow their community pharmacists to pass their information on non-dispensed medication to their physicians through the DIS when compared to the Scottish patient group (84% Ontario patients vs. 53% Scottish patients, $p<0.05$). A statistically significantly higher number of Ontario patients would also allow their community pharmacists to pass their information on the problems they have with their medications to their physicians through the DIS when compared to the Scottish patient group (89% Ontario patients vs. 62% Scottish patients, $p<0.05$).

4.1.5.6 REPEAT PRESCRIPTIONS

The Ontario pharmacists were asked if they would like to operate a repeat prescription collection service (Q26, Appendix 2), service that allows pharmacists to directly collect prescriptions from physician's office. The Ontario patients were asked if they would like their physician's office or community pharmacist to offer this service (Q11, Appendix 1).

Since this service was already present in Scotland, Scottish pharmacist respondents were asked if they operated this service at that time and would like to see this service continue electronically once the DIS was implemented for them. Similarly, the Scottish patients were asked if they would like their physician's office or community pharmacy to continue to offer this service electronically once the DIS was implemented.

The majority of the Ontario pharmacist respondents (69%) said that they would like to operate repeat prescription collection service with the implementation of the DIS. Similarly, majority of the Scottish pharmacist respondents (79%) said that they were currently operating a repeat prescription collection service in Scotland and would like to continue operating this service electronically once the DIS was implemented.

About half (49%) of the Ontario patients were in favour of the repeat prescription collection service with the implementation of the DIS. Half of the Scottish patients (55%) were also in favour of continuing with the repeat prescription collection service electronically once the DIS was implemented.

The Ontario and Scottish pharmacists were given a list of possible advantages and disadvantages associated with repeat prescriptions with the implementation of the DIS and asked whether they viewed features as an advantage or disadvantage.

Choices given to the Ontario and Scottish pharmacists were strongly agree, agree, unsure, disagree, and strongly disagree. Strongly agree and agree were collapsed into one

category. Table 26 represents the 8 potential features of repeat prescribing with the implementation of the DIS, agreed by the Ontario and Scottish pharmacist group.

Possible advantages and disadvantages of the repeat prescription collection service with the implementation of the DIS **n.s = non-significant**	**Ontario pharmacists agree percent (n=36)**	**Scottish pharmacists agree percent (n=148)**	**Pr test Significance (α= 0.05)**
It is important that each installment could be submitted to the ODB Program/ PPD at the time of dispensing so that reimbursement is not delayed.	92%	92%	n.s
Patient care would improve through increased pharmacist intervention	89%	71%	**p<0.05**
The monthly dispensing interval would have to be flexible to allow for unusual circumstances e.g. patient is going for a 2-month long holiday.	86%	92%	n.s
Any improvement in patient care would depend on the patient having each installment dispensed at the same pharmacy.	78%	82%	n.s
The computer program should contain barriers to prevent further dispensing before the scheduled date.	67%	61%	n.s
This system is likely to reduce wastage caused by dispensing of medication not required by patients.	67%	79%	n.s
Using a protocol to interview patients prior to dispensing a repeat prescription would not significantly increase my workload.	25%	14%	n.s
Patient care would be worse because the family physician has less involvement in managing the repeat prescription.	11%	14%	n.s

Table 26: Views of the Ontario and Scottish pharmacists on the potential advantages and disadvantages of repeat prescribing with the implementation of the DIS

The majority of the pharmacists in both populations had similar percentage views on the features of repeat prescription service. Two features, 'protocol to interviewing patients prior to dispensing repeat prescription not taking up their time' (25% Ontario pharmacists vs. 14% Scottish pharmacists) and 'patient care worsening due to less involvement by the physicians' (11% Ontario pharmacists vs. 14% Scottish pharmacists) were agreed by only a minority of pharmacists in both groups as being potential advantages of repeat prescribing with the implementation of the DIS.

A statistically significantly higher number of Ontario pharmacists agreed that 'patient care would improve through increased pharmacist intervention' with the implementation of the DIS when compared to the Scottish pharmacist group (89% Ontario pharmacists vs. 71% Scottish pharmacists, p=0.03).

The Ontario and Scottish physicians were also asked for their opinions on repeat prescriptions with the implementation of the DIS. Physicians were asked about their

perceptions on the introduction of repeat prescribing which would allow pharmacists to play a greater role in managing patient's repeat prescription(s) (Section F, Q43-47, Appendix 3).

Choices given to the physicians were strongly agree, agree, unsure, disagree, and strongly disagree. Strongly agree and agree were collapsed into one category. Table 27 represents the five potential features of repeat prescribing with the implementation of the DIS, agreed by the Ontario and Scottish physician group.

Possible advantages and disadvantages of the repeat prescription collection service with the implementation of the DIS **n.s = non-significant**	**Ontario physicians percent (n=23)**	**Scottish physicians percent (n=145)**	**Pr test Significance (α= 0.05)**
No one system would be suitable for all repeat patients	61%	70%	n.s
Family physician workload would decrease if such a repeat system was to be implemented	61%	69%	n.s
Clinic staff workload would decrease if such a repeat system was to be implemented	52%	80%	**p<0.05**
Patient care would improve through increased pharmacist intervention	35%	41%	n.s
Patient care would be worse because the prescriber has less involvement in managing the repeat prescription	22%	17%	n.s

Table 27: Views of the Ontario and Scottish physicians on the potential advantages of repeat prescribing with the implementation of the DIS

The Ontario and Scottish physician had similar percentage views on the possible features of repeat prescription collection service. Both groups agreed with the first three features, but only a minority of the Ontario and Scottish physicians agreed that 'patient care would improve through increased pharmacist intervention' (35% Ontario physicians vs. 41% Scottish physicians, $p>0.05$) or that 'patient care would worsen due to less involvement from the physicians' (22% Ontario physicians vs. 17% Scottish physicians, $p>0.05$).

A statistically significantly higher number of the Scottish physicians agreed that the 'clinic staff workload would decrease if such a repeat system was to be implemented' when compared to the Ontario physician group (80% Scottish physicians vs. 52% Ontario physicians, $p<0.05$).

4.1.5.7 ADVANCE DISPENSING OF PRESCRIPTIONS

Just as the prescription collection service will allow pharmacists to collect prescriptions directly from the physician's office, advanced dispensing will also allow pharmacists to prepare prescriptions ahead of time and have them ready for the patients in advance. The Ontario and Scottish pharmacist respondents were asked whether they agree or disagree

with the given possibilities that may potentially be advantages or disadvantages of advanced dispensing (Section F, Q35-39, Appendix 2).

Choices given to the pharmacists were strongly agree, agree, unsure, disagree, strongly disagree, and no opinion. Strongly agree and agree were collapsed into one category. Table 28 represents possible features of advanced dispensing with the implementation of the DIS that were perceived as potential advantages by the Ontario and Scottish pharmacist respondent group.

Possible advantages and disadvantages of advanced dispensing service with the implementation of the DIS **n.s = non-significant**	**Ontario pharmacists agree percent (n=36)**	**Scottish pharmacist agree percent (n=148)**	**Pr test Significance (α= 0.05)**
Not having to collect repeat prescriptions from the family physician's office would be more convenient for me.	64%	70%	n.s
It would be an advantage if DIS/ ePrescribing allowed more advance dispensing.	59%	66%	n.s
Advance dispensing of this type will result in wastage through patients failing to collect their medication.	50%	35%	n.s
Advance dispensing will compromise the quality of care a patient receives.	11%	18%	n.s
More advance dispensing would lead to deterioration of the patient/pharmacist professional relationship.	9%	19%	n.s

Table 28: Views of the Ontario and Scottish pharmacists on the possible advantages of advanced dispensing with the implementation of the DIS

The majority of the Scottish and Ontario pharmacists agreed that the advanced dispensing of prescriptions with the implementation of the DIS would be beneficial for patients.

Only the minority of the Ontario and Scottish pharmacists 'disagreed' with the last two possibilities that 'advance dispensing will compromise the quality of patient care' (47% Ontario pharmacists vs. 60% Scottish pharmacists) and 'more advanced dispensing may lead to deterioration of the patient/pharmacist professional relationship' (39% Ontario pharmacists vs. 49% Scottish pharmacists) with the implementation of the DIS.

4.1.5.8 SECURITY AND CONFIDENTIALITY OF PATIENT INFORMATION

EMR systems store and would transfer confidential information with the implementation of the DIS. It is important for the security and confidentiality of patient information that unauthorized individuals could not access the DIS. Patient groups were asked on how confident they were that the system would keep the patient data secure from unauthorized individuals.

Figure 23 displays the percentages of the Ontario and Scottish patient groups that were very confident, somewhat confident and not at all confident in the security of the DIS.

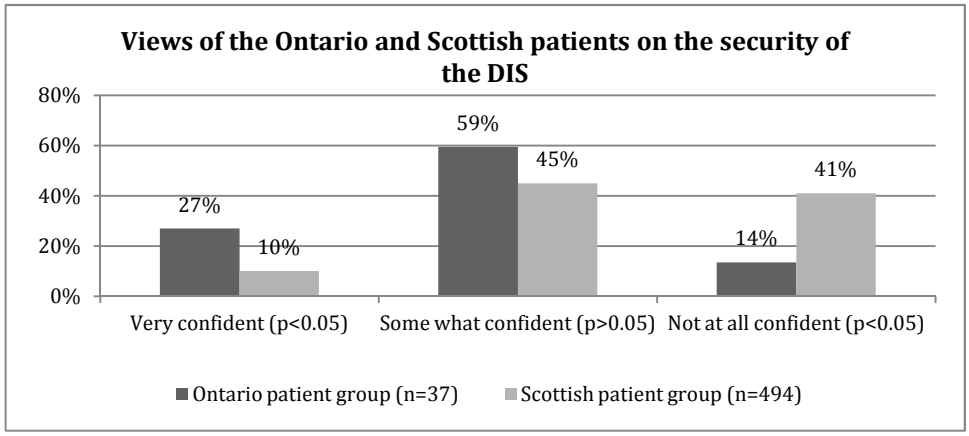

Figure 23: Views of the Ontario and Scottish patients on the security of the DIS

A statistically significantly higher number of Ontario patient respondents were very confident with the security of the new system as compared to the Scottish patient respondents (27% Ontario patients vs. 10% Scottish patients, $p<0.05$). A statistically significantly higher number of Scottish patients were not at all confident with the security measures on the upcoming DIS as compared to the Ontario patient group (41% Scottish patients vs. 14% Ontario patients, $p<0.05$).

Pharmacist respondents were asked about the current security issues presented with the implementation of the DIS. The majority of the Ontario and Scottish pharmacist respondents agreed or strongly agreed with the security measures suggested for the DIS (Section G, Q40-42, Appendix 2).

Figure 24 displays different aspects of security measures that could be taken to improve the security of the DIS (the categories agree and strongly agree were collapsed into one category). The first aspect was that each of the dispensing staff should log on separately to the computer when using it so that an accurate record can be kept of who accessed, dispensed and endorsed ePrescriptions. The second aspect was that members of staff other than dispensary staff must not have access to the dispensary computers. The third aspect was that the patient medical information available on the pharmacy computer other than the prescription information should only be accessible to qualified pharmacists.

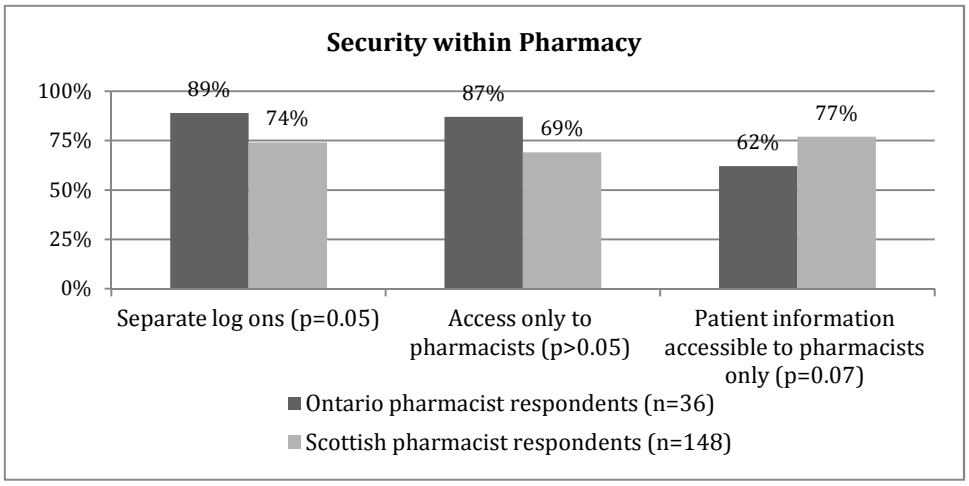

Figure 24: Views of the Ontario and Scottish pharmacists on the security within pharmacies with the implementation of the DIS

The Ontario and Scottish pharmacists were found to have somewhat similar views on the security issues within the pharmacies. While having separate log on feature was the statistically significantly most popular perceived solution amongst the Ontario pharmacist respondents when compared to Scottish pharmacists (89% Ontario pharmacists vs. 74% Scottish pharmacists, p=0.05), patient information only accessible to the pharmacists in the pharmacy was perceived as the most popular security solution amongst the Scottish pharmacist respondents (77% Scottish pharmacists vs. 62% Ontario pharmacists, p=0.07) when compared to Ontario pharmacist group.

4.1.5.9 PREFERRED MODELS FOR THE DIS

The Ontario and Scottish pharmacist and patient groups were asked to rank on the 3 to 4 models of DIS that may potentially be chosen as the model for the DIS. Pharmacists were asked to rank from four suggested models (Q62, Appendix 2), while patients were asked to rank from three models (Q25, Appendix 1). The first rankings within the pharmacist and patient respondents in both populations were compared.

Please refer to the pages (52 and 67) for a detailed description of the DIS models for both patient and pharmacist questionnaires.

The Ontario and Scottish patient preferences for the first rankings on the DIS models were statistically significantly not different. 'Direct email to the pharmacy from the physician' was the most popular and highest ranked preference for the majority of both the Scottish and Ontario patients. Figure 25 displays the first rankings of the Ontario and Scottish patients on the DIS models.

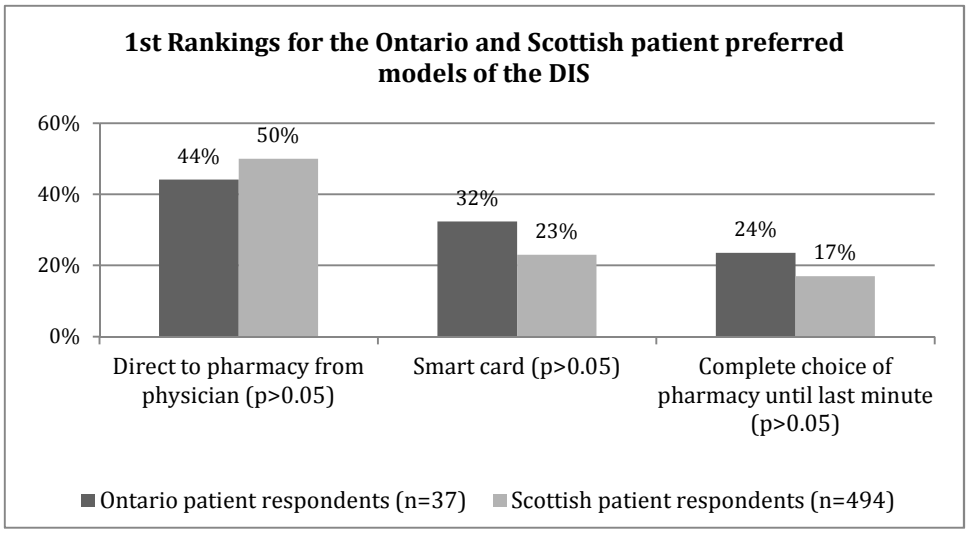

Figure 25: Preferences for first rankings of the Ontario and Scottish patients on the DIS models

The Ontario and Scottish patients were not statistically different in their first preference for the DIS model, 'direct email to pharmacy from physician' (43% vs. 50%, 95% CI for the -6% difference, -23% to 10%). The Ontario and Scottish patients were not statistically different in their second preference, 'smart card' (32% vs. 23%, 95% CI for the 9% difference, -6% to 25%). Neither were they statistically different for their third preference, 'complete choice of pharmacy until last minute' (24% vs. 17%, 95% CI for the 7% difference, -7% to 22%).

Figure 26 displays the first rankings of the Ontario and Scottish pharmacists on the DIS models.

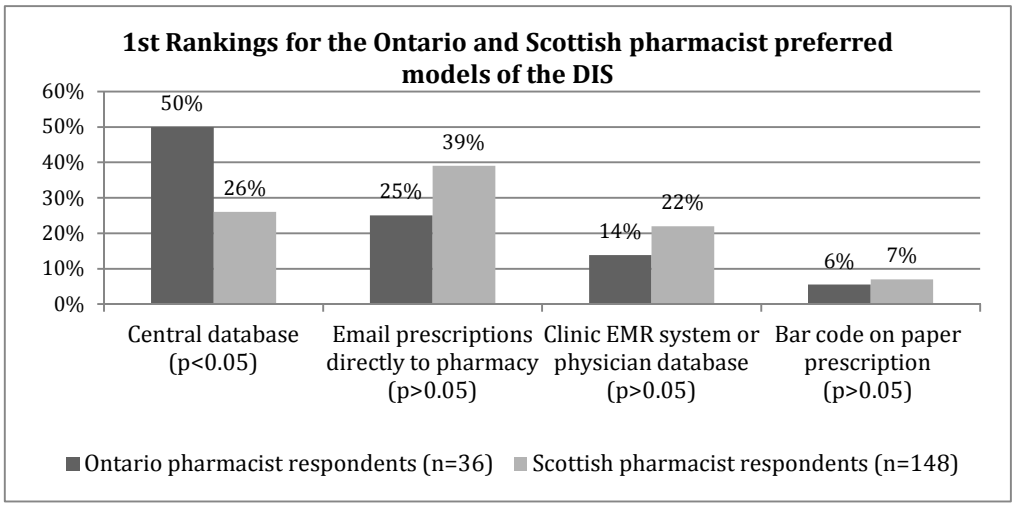

Figure 26: Preferences for first rankings of the Ontario and Scottish pharmacists on the DIS models

The Ontario and Scottish pharmacist preferences for the first rankings on the DIS models were not statistically significantly different except for the rankings on 'central database' DIS model. A statistically significantly higher number of the Ontario pharmacist respondents ranked 'central database', as their first preference for the DIS models when compared to the Scottish pharmacist group (50% Ontario pharmacists vs. 26% Scottish pharmacists, $p<0.05$, 95% CI for the 24% difference, -3% to 34%). 'Emailing prescriptions directly to pharmacy' was the first ranked preference for the DIS models by the Scottish pharmacist respondents. 'Emailing prescriptions directly to the pharmacy' was the second highest ranked preference for the DIS models by Ontario pharmacist respondents (25% vs. 39%, 95% CI for the -14% difference, -30% to 2%). Similarly, Scottish pharmacist respondents ranked 'central database' as the second highest ranked preference for the DIS models.

4.1.5.10 COMPARISON OF GENERAL FINDINGS

At the time of DIS implementation in Scotland in 2001[59], services such as a repeat prescription collection service and advance dispensing of prescriptions existed with paper prescriptions. Scottish healthcare professional groups were more advanced with their use of these services and had more knowledge of the implementation of their DIS in Scotland at the time.

In comparison, Ontario is still new to the concept of a repeat prescription service and advance dispensing. Many healthcare professionals, patients and consumers were not aware of the implementation of the DIS before they filled the study questionnaire.

Despite some of these differences, both the Ontario and Scottish populations supported the idea of a DIS and introduction of ePrescriptions for the overall improvement in quality of care for their patients.

Figure 27 displays the percentages of the two group-specific Ontario and Scottish populations on their views on the implementation of the DIS in their jurisdictions. The majority of the Ontario and Scottish respondents in all three groups agreed that the implementation of the DIS is a good idea in principle.

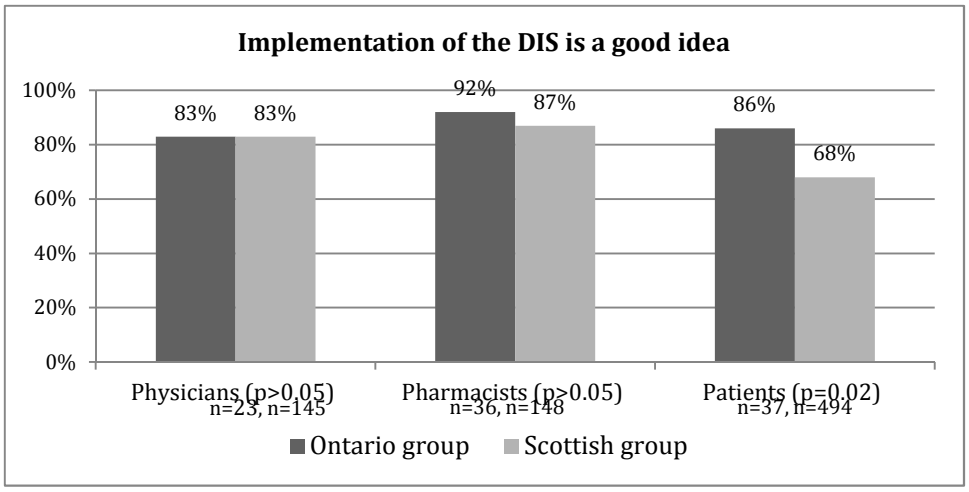

Figure 27: Ontario and Scottish views: whether Implementation of the DIS is a good idea in principle

A statistically significantly higher number of Ontario patient respondents agreed that the implementation of the DIS is a good idea in principle when compared to the Scottish patient group (86% Ontario patients vs. 68% Scottish patients, $p<0.05$).

4.1.5.11 SUMMARY ON THE COMPARISON OF FINDINGS WITH THE SCOTTISH STUDY

The Ontario and Scottish physician, patient and pharmacy groups supported the implementation of the DIS, and the introduction of a two-way ePrescribing and eDispensing for the overall improvement in quality of care for patients. The majority of the Ontario and Scottish respondents in all three groups agreed that the implementation of the DIS is a good idea in principle. A statistically significantly higher number of Ontario patient respondents agreed that the implementation of the DIS is a good idea in principle when compared to the Scottish patient group.

A statistically significantly higher number of Scottish patients reported receiving ePrescriptions from their family physicians in comparison to the Ontario patients.

A statistically significantly higher number of Ontario physicians felt that both the government and the owner should pay for the maintenance costs associated with the implementation of the DIS when compared to the Scottish physician group. The majority of the Ontario and Scottish pharmacists believed that the government should fund all the hardware, software, and training costs associated with the implementation of the DIS. The Ontario pharmacist respondents believed that the pharmacy owner should pay for the maintenance costs, while the Scottish pharmacist group held the government responsible for funding the ongoing maintenance costs associated with the implementation of the DIS.

A higher percentage of Scottish physician respondents reported being in favour of pharmacist access to all 13 aspects of patient information than the Ontario physician respondents. A statistically significantly higher number of Scottish physicians reported the data on sex and ADEs was important than the Ontario physicians.

A statistically significantly higher number of the Ontario patients would allow their community pharmacists to pass their information on non-dispensed medication to their physicians through the DIS when compared to the Scottish patient group. A statistically significantly higher number of the Ontario patients would also allow their community pharmacists to pass their information on the problems they have with their medications to their physicians through the DIS when compared to the Scottish patient group.

The majority of the Ontario pharmacist respondents (69%) said that they would like to operate repeat prescription collection service with the implementation of the DIS. Similarly, majority of the Scottish pharmacist respondents (79%) said that they were currently operating a repeat prescription collection service in Scotland and would like to continue operating this service electronically once the DIS was implemented.

A statistically significantly higher number of Ontario patient respondents were very confident with the security of the new system as compared to the Scottish patient respondents. A statistically significantly higher number of Scottish patients were not at all confident with the security measure on the upcoming DIS as compared to the Ontario patient group.

Direct email to a pharmacy from the physician was the most popular and highest ranked preference for the majority of both the Scottish and Ontario patients. A statistically significantly higher number of the Ontario pharmacist respondents ranked central database as their first preference for the DIS model when compared to the Scottish pharmacist group.

4.2 DISCUSSION

Some interesting main findings, patterns and associations emerged from the results. The overall perception of the DIS was positive and all three groups (physicians, pharmacists, and patients) mostly agreed that the implementation of the DIS was a good idea in principle. The DIS perspectives of each group varied according to the roles they played in the healthcare system. Different suggested aspects (discussed in detail under each group's section) of the DIS appealed to each group.

Surprisingly, other than some community pharmacists, few physician or pharmacist respondents were aware of the implementation of the DIS before this survey. This unawareness could prove to be a major drawback for eHealth Ontario and an obstacle in adopting the DIS by physicians and patients.

Common agreement amongst all three groups was on the security and confidentiality of patient information. It was not a surprise to observe that physicians, patients and even some pharmacist respondents were concerned and hesitant to share patients' confidential medical information.

The pharmacists and physicians agreed that quality of care for the patient would improve with increased involvement from the pharmacist. However, pharmacists were concerned about the extra work they would need in addition to not being remunerated for these extra services with the introduction of the DIS.

All three groups had specific concerns and expectations on the security of the DIS. A few patient and physician respondents were completely against the implementation of the DIS while this displeasure was not evident in any of the pharmacist survey responses.

The discussion section has been divided into 5 sections similar to the results sections for the purpose of consistency for each group.

4.2.1 PATIENT QUESTIONNAIRE RESPONSES

Patient opinions fluctuated from both ends of the spectrum. A few responses were completely against the implementation of the DIS while others were very positive towards the implementation of the DIS. It was no surprise that a majority of the patient respondents perceived implementation of the DIS as a good idea in principle.

4.2.1.1 DEMOGRAPHICS

All the patient respondents were currently taking prescribed medication despite the 20-29 years age group dominance. This could be due to the fact that many of the younger women may be receiving prescriptions for birth control.

About a fifth of the consumers revealed that they paid full price for the medication. This could also be due to the fact that most of the consumer responses were from the age group 20-29 years, who may have possibly been students and hence still unemployed at the time. All respondents in the later age groups from 50-69 years completely supported the implementation of DIS and thought it was a good idea in principle.

4.2.1.2 USE OF COMMUNITY PHARMACIES

Interestingly, patients under the age of 30 who always chose to use a ‘different’ pharmacy (Q4 of the patient questionnaire) were the same patients who also never used the ‘same’ pharmacy (Q3 of the patient questionnaire). This further confirmed the belief that patients under the age of 30 preferred their mobility, hence did not want to reserve to only one pharmacy. Younger patients and consumers especially under the age of 30 may likely be students or still not settled and hence they tend to move more than the older patients. In situations such as these, it may definitely be problematic for the physician to email different pharmacies directly all the time if ‘emailing directly to the pharmacies’, the most preferred model was in fact implemented as the model for the DIS.

4.2.1.3 EPRESCRIPTIONS

More than half of the patients said that their family physicians or clinic did not use a computer to print out paper prescriptions. This may suggest that many primary care practices may have still not transitioned to EMR systems or may still be under the process of adopting EMR systems in Ontario.

4.2.1.4 REPEAT PRESCRIPTIONS

There was no statistical association between age and receiving repeat prescriptions, suggesting a lot of younger patients (16%) below the age of 40 also received repeat prescriptions. In fact, association between the number of patient respondents and the support to have a repeat prescription collection service was statistically significant. Some patients had complaints in their questionnaires that their physicians forced them to revisit

them every three months just so that they could charge fees for the consultation, even for simple prescriptions such as contraceptives or birth control medication. Repeat medications that do not usually require a short interval visit to the physician's office (such as birth control pills) could be prescribed in a greater supply, sufficient for a year to improve patient adherence[5; 65].

If the repeat prescription service were to be implemented, the frequency with which patients were prepared to return to the same pharmacy was a reflection of their willingness to use the same pharmacy only for the purpose of repeat prescription collection service. It also mirrored the duration their repeat prescription would currently last and the convenience of reduced visits made to the doctor's office.

4.2.1.5 SHARING INFORMATION: DISCUSSING WITH THE PHARMACIST

Most patients under the age of 40 years chose not to discuss their laboratory test results or lifestyle factors with pharmacists. This pattern could suggest their concerns in the confidentiality for their medical information[64]. This concern was later confirmed by the fact that the patients were still not happy to share their 'overall' medical information even if they were provided a private area to speak with their pharmacist. Although there was an 11% increase observed with respect to sharing laboratory test results with the pharmacist if a private area was provided, it was still not statistically significantly sufficient to suggest that patients would likely be happy to share all their medical information with the pharmacist if a private area was provided.

Only very few of the respondents had reservations on having their pharmacists pass their information on non-dispensed medications, OTC drug information or information about health in general to the family physician. This may indirectly suggest patient respondents approving the inclusion of OTC drug information, etc. to be included in the DIS.

4.2.1.6 EXEMPTION OF ODB INFORMATION FROM DIS

The majority of patients believed that it was a good idea to automatically include ODB information in the DIS. Automatic inclusion of ODB information would mean that the pharmacist does not have to discuss any ODB information with the patients. This suggestion on automatically including ODB information in the DIS confirmed that the patients were conscious of discussing their personal information in front of their pharmacists[64]. Most of the patients preferred to discuss this information only with their physician, but not with their pharmacists.

4.2.1.7 OPINIONS OF PATIENTS ON THE DIS

As one of the main stakeholders of the DIS, patients would be most impacted by the implementation of the DIS, along with physicians and pharmacists. It was observed that not many patient respondents were aware of the implementation of the system. This

system will be expensive to implement and may change the current flow of the prescribing and dispensing process of medications.

Patients were given three possible models of the DIS and asked to rank them in order of preference (please check Q25, Appendix 1 for the detailed description on DIS models). The highest ranked preference for the DIS models by the patients was to have prescription sent directly to the community pharmacy from family physician's office via email. Although, this system may functionally prove to be inconvenient for family physicians and pharmacists, the patients' preference of this system might suggest their reliance in this system with respect to protecting their information[46; 5].

The patient group might perceive 'direct email' as the most secure DIS model because this system may be simple to understand. Whereas the idea or the concept of a 'central database' or a 'complete choice of pharmacy until last minute' may be a little complex to understand, unless more detailed information describing the benefits may be provided to the patients. A lot of the patient respondents had misconceptions with the concept of a central database or a data repository. They perceived the 'central database' to give clear access to all community pharmacists in Ontario who could access their medical information. In reality, only the pharmacist that patients choose will be given access to, by the patient's family physician to view patient information in the DIS. The pharmacist could then retrieve their medical information from the central database. This reason could also explain why the preference of a central database was only dominant amongst the younger age group (20-29 years), who may be more aware of the benefits and functionality of a central database in comparison with the older age groups.

4.2.2 PHARMACIST QUESTIONNAIRE RESPONSES

Pharmacist opinions were fairly consistent with respect to most of the questions on the survey. It was no surprise to observe that almost all of the pharmacists except three were strongly in favour of the DIS implementation.

4.2.2.1 DEMOGRAPHICS

The majority of the pharmacist responders were from single business pharmacies while only a limited number of pharmacist responders were employees of large business outlets such as Metro, Rexall, Pharma Plus, Shoppers Drug Mart, Costco, etc. This weak contribution from the large business outlets may suggest less interest from large business outlets. This could also be due to the fact that these outlets may already have a technologically strong PMS or perhaps a different workflow structure and work patterns discouraging these pharmacists from filling out surveys.

4.2.2.2 PHARMACIST ACCESS TO THE DIS

With pharmacist access to more patient information through the DIS, and more importantly, if the government would be ready to compensate for this service, pharmacists felt they could provide an in-depth medication review service to their patients. Although some would say that this service already exists under the name of medication check process (more commonly known as meds check limited to once a year per patient), the program however does not accomplish an in-depth review of medications achieved with additional information provided by the DIS. To provide this in-depth review, patients and physician will have to approve of pharmacist access to detailed patient medication information.

The most reliable source of information for diagnoses, drug history, hospital discharge summaries, screening and laboratory tests were reported to be the EMRs by the pharmacists. This fact confirmed the belief that the DIS will be beneficial in bridging information gaps associated with improving quality of patient care[16]. In fact a randomized control trial on community pharmacist-managed repeat prescribing system demonstrated to be logistically feasible, to identify clinical problems, and to lower healthcare expenditures[52].

4.2.2.3 ELECTRONIC COMMUNICATION WITH FAMILY PHYSICIANS

The majority of the pharmacists responded that they would be prepared to ask patients for their consent to pass on their OTC drug purchase information to patient's family physician. However, the rate dropped suddenly when asked if they would be prepared to enter such OTC information onto a computer to pass it onto the family physicians. Most of the pharmacists were concerned that OTC drug information will require screening for completeness before it is passed onto the physicians. This process will consume time, and thus pharmacists felt they should be compensated for this added work.

4.2.2.4 ADVANTAGES AND DISADVANTAGES OF THE DIS AND EPRESCRIBING

Concerns regarding perceived advantages or disadvantages were current lack of computer software integration in pharmacies making the described hypothetical features of the DIS difficult to evaluate. Unfortunately, until the actual implementation of the DIS pharmacists and physicians would worry about concerns such as these in the general interest for their patients and their work practices.

Pharmacists were concerned about the patients who do not reside in Ontario. Some pharmacists were also concerned about the patient group that does not prefer ePrescriptions and would rather carry a paper prescription with them to any pharmacy of their choice. A few pharmacists believed that paper prescriptions would be useful even after the implementation of the DIS as not all pharmacies carry all medications all the time. With the paper prescriptions, the patient would be able to take their prescription to the second pharmacy if the first pharmacy did not carry the patient's prescribed medication. This fact may suggest that even with the implementation of the DIS and the introduction of ePrescriptions, physicians in some cases may need to give their patients a printout of their ePrescription. However, with the 'central database' as the DIS model, handing a printout of an ePrescription will not be necessary as the patients can give their prescription number to any pharmacy of their choice, that can later access patient prescription[5].

4.2.2.5 OPINIONS OF THE PHARMACISTS ON THE DIS MODELS

Most pharmacists ranked the central database where the family physician can send prescription related data that could be retrieved by pharmacy, another family practice and ODB Program as their first ranked preference. However, a quarter of the pharmacists ranked emailing prescription directly to the pharmacy as their first choice. This could either suggest that the pharmacists who did not choose central database as their first preference may either not be aware of the potential benefits of a central database system (such as a patient centered model with patient choice of pharmacy until the last min) or they did not want to take the liability associated with accessing patient's medical information. Other reasons for not choosing 'central database' as their highest ranked preference may be that the 'direct email to the pharmacy' option already existed in some pharmacies that were attached to the physician's clinic, making these pharmacists reluctant to change to a new model.

What was definitely certain was that bar code on a paper prescription was the least preferred model. This, and the responses received on other features of the DIS, might suggest that some pharmacists may in fact be in favour of completely drawing away paper prescriptions altogether, something that patients may not necessarily prefer or like much at first until they adapt completely to the concept of ePrescriptions.

4.2.3 PHYSICIAN QUESTIONNAIRE RESPONSES

Physician questionnaire responses in general strongly supported the implementation of the DIS. With the exception of a few physicians who were against the idea of pharmacist access to patient information because of the security and confidentiality concerns for the patients, most physicians supported the implementation of the DIS. However, all physicians unanimously agreed that this study was important in gaining perceptions of all the stakeholders (physicians, pharmacist and patients) before a large-scale system such as the DIS is implemented in Ontario.

4.2.3.1 DEMOGRAPHICS

In terms of computer and EMR system use, many physicians and their staff were accustomed to using the EMR systems and computers to printout repeat prescriptions. This may be a good indication that many physicians may be more adoptive to the DIS use and ePrescribing. This factor was further confirmed by the content being stored in EMR systems. Appointments were not the only information stored but more useful content such as medication records, laboratory tests, primary care patient notes, etc. were all considered useful and stored in EMR systems instead of paper records.

4.2.3.2 FUNDING FOR THE DIS

Many physicians do not have sufficient time for anything outside of their daily work routine. With such time constraints, the government will have to provide extra incentives by funding for training, hardware and software costs associated with the implementation of the DIS if they want the physicians to get accustomed to using the DIS. Keeping the busy work schedule in mind, the government may also have to come up with a creative alternative to training physicians that does not consume a lot of their time in learning about the DIS.

4.2.3.3 OPINIONS OF FAMILY PHYSICIANS ON THE DIS

Despite not being aware of the DIS before this study, physicians did, however, expect potential benefits from this new system. Physicians expected the DIS to be more efficient and coordinated with their EMR systems to help with better medication tracking specifically for narcotics medications. On the other hand, some physicians were also concerned by the implementation of the DIS because it may add to their existing workload, may not be interoperable with their EMR systems, or permit unnecessary patient information access to pharmacists. What physicians might not realize is, that they might actually save time as they get familiar with using the DIS and use it more frequently in their daily practice[63].

4.2.4 COMPARISON OF PATIENT, COMMUNITY PHARMACIST AND FAMILY PHYSICIAN RESPONSES

Although the questionnaires were specific to each group and varied in context, some content was similar. With respect to awareness of the DIS before the study, other than the pharmacists, very few patients and fewer physicians had any idea of the implementation of this huge system. This lack of awareness may be a threat in adoption of the DIS by physician and patient groups. If patients are not aware of the potential benefits of the DIS, not all patients might accept ePrescribing and neither would the physicians if their patients would not be satisfied with this new system. This is because maintaining patient health and satisfaction have always been the priority for physicians.

Although it may seem that the patients might not be impacted by the DIS, as much as the physicians or pharmacists, they will still be the main stakeholders of the DIS as this system bridges gaps in information that belongs to patients. Since physicians and pharmacists work in the interest of their patients, their adoption of the DIS might depend on satisfaction and willingness of their patients in transitioning to ePrescribing and eDispensing. Hence the government will have to take measures to market the DIS and its potential benefits to the patients in addition to marketing this system to the physicians and pharmacists.

4.2.4.1 PRINTING OF EPRESCRIPTIONS

Less than half of the patients were sure that their physicians used an ePrescription system to printout ePrescriptions for them compared to more than half physicians who reported to use the computer either always, most of the times or sometimes to print out an ePrescription for their patients. This mismatch in receiving and distributing of ePrescription printouts might be due to various reasons. It may be an indication that patients might not be aware of their physicians using a computer to print out an actual ePrescription for them and that the physicians may not be using a computer to printout ePrescriptions in front of their patients.

4.2.4.2 PHARMACIST ACCESS TO PATIENT INFORMATION

The majority of the pharmacists said that most aspects of patient information were always useful to them except for laboratory and screening test results. On the other hand, approximately only half of the physician respondents agreed that patient information should be made accessible to the pharmacists. This is an indication that most physicians either perceived patient's medical information unnecessary for the pharmacists or were more concerned about the confidentiality of patient information if access would be made available to pharmacists.

Physicians may think that pharmacists may not necessarily require access to complete patient medication information but what they do not realize is that pharmacists would be

liable for all the medications they dispense incase of an ADE (as observed through the questionnaire). Most of the patient information usually is useful for pharmacists[16]. Pharmacist access to patient information may serve as an opportunity to improve patient compliance, ADE monitoring and reduce medication costs through prevention of unnecessary medication dispensing[16; 52; 55].

4.2.4.3 REPEAT PRESCRIPTION COLLECTION SERVICE

Repeat prescription collection service was viewed differently by each group. Some pharmacists did not agree to it mainly because they are not yet aware and do not realize the potential benefits of this service. Those that did have some idea or understood the mechanism behind the repeat prescription service agreed they would likely operate this service in their community pharmacies. The only drawback or challenge that pharmacists felt with this new service was the time consumed to operate this service. Since this repeat prescription collection service is a new concept in Ontario, it seems by the questionnaire responses that by default, most pharmacists assumed that the service would consume most of their time first with the implementation and then with its operation in addition to their daily tasks.

For pharmacists as well as patients, a repeat prescription collection service would most likely be beneficial if patients choose the same pharmacy for this service. Choosing the same pharmacy would permit pharmacists to access complete patient medical information rather than receiving only bits and pieces of patient information from patients. This would also give pharmacists the opportunity to maintain a good working relationship with their clients and patients[46]. However, a central database model for the DIS model would allow pharmacist access to patient information without the necessity for the pharmacists to rely only on discussed medical information with their patients. In a case such as this, patients may not be required to use the same pharmacy for repeat prescription collection service. However this may not establish the trust in patient and pharmacist relationship that could be achieved by using the same pharmacy[46].

In countries where a repeat prescription collection service already exists, repeat prescriptions are regularly handed out by the clinic staff with little supervision by physician prior to signing[50; 51]; however the physician is ultimately responsible for the prescribed medication. This factor may not be taken positively by the physicians in Ontario who usually have the complete autonomy to prescribe medication to the patient be that for acute or chronic disease conditions.

4.2.4.4 PHYSICIAN ACCESS TO PATIENT INFORMATION

The majority of the physicians agreed that they would like to receive information from community pharmacies on non-dispensed items or OTC purchased medications. Information on non-dispensed prescriptions would help them improve patient medication monitoring and as a result indirectly may improve patient compliance[16]. OTC drug

purchases would provide them with important information especially for chronically ill patients such as patients with hypertension or cardiovascular risk factors, who may purchase OTC medications that, may not necessarily improve their condition[46]. OTC drugs have sometimes known to be misused by patients. An Irish study (2005) reported that almost one-third of the participants reported having encountered cases of OTC abuse[53]. In the case of misuse and abuse of OTC drugs, inclusion of OTC drug purchase in the DIS may help physicians target and eliminate this abuse.

Information on OTC or non-dispensed medications may be useful for the family physicians in Ontario but one may also think that receiving this information in addition to their overworked normal day-to-day busy routines could result in an information overload for them[46]. Once information on OTC drug purchases is made available through the DIS, it would also increase liability and responsibility on physicians to monitor their patients for OTC drug purchases. Although such monitoring is expected from the pharmacists instead of physicians, with the introduction of the DIS, both physicians and pharmacists may need to collaborate on these aspects to improve patient care[46; 54].

Although most of the patient respondents were open to sharing OTC and non-dispensed drug information with their physicians, some patients may not like this intrusion by their healthcare professionals. As a result, the need of building patient consent models for retrieving such patient information with the implementation of the DIS will have to be considered.

In the case of information on non-dispensed items, with the 'central database' model of DIS this information could be gathered automatically and flagged to the physicians, instead of asking the pharmacists for all information on non-dispensed items or ODB.

4.2.5 COMPARISON OF FINDINGS WITH THE SCOTTISH STUDY

Although the Scottish study was conducted on a national level with much higher response rate from all three groups, it was interesting to observe that some of the perceptions were similar while others were very different.

While Scotland is far ahead of Ontario with respect to ePrescribing and already has implemented the DIS, Ontario's proposed DIS is quite similar to the Scottish DIS in terms of functionality and the perceived potential benefits. Even at the time of the Scottish study, when Scottish perceptions were being studied there was no doubt that the Scottish physician, patient and pharmacist groups had far more understanding of the Scottish DIS in comparison with the Ontario groups.

Services such as repeat prescription collection service and advance dispensing of medications already existed on paper in Scotland at the time of the study. Hence the stakeholders were more informed of the potential benefits these systems would provide with their existence. The only difference with the introduction of the Scottish DIS was that these services would function electronically within the DIS. Repeat prescription collection service and advance dispensing of medication services are completely new to Ontario, hence the stakeholders were not aware of the benefits of these services.

4.2.5.1 PRINTED PRESCRIPTIONS BETWEEN ONTARIO AND SCOTTISH CLINICS

At the time of the Scottish DIS implementation, the Scottish health system was far more advanced with respect to the use of the EMR systems in primary care clinics[60; 61]. Perhaps because of this reason, in comparison with Ontario patients more Scottish patients received printed ePrescriptions than paper prescriptions, indicating more widespread use of the EMR systems in Scottish primary care clinics. Physicians that have EMR systems in their clinics have proven to adopt a more active role in clarifying information, encouraging questions, and ensuring completeness of patient information by the end of the visit[49]. Hence primary care clinics that already have EMR systems may be more accepting of the DIS than the ones that still have not yet transitioned to EMR systems.

4.2.5.2 VIEWS ON FUNDING FOR THE DIS BETWEEN ONTARIO AND SCOTTISH GROUP RESPONDENTS

Views of the Ontario physicians and pharmacists on funding costs associated with the implementation of the DIS were compared to the Scottish physician and pharmacist groups. The Ontario physician and pharmacist respondents felt the owners of the pharmacies or clinics should pay for the maintenance costs associated with the implementation of the DIS. Only Scottish pharmacists felt that the owner should be responsible for maintenance costs associated with the implementation of the DIS. These differences in expectations may reflect the differences in the healthcare models the jurisdictions may have. Ontario's healthcare model is based on a public service system

where most of the healthcare services are primarily funded by the government. The Scottish healthcare model is based on both public and private sectors. The differences in the opinions of these two groups may mirror the differences in the two healthcare models.

4.2.5.3 PHARMACIST ACCESS TO PATIENT INFORMATION

ePrescribing could mean that the community pharmacists will have access to more patient information than is currently available to them[46]. However the need for adequate information to provide effective clinical services must be balanced against the provision of too much information, which might overload the user with unnecessary patient data or present problems with confidentiality with respect to patient data[46].

Overall there were no major differences in opinions between Scottish and Ontario physician and pharmacist groups with respect to accessing patient information. A higher percentage of Scottish physician respondents reported being in favour of pharmacist access to all 13 aspects of patient information than the Ontario physician respondents. It was also interesting to note that a higher number of the Scottish pharmacist respondents reported most aspects of patient's medical information as 'sometimes useful'. The Ontario pharmacist respondents reported the same aspects of patient's medical information as 'always useful'. This difference in perceiving patient information as 'always useful' or 'sometime useful' may be another reflection of the differences in healthcare models.

Pharmacists, with proper access to patient-specific healthcare information, can reduce patients' risk for medication-related problems and improve the quality of their health care[62]. From the project it was deduced, that a statistically significantly higher percentage of the Ontario patients would allow pharmacists to access their information through the DIS when compared to Scottish patients. A statistically significantly lower number of Ontario patients were opposed to pharmacists looking at their medical information through the DIS as compared to the Scottish patients. This statistically significant variation in views could be due to the difference in patient age groups for both group respondents.

4.2.5.4 VIEWS ON POTENTIAL ADVANTAGES OF THE DIS

Comparisons were made between the potential advantages and disadvantages of the DIS perceived by the Ontario and Scottish physician respondents. Almost the same percentage of physician respondents from both populations perceived all features to be potential advantages of the DIS except two features. While 'no paper prescription in hand to check what has been prescribed' and 'less personal contact with community pharmacists e.g., fewer telephone calls' was considered advantageous by half of the Ontario physician respondents, they were perceived as a huge disadvantage by the Scottish physician respondents. This statistically significant difference in perceptions may be reflective of the difference in workflow patterns between the two jurisdictions. The Ontario physicians

perceiving ‘less paper prescription and less contact with community pharmacy’ to be a potential advantage of the DIS might be a positive indication to completely transition to ePrescribing in Ontario. The Scottish physicians may be more comfortable with the flow of verifying prescriptions on paper before they could be taken to the pharmacy by the patient, and communicating with pharmacist in case of required prescription verification.

Interestingly, a similar pattern in differences was also observed with the pharmacist groups. While the Ontario pharmacist respondents considered ‘no need of paper copy when dispensing’ or ‘no paper prescription required with which to identify patient as a rightful recipient of medication’ as potential advantages, they were considered huge drawbacks by the Scottish pharmacist respondents. Again in the case of pharmacist groups, this statistically significant difference in perceptions may reflect the difference in workflow patterns between the two jurisdictions. The Ontario pharmacists perceiving ‘less paper prescription when dispensing and no paper prescription required with which to identify patient’ to be a potential advantage of the DIS might be an indication to completely transitioning to an electronic paper free system. The Scottish pharmacists may be more comfortable with the flow of verifying prescriptions on paper to make sure that the patient is the right recipient for the medication before dispensing their medications.

4.2.5.5 SECURITY AND CONFIDENTIALITY OF PATIENT INFORMATION

Security and confidentiality were one of the most important aspects considered with the implementation of the DIS for the Ontario and Scottish group respondents. The majority of the patients from both geographic areas were somewhat confident that the system would be secure. However, many Scottish patients were ‘not at all’ confident in the security of the DIS as compared to a ‘few’ Ontario patient respondents not at all confident with the security of the DIS. This difference was also observed with high patient confidence levels. A significantly higher number of Ontario patient respondents were ‘very’ confident with the security of the DIS as compared to only a ‘few’ Scottish patient respondents. This difference in opinions on system security and confidentiality may just be due to the differences in the percentages of age groups present in each patient group. A higher percentage of patient respondents were fairly younger in the Ontario patient group than in the Scottish patient group, one of the reasons for higher levels of trust in security and confidentiality levels found in the Ontario patient group.

4.2.5.6 PREFERRED MODELS FOR THE DIS

The first ranking preferences for the DIS models were ‘direct email to the pharmacy’ for both the Ontario and Scottish patient respondents. This was not true for pharmacist respondent groups.

The Ontario pharmacist respondents ranked the ‘central database’ as their most preferred model and ‘direct email from the physician to the pharmacist’ as their second preference. ‘Direct email from physicians to the pharmacists’ was the most preferred DIS model for

the Scottish pharmacists and the 'central database' was the second most preferred DIS model. This difference may be due to the different views and work experiences of both pharmacist groups.

Ontario pharmacists emphasized that the DIS should be patient focused instead of being physician centered or catering to the needs of physicians or pharmacists. Many of pharmacists commented that a central database would allow the patient to decide the pharmacy of their choice until the last minute, which may not be possible if patients were made to choose their pharmacy at the time of physician visit. Pharmacists commented that 'direct email to the pharmacy' would not be the most viable option for the DIS as many patients do not remember their pharmacist's contact information at the time of the patient visit to their physician's office, resulting in physician choice of pharmacy.

The highest ranked DIS model for Scottish pharmacists was 'direct email to the pharmacists'. The Scottish pharmacists may likely be focused on the advance dispensing of medication, successfully executed with the direct email option. This DIS model would allow Scottish pharmacists to dispense their patient's prescription before their patient's arrival. Ontario pharmacists might not be aware of these services in Ontario, which existed at the time of Scottish study.

4.2.6 LIMITATIONS

During the process of the study, the study project was faced by several challenges and shortfalls that delayed the process as well as did not allow for some of the desired tasks to occur as expected.

4.2.6.1 LITERATURE REVIEW

Although MEDLINE, PubMed, Cochrane Library, Google Scholar, McMaster and Hamilton Health Sciences Library, and the World Wide Web were searched to gain a comprehensive literature review of data (both academic and corporate) related to electronic data interchange, drug information system, ePrescribing, eDispensing and any data related to electronic transfer of prescription related information; this research study still remains relatively new and challenging. Other than the Scottish study[5], and commercial documents on the DIS published by Canada Health Infoway, not much literature was directly relevant for the purpose of this study.

4.2.6.2 BUDGET

Retrieval of survey responses from all groups, especially from the family physicians, was the biggest challenge of the study. Physician and pharmacist survey respondents usually expect a financial incentive to complete an average study survey. With no budget allocated as compensation for time taken to respond to the surveys, retrieving a larger number of responses was a struggle.

4.2.6.3 RESPONSE RATES

One cannot overlook that the response rate decreased respectively from patient to pharmacist to physician responses. With each respective questionnaire group, it became progressively difficult to receive a response due to time and financial constraints. As mentioned earlier, Ontario's working model has always been a fee for service model, a model that may sometimes be discouraging with respect to collection of information for research purpose unless there is an incentive for the participation of the study recipient.

4.2.6.4 SELECTION OF SAMPLING METHODS

Due to time and budget constraints, all sampling was based on convenience and snowball methods. As there was no random sampling method used, there is a possibility that not all perceptions might have been captured by the study questionnaires from all three groups. Although the study did capture perceptions from the urban areas and the suburban small towns to make sure all respondents from both small and large settings could provide their views.

4.2.6.5 NUMBER OF SURVEYS FOR EACH GROUP

Due to the time and the budget constraints, a fixed number of 35 responses were targeted to collect from each group. For a study measuring perceptions of a provincially wide system, this number may be too small to be representative of all the Ontario population. Hence, this small number in each group may have decreased the power of this study.

Emphasis needs to be placed on the fact that this study was a thesis project and, therefore, to ascertain results in a desirable timeline to finish the project with no financial grant, the sampling number needed to be realistic and manageable to retrieve results within the specified period. This small sampling frame may jeopardize the study and there may be a risk that the results may not be representative of the complete population frame of Ontario.

4.2.6.6 FORMAT OF QUESTIONNAIRES

The questionnaires were used from a Scottish study[5] by the consent of the authors. The language of the content was altered and tailored to be comprehensible for Ontario's population, however the complexity of the nested tables and questionnaires were not tampered to retain face and criterion validity set by the Scottish authors for the questionnaires. For this reason, the electronic version of the questionnaires were word documents instead of actual online surveys constructed using survey software that respondents could complete and send back directly on the contact information provided. Due to this nature of the document, respondents had to first download the electronic version of the document onto their computer, complete the questionnaire, and then either email their copy back or fax it on the number provided in the questionnaire. This factor may have not only been a reason for a lower response rate from the physicians but could also be the main reason for the delay in receiving responses from all group respondents.

5.0 Conclusion & Recommendations

Much of the literature discussed either computerized provider order entry systems in secondary care or only ePrescribing that focused on one-way communication from physicians to pharmacists. Although some European countries have implemented a DIS, little information was found on the two-way electronic data interchange that supported both ePrescribing and eDispensing features. Ontario will be one of the first provinces to implement this two-way communication system not only in Canada but also in North America.

Planning and implementing such a huge project will not be so easy and will require surplus resources to make it successful. Critical success factors and lessons learnt from the 'stakeholders' in other Canadian jurisdictions have to be kept in mind during the planning stages of the DIS to overcome any technical, financial, political, security and interoperability barriers.

The designers, planners and engineers of the system could review all the concerns such as the ones mentioned in this study before implementing this system and improvise on their architecture, focusing wherever a solution is needed. What the experts usually miss out are the perceptions held by the stakeholder or primary user group of a new system such as the DIS. Focusing on what the Ontario public think of the DIS, including family physicians, community pharmacists and patients, is crucial for its successful implementation and adoption by its users.

The majority of the three primary user groups (prescriber, dispensers and the consumers) perceived implementation of the DIS as a good idea in principle. What is alarming is that other than the pharmacists (the dispenser group), not many family physicians (the prescriber group), and patients (the consumer group), were aware of the implementation of the DIS.

For all three primary user groups to adopt the DIS and support its implementation, more awareness (such as through marketing) needs to be raised amongst these groups. Without the necessary exposure to the potential benefits of the DIS, users will not understand that for the province to progress and improve healthcare a province wide electronic system such as the DIS is necessary.

DIS will indeed be successful in improving healthcare and resolving many existing workflow problems, but adoption will remain a challenge if perceptions of the main stakeholders are not considered before, during and after the project life cycle.

For successful adaption to the DIS, developers and implementers must be aware of the perceptions, concerns and expectations that all three stakeholder groups have from the DIS. Some issues and concerns that need to be resolved before the DIS is implemented have been recommended for each stakeholder group.

5.1 PATIENTS AND CONSUMERS

Ontarians are the rightful owners of their information and remain concerned on how their data is stored at their family physician's office. With the introduction of the EMR systems in primary care practices, many patients are aware that their information is now stored electronically instead of on paper. Patients are concerned about the security and privacy measures taken to protect their medical information.

Patients will have to be introduced to the new DIS. Patients will need to be informed that their information will now be available in the DIS through their physician's EMR systems. If patients will not like the features of the DIS that will share their medical information, then their physicians and pharmacists will also not adopt this new system, because they are working in the interest of their patients. Hence, the patients will need to know the potential benefits of the DIS just as much as the pharmacists and physicians will have to be appraised of the system.

Privacy and security of patient data was a common concern amongst patient respondents especially with the pharmacist access to patient information through the DIS. These concerns will have to be addressed by the experts in order for patients to feel safe and satisfied with the DIS[58]. Otherwise substantial problems could arise if patients feel they have no control over the fate of their information[56].

Patients have the right to choose who can access their information. Some patients may not feel comfortable sharing their information with the pharmacists even after learning the benefits of sharing information. For this reason, the DIS will need to have various levels of security and consent directive models tailoring to everyone's requirements.

Direct email to the pharmacist by physicians was the more preferred and highest ranked model of the DIS selected by patient respondents. However for an optimum functioning provincially wide system and to encourage a two-way communication between the physicians and pharmacists, this may not be the best model for the DIS. If the administers want to choose central database as the model for DIS, then patients will have to be informed of the additional benefits achieved with a central database model as opposed to direct email model.

5.2 COMMUNITY PHARMACISTS (THE DISPENSER GROUP)

Pharmacist respondents out of all three stakeholder groups were not only the most supportive but also the group with awareness of the DIS prior to the survey study. However, this should not be confused with the fact that they have no concerns with the implementation of the DIS. Many of them were also concerned about the security and confidentiality with respect to sharing patient information such as OTC purchased drug information. Pharmacist concerns will have to be addressed to maximize utilization of the DIS.

For pharmacists to adapt to the system, the government will have to fund the new software, hardware and training costs. MOHLTC and eHealth Ontario should further discuss with the pharmacists and seek the most convenient methods for the pharmacists to make all the necessary changes to install the DIS in their pharmacies.

Adequate, mandatory and convenient training will have to prepared and given to pharmacists for them to make efficient use of the DIS. Specific health organizations that specialize in training pharmacists should be contacted as they are proven to work successfully with end users[58]. These organizations can help pharmacists prepare for the future and the transformations they will have to make with the implementation of DIS[58]. Change management will also have to be considered and planned in detail for the long-term adaption and success of the DIS.

Only marketing and raising awareness on the upcoming DIS will not be sufficient. Pharmacists will have to be assured of its advantages with respect to improving quality of care for patients as well as improving the efficiency in their daily routine workflow.

Adoption of the DIS in pharmacies in Ontario will consume time. The rollout for DIS should be systematically deployed so that success in one area could encourage the other pharmacies to adopt DIS in other areas.

Other than funding costs associated with the implementation of the DIS, the government should provide incentives (such as funding for the maintenance costs) for the pharmacists that will not only ease the process of adoption for pharmacists but also help in faster adoption and transitioning to a new provincial system.

Once the DIS has been rolled out completely across Ontario, a reasonable time line should be executed, after which any additional incentives for pharmacists should be removed incase if they do not adopt DIS in that timeframe.

5.3 FAMILY PHYSICIANS (THE PRESCRIBER GROUP)

Although most of the family physicians do not seem to be aware of the upcoming DIS in Ontario, most of the physician respondents were in support of its implementation. For the two-way communication to occur in DIS, awareness must be raised amongst all family physicians of Ontario. The DIS will have to be leveraged across all primary care clinics possible for physician mass adoption and efficient use of DIS.

The physician group was indeed most concerned about patient security and confidentiality with respect to patient information once the DIS would be implemented. Physicians were mostly concerned about the pharmacist access to patient information. Common factors such as age, sex, ADEs, current prescriptions were not worrisome for the physicians to share with the pharmacists. However, sharing of more in-depth patient information such as laboratory and screening test results was concerning for physicians.

If the DIS will include more in-depth patient information, then physicians will have to be consulted and involved in the process of selecting what patient information might be allowed for pharmacists to access. This will also give physicians the opportunity to voice their opinions and make them feel involved in the whole process, resulting in more physician support and adoption of the DIS in their family practices.

For the physicians to adapt to the DIS, the government will have to provide funding for software, hardware and training costs. MOHLTC and eHealth Ontario should further discuss with the physicians and sought on the most convenient method for the physicians to make all necessary changes to install DIS in their primary care clinics.

Adequate, mandatory and convenient training will have to given to physicians for them to make efficient use of the DIS. Many pharmacist respondents still felt that physicians will still choose the wrong option from the drop down menu lists or make mistakes in general despite ePrescribing. Change management will have to be considered and planned in detail for the long-term adoption and success of DIS amongst physicians.

Physicians being the harder group to convince to adopt DIS will have to be assured of its advantages with respect to improving quality of care for patients as well as improving the efficiency in their daily workflow.

Other than funding for the hardware and software costs associated with the implementation of the DIS, the government should provide incentives (such as funding maintenance costs) that will not only ease the process of adoption for physicians but also help in timely adoption and transitioning to a new provincial system.

5.4 IMPLEMENTATION AND DEPLOYMENT OF THE DIS

eHealth Ontario and MOHLTC may face challenges from the main stakholders in their adoption of the DIS. All three stakeholders groups may perceive specific barriers towards adoption. Pharmacists may fear added workload to their daily routine without any remuneration with the implementation of the DIS. They may also fear that their daily work routine may slow down with the addition of security features such as separate log on features associated with their pharmacy management systems. Physicians may fear that pharmacists may get additional sales opportunities for their drugs and related merchandise with the provision of patient information to the pharmacists through Ontario's DIS. The physicians may also be concerned with the training time required to get accustomed to using the DIS and any technological drawbacks associated with the DIS that may hinder their daily medical practice. Patients on the other hand may have other concerns that may act as barriers to adapting to the Ontario's DIS. They may fear that their medical information may be shared with all the pharmacists instead of their selected pharmacist if 'central database model' is chosen as the model to be implemented in Ontario. Patients will have to be given information and reassurance about the potential benefits and security measures that the model of the central database would incorporate with its implementation. All three-stakeholder groups would have to be well informed about the potential benefits of the upcoming DIS. Their queries will have to be answered and any confusion clarified.

Perceptions from all three-stakeholder groups should be taken into account for the roll out of the DIS, including change management and other critical factors that need to be revisited to ensure that the DIS long-term goals are met. Physicians, pharmacists and patients need to have a positive and accepting attitude towards the DIS for its successful adoption. This can only be achieved by involving the stakeholders throughout the DIS lifecycle.

Security standards should also be established and enforced with the DIS implementation. Physicians and patients will be more comfortable in accepting the DIS if they know that standard security measures are in place that protect patient information.

Once the DIS is rolled out and deployment is completed, a team should be assigned to make routine on-site visits to clinics and pharmacies. This team would be able to alleviate concerns physicians and pharmacists may voice and to provide information on the DIS and its new features that may impact workflow.

If all the measures are considered including the perceptions of physicians, pharmacists and patients, then the implementation of the DIS will be a success across Ontario, although this will require effort and time like any other large project.

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Appendices

APPENDIX 1: PATIENT QUESTIONNAIRE

McMaster University

McMaster University
Faculties of Business, Health Sciences, and Engineering
MSc eHealth

Drug Information System Questionnaire For Consumers

Drug Information System

Please help us with this important research.

McMaster University
Faculties of Business, Health Sciences, and Engineering
MSc eHealth

McMaster University
1280 Main St. West
Hamilton, Ontario, Canada
L8S 4M4

905-525-9140 ext 22803
mckib@mcmaster.ca

Dear Potential Study Participant,

This letter is an invitation to participate in a research study from McMaster University. I am a M.Sc. student in the ***eHealth*** Program. Part of my graduate work is to complete my thesis at the McMaster University under Dr. Ann McKibbon. I want to study how people like you think of Ontario's upcoming Drug Information System. Ontario is planning on moving to an electronic prescribing system that will allow doctors and nurses to prescribe drugs for you by using their computers. The computers will send information about you and your new or existing prescriptions to pharmacies. The pharmacists take these electronic prescriptions and dispense the drugs for you to pick up. eHealth Ontario and other government organizations want to introduce their Drug Information System (electronic prescribing and electronic dispensing) in the next year. We are collecting data on what family physicians and other prescribers such as nurse practitioners, community pharmacists and people like you feel about the new electronic Drug Information System.

Study Overview

The fourth leading cause of death in Ontario is preventable adverse drug events[1]. eHealth Ontario plans to use electronic prescribing to reduce the number of these adverse drug events. Problems with drug prescribing occur for various reasons. For example, physicians may prescribe medications that are not effective for certain conditions or medications that may interact with each other; people may be taking their medications incorrectly; they may also have conflicting prescriptions from several physicians or nurse practitioners; or physicians may not monitor drug allergies in their patients, or may prescribe the wrong dose[1].

eHealth Ontario, with funding from Canada Health Infoway, is considering introducing a system called the Drug Information System. This system will introduce and integrate electronic prescribing, electronic dispensing and electronic data interchange* between the prescribers and dispensers, which could radically change the current process for prescribing and dispensing medicine(s). They are currently investigating various options. The eHealth program from McMaster University is studying the requirements of the people who will be most affected – the patients, the prescribers (family physicians and nurse practitioners) and community pharmacists.

*Electronic data interchange: It is the two way electronic order communication between physicians and pharmacists regarding the medications of patients.

eHealth Ontario feels that their Drug Information System, which involves data collection and electronic prescribing, will help prevent problems with medications as listed above. They suggest that electronic prescribing can reduce 217,000 adverse drug events, 132,000 physician office visits, 20,000 hospitalizations and 2,200 deaths related directly to problems with drugs each year. These reductions will cut healthcare spending by $350 million.

Before implementing such a large-scale system, the views of people who use the healthcare system should be sought. Therefore we are using questionnaires to discover what is important for people who need medication(s), doctors and nurses, and pharmacists. eHealth Ontario will review what we find to insure that Ontario's electronic prescribing system is as useful as possible for all.

My research will take place in the Hamilton and Greater Toronto Area. It will focus on what information should be transferred from a doctor's office to a community pharmacy. We also want to find out if you have any worries about your data being secure and kept private.
As a citizen of Ontario your feelings and insights are important in the implementation of a Drug Information System. Please help us by filling out this survey. It should only take you 15 minutes to fill it out.

Your Involvement
The survey includes questions on how you view the way prescriptions are processed in Ontario now. We will also describe how electronic prescribing will likely work and ask your opinion on these new processes. We will describe what a drug information system is and how the current prescription system will change once the Drug Information System is implemented.

Participation in the survey is entirely voluntary. Completing the survey does not have any known or anticipated risks other than taking out 15 minutes to fill it. You may decline to answer any of the questions. Further, you may stop the questionnaire at any time. All information you provide is confidential and the data collected will be completely anonymous. *We will give our findings to eHealth Ontario for their consideration; Therefore, you can influence the planning and implementation of electronic prescribing by filling out this questionnaire.*

We would appreciate it if you could return the questionnaire as soon as possible or before 30 October 2011.

Contact Information
If you have any questions about this study, or would like additional information about participation, please contact me at ***416-258-1150*** or by email ***quresh5@mcmaster.ca.*** You can also contact my supervisor ***Dr. Ann McKibbon*** by telephone at 1-905-525-9140 ext. ***22803*** or by email at ***mckib@mcmaster.ca.***

A website describing the project in more detail is also available at eHealth Ontario's website:
http://www.ehealthontario.on.ca/News/2011/March28_2011.asp

A more detailed, technical document, *'Perceptions of Ontario's First Upcoming Drug Information System: Narrating the story of prescribers, dispensers and patients'* is still under development but can be emailed to you or your organization upon request once it is completed. Please let us know if you would like to request a copy by filling out the last question of this questionnaire. We would like to hear from you.
This study has received ethics approval through the Office of Research Ethics at the McMaster University. If you have any comments or concerns resulting from your participation in this study, please contact, **The Office of the Chair, HHS/FHS REB** at 1-905-521-2100 ext. **42013**. Thank you in advance for your interest and assistance with this research.
Yours very truly,

Hafsa Qureshi Grymek
M.Sc. Candidate

CONSENT FORM

By signing this consent form, you are not waiving your legal rights or releasing the investigator(s) or involved institution(s) from their legal and professional responsibilities.

I have read the information presented in the information letter about a study being conducted by **Hafsa Qureshi Grymek** of the eHealth Program at McMaster University, under the supervision of **Professor *Ann McKibbon***. I have had an opportunity to ask any questions related to this study, to receive satisfactory answers to my questions, and any additional details I required.

I am also aware that excerpts from the survey may be included in the thesis and/or publications to come from the research, with the understanding that quotations will be anonymous.

I was informed that I may withdraw my consent at any time without penalty by advising the researcher.

This project has been reviewed by and received ethics clearance through the Office of Research Ethics at the McMaster University. I was informed that if I have any comments or concerns resulting from my participation in this study, I may contact, **The Office of the Chair, HHS/FHS REB** at 1-905-521-2100 ext. **42013**.

With full knowledge of all foregoing, I agree, of my own free will, to participate in this study.

☐ Yes ☐ No

I agree to the use of anonymous quotations in any thesis or publication that comes of this research.

☐ Yes ☐ No

Participant Name: _____(Please print)

Participant Signature: _____

Date:

Drug Information System Study

What is McMaster's Drug Information Study about?

eHealth Ontario and the Ministry of Health and Long Term Care are considering introducing a system called Drug Information System. This system will include electronic prescriptions, electronic dispensing and a two way electronic order communication between your family physicians and community pharmacists. When you visit or telephone your doctor and need a prescription, he/she would use a computer to send an electronic prescription to your drug store. You would then go to the pharmacy to collect the medicines the doctor or nurse practitioner have prescribed. Electronic prescriptions might completely replace paper prescriptions.

You visit your physician or nurse practitioner -

or phone in for a prescription

He/she writes and sends an electronic prescription 'message' using the clinic computer

Your chosen pharmacy receives the electronic prescription; checks for complete records and if needed verifies with your family physician on the pharmacy computer and dispenses your medicines.

A. Please tell us about your use of prescriptions and community pharmacies

Q1. Approximately how many prescriptions do you get dispensed for yourself or for other people?

	For myself	For other people
At least one every three months	☐	☐
At least one a year	☐	☐
Less than one a year	☐	☐
I have never had a prescription dispensed	☐	☐

Q2. How much do you usually pay for your prescriptions?

I pay full prices for my drugs (I have no insurance coverage)	☐
I pay the dispensing fee and my work or other insurance pays the rest	☐
I am a senior and I pay $6.11 per prescription with a $100 deductible per year	☐

I am a senior and I pay $2 per prescription (Ontario Drug Benefit)	☐
Other:	☐

Q3. Do you always use the same pharmacy to have prescriptions dispensed?

Yes, always	☐
Usually	☐
No	☐

Q4. How important is it to you to be able to choose a <u>different</u> pharmacy each time you have prescriptions dispensed?

Not at all important, I will always use the same pharmacy	☐
Not important – although I do not always use the same pharmacy, I would not mind if I had to use the same one all the time	☐
Quite important – I like the flexibility of getting my prescription dispensed at a pharmacy which is convenient for me at the time	☐
Very important – it would be impossible for me to use the same pharmacy all the time	☐

Q5. If the pharmacy you took the prescription to did not have some or all of the medicine(s) in stock, would you want to be able to take the prescription to another pharmacy rather than return at a later time?

No, never	☐
Yes, sometimes	☐
Yes, always	☐

Q6. Does your family physician or nurse practitioner already use a computer to print out paper prescriptions?

Yes ☐ No ☐ (go to Q8) Don't know ☐ (go to Q8)

Q7. If 'yes' to Q6, are you annoyed or 'put off' by the family physician or nurse practitioner typing on the computer during your clinic visit?

Yes ☐ No ☐ Don't know ☐

Q8. Would it bother you if your family physician or nurse practitioner did not give you a paper prescription, which you could read for yourself, but instead, only sent an electronic message to the pharmacy?

Yes ☐ No ☐ Don't know ☐

B. Repeat prescriptions

Q9. Do you receive at least one regular (*repeat*) prescription from your family physician or nurse practitioner?

Yes ☐ No ☐ (go to Q18) Don't know ☐ (go to Q18)

Q10. If 'yes', how long does your repeat prescription <u>usually</u> last?

One month	☐	Two months	☐
Three months	☐	More than three months (please specify _____ months)	☐

Q11. Would you like your family physician's office (*or your regular pharmacy*) to offer a repeat prescription collection service where your prescription is sent to your chosen pharmacy (*so that you do not need to visit the clinic or hand in your prescription to the pharmacy in person?*)

Yes ☐ No ☐ (go to Q14) Don't know ☐

Q12. An electronic prescribing system could change the way in which you receive your repeat prescription.

For example: *Your family doctor or nurse practitioner could write a repeat prescription, which would last for 6 months and which your pharmacist could dispense every one or two months. In this way you would not need to contact the family doctor's office for a repeat prescription for at least 6 months.*

Each time you needed a new supply of medicine(s), you would simply visit a pharmacy. We would like to know what you think of this type of system? Please indicate to what extent you agree with the following statement.

'I would like a Drug Information System like the one described above where my repeat prescription would last for 6 months' by the use of electronic prescribing.

Strongly agree	☐	
Agree	☐	
Disagree	☐	Go to Q18
Strongly disagree	☐	Go to Q18
Don't know	☐	

Q13. A previous question (Q4) asked about how important it was for you to be able to choose a different pharmacy each time you have a prescription dispensed.

The repeat system described above might mean that you would always have to use the same pharmacy to get your repeat prescription dispensed. Please indicate to what extent you agree or disagree with the following statement.

'I would like a repeat prescription which lasts for 6-months even if it means always using the same pharmacy'

Strongly agree	☐
Agree	☐
Disagree	☐
Strongly disagree	☐
Don't know	☐

Q14. Although you would not need to visit the clinic to get your prescription within the 6-month period, you would still have to order and collect your medicine(s) from the pharmacy.
What is the **maximum** number of times you would find it acceptable to visit the pharmacy during this 6-month period?

Once a month	☐
Once every 2 months	☐
Once every 3 months	☐
Only once in the 6 months	☐

Q15. For some people with a repeat prescription containing more than one item, different medicine(s) sometimes run out at different times making it necessary for them to contact the clinic for another prescription multiple times. **Does this ever happen to you?**

No, never	☐	Go to Q18
Yes, occasionally	☐	
Yes, frequently	☐	

Q16. If the new repeat system allowed your pharmacist to dispense the quantities of medicine(s) you need within the 6-month period in a more flexible way (*to avoid having to return to the clinic*), **how much of an advantage would that be for you?**

Major advantage	☐
Some advantage	☐
No advantage	☐

Q17. One feature of an electronic prescription might be that you could have your repeat prescription dispensed anywhere in Ontario without needing to hand in a paper prescription form. ***For example***: If you were travelling or on holiday and ran out of your regular medication, the local pharmacy could access your prescription on the computer and renew your supply. **How much of an advantage would that be for you?**

Major advantage	☐
Some advantage	☐
No advantage	☐

C. Sharing information

Q18. As part of the new prescription service, your pharmacist might want to ask you some questions about your medicine(s). (*Many pharmacists may already ask some of these questions*).

For example: *If you have had this medication before, he/she might ask about how much you have left or if you are having any problems with your medication e.g. side effects or other adverse reactions.*

He/she might also want to ask questions about your medical condition or about your lifestyle such as whether you smoke or drink alcohol.

The answers you give to these questions could help the pharmacist to decide whether the medicine(s) you are taking are the best treatment for you as an individual or whether you should go and see your family physician or nurse practitioner to discuss this further.

How do you feel about this?

Which of the following list of subjects (*if any*) would you be happy to discuss with the pharmacist? (*Please check all that apply*)

	Happy to discuss
The medicine(s) on the prescription you have come to collect	☐
Other medicine(s) you are taking just now	☐

Medicine(s) you have taken in the past		☐
Your current medical problems		☐
Medical problems you have had in the past		☐
Test results	Blood tests	☐
	Urine tests	☐
	Blood pressure levels	☐
	Lung function tests	☐
Any allergies you may have		☐
Lifestyle factors	Smoking	☐
	Drinking alcohol	☐
Your age		☐

OR

I would not want to discuss **ANY** of my medical records with a community pharmacist	☐

Q19. Does the pharmacy you use most often have a separate area where you can speak to the pharmacist in private without other customers overhearing your conversation?

Yes ☐ (go to Q21) No ☐ Don't know ☐

Q20. If you answered 'no' or 'don't know' to Q19, do you think that you would be happier to discuss any of the subjects listed if a private area was available in the pharmacy? (*Please check all that apply*)

		Happy to discuss in a private area
The prescription you have come to collect		☐
Other medicine(s) you are taking just now		☐
Medicine(s) you have taken in the past		☐
Your current medical problems		☐
Medical problems you have had in the past		☐
Test results	Blood tests	☐
	Urine tests	☐
	Blood pressure levels	☐
	Lung function tests	☐
Any allergies you may have		☐
Lifestyle factors	Smoking	☐
	Drinking alcohol	☐
Your age		☐

OR

I would not want to discuss **ANY** of my medical records with a community pharmacist, even in a private area	☐

Q21. If family physician's office and community pharmacies become 'linked' by computer, it has been suggested that pharmacists might be allowed to look at electronic patient records, which physicians and the other clinic staff could keep on their computers.

In this way, pharmacists would have a more complete picture of your medical problems and might be able to offer a better level of health care.

How would you feel about pharmacists having access to your confidential medical records?

Please indicate which of the following types of information (*if any*) you would be happy for your pharmacist to look at in your medical records (*Please check all that apply*)

		Happy for pharmacist to look at
Medicine(s) you are taking currently		☐
Medicine(s) you have taken in the past		☐
Your current medical problems		☐
Medical problems you have had in the past		☐
Test results	Blood tests	☐
	Urine tests	☐
	Blood pressure levels	☐
	Lung function tests	☐
Any allergies you may have		☐
Lifestyle factors	Smoking	☐
	Drinking alcohol	☐
Your age		☐

OR

I would not want a community pharmacist to look at **ANY** of my medical records	☐

Q22. Similarly, it might be possible for pharmacists to pass information electronically to your family physician about you and the medicine(s) you are taking. How do you feel about this?

Please indicate which of the following types of information (*if any*) you would accept the pharmacist passing onto your family physician and other clinic staff (*Please check all that apply*)

	Happy for pharmacist to pass onto your clinic
Any medicine(s) from your prescription which you choose not to have dispensed	☐
Problems you might be having with your medicine(s) e.g. if they are not treating your symptoms or are causing side effects	☐
Medicine(s) that you buy 'over the counter' in the pharmacy	☐
Information about my health in general	☐

OR

I would not want a community pharmacist to pass on **ANY** information about me to my family physician	☐

Q23. Electronic medical records which store and transfer confidential information must be very secure. It is important that unauthorized individuals could not access such a system.
How confident are you that it will be possible to make the system secure from unauthorized individuals?

Very confident	☐
Somewhat confident	☐
Not at all confident	☐

Q24. Some people do not have to pay for their prescriptions or pay lower dispensing fees (e.g. people over 65 years, people on certain Ontario Drug Benefit Program).
Currently, the community pharmacist asks people if they are exempt and checks that they have filled in the appropriate forms. All, or most, exemption information could be included automatically with an electronic prescription so that the pharmacist does not have to discuss this with the person who is receiving the medications.

Do you think this would be a good idea?

Yes ☐ No ☐ Don't know ☐

D. Which system?

Q25. The next table describes 3 different possible electronic prescription systems. Please read each one carefully and then rank them in order of preference by writing the number 1 next to the one you would <u>most</u> like to use, the number 2 next to your second choice and the number 3 next to your third choice.

When you ask your family doctor or nurse practitioner or phone the clinic for a prescription, you tell them which pharmacy you want your electronic prescription to be sent to. The pharmacist will receive the prescription a few minutes after it is sent from the clinic and will be able to have it ready for you (*or your representative*) to collect at your convenience. Once you have chosen the pharmacy, you will not be able to change your mind.	____
When you ask your family doctor or nurse practitioner or phone the clinic for a prescription, they send your electronic prescription to a central 'data store'. You can then telephone or visit the pharmacy of your choice and ask them to 'download' and dispense your prescription. If you (*or your representative*) visit the pharmacy in person, you will have to wait for your prescription in the same way as if you had handed in a paper prescription. With this system, you can decide at the last minute which pharmacy you want to use.	____
At the family doctor's office your prescription information is electronically written onto a 'Smart Card' (similar to a credit card). At the pharmacy of your choice, the card is handed to the pharmacy staff and the information on the card is 'downloaded' onto the pharmacy computer. The pharmacist dispenses your medicine(s) in the same way as a paper prescription. With this system, you can decide at the last minute which pharmacy you want to use	____

but you (*or your representative*) will have to visit the pharmacy in person.	

E. ePrescriptions in general

Q26a. Do you think that the electronic transfer of prescription-related data is a good idea in principle?

Yes ☐ No ☐ Don't know ☐

Q26b. Did you know about the Drug Information System that will be implemented in Ontario by 2012 before you filled out this survey?

Yes ☐ No ☐ Don't know ☐

F. And finally, please tell us a little about yourself

Q27. Age

20-29 years	☐
30-39 years	☐
40-49 years	☐
50-59 years	☐
60-69 years	☐
70 years and over	☐

Q28. Sex

Male	☐
Female	☐

Please add any comments you would like to make about the Drug Information System in the space below.

_____

_____

_____

_____

_____

Q29. Would you like to receive the final report on this study, *'Perceptions of Ontario's First Upcoming Drug Information System: Narrating the story of prescribers, dispensers and patients*' once it is complete? (please check boxes)

Yes ☐ No ☐

Email address to which we can email you the final report: _____

Thank you for completing this questionnaire. Please submit the questionnaire electronically to quresh5@mcmaster.ca or if you received a paper copy, return it back to the distributor before October 31 and we will ensure to collect your questionnaire from them.

APPENDIX 2: PHARMACIST QUESTIONNAIRE

McMaster University
Faculties of Business, Health Sciences, and Engineering
MSc eHealth

Drug Information System Questionnaire For Community Pharmacists

Drug Information System

Please help us with this important research.

McMaster University
Faculties of Business, Health Sciences, and Engineering
MSc eHealth

McMaster University
1280 Main St. West
Hamilton, Ontario, Canada
L8S 4M4

905-525-9140 ext 22803
mckib@mcmaster.ca

Dear Pharmacist,

This letter is an invitation to participate in a research study from McMaster University. I am a M.Sc. student in the ***eHealth*** Program. Part of my graduate work is to complete my thesis at the McMaster University under Dr. Ann McKibbon. I want to study how community pharmacists like you think and what information you have on Ontario's upcoming Drug Information System. Ontario is planning on moving to an electronic prescribing system that will allow doctors and nurses to prescribe drugs for patients by using their computers. The computers with EMR solution will send information about patients and their new or existing prescriptions to your pharmacies. Community pharmacists like you will be retrieving these electronic prescriptions and dispensing the drugs for your patients to pick up. eHealth Ontario and other government organizations want to introduce their Drug Information System (electronic prescribing and electronic dispensing) in the next year. We are collecting data on what patients, family physicians, other prescribers, and community pharmacists like you feel about the new electronic Drug Information System.

Study Overview

The fourth leading cause of death in Ontario is preventable adverse drug events[1]. eHealth Ontario plans to use electronic prescribing to reduce the number of these adverse drug events. Problems with drug prescribing occur for various reasons. For example, physicians may prescribe medications that are not effective for certain conditions or medications that may interact with each other; people may be taking their medications incorrectly; they may also have conflicting prescriptions from several physicians or nurse practitioners; or physicians may not monitor drug allergies in their patients, or may prescribe the wrong dose[1].

eHealth Ontario with funding from Canada Health Infoway, is considering introducing a system called the Drug Information System. This system will introduce and integrate electronic prescribing, electronic dispensing and electronic data interchange* between the prescribers and dispensers, which could radically change the current process for prescribing and dispensing medicines. They are currently investigating various options. The eHealth program from McMaster University is studying the requirements of the people who will be most affected – the patients, the prescribers (family physicians and nurse practitioners) and community pharmacists.

*Electronic data interchange: It is the two way electronic order communication between physicians and pharmacists regarding the medications of patients.

eHealth Ontario, feels that their Drug Information System, which involves data collection and electronic prescribing, will help prevent problems with medications as listed above. They suggest that electronic prescribing can reduce 217,000 adverse drug events, 132,000 physician office visits, 20,000 hospitalizations and 2,200 deaths related directly to problems with drugs each year. These reductions will cut healthcare spending by $350 million.

Before implementing such a large-scale system, the views of healthcare professionals who run the healthcare system should be sought. Therefore we are using questionnaires to discover what is important for users, doctors and nurses, and pharmacists. eHealth Ontario will review what we find to insure that Ontario's electronic prescribing system is as useful as possible for all.
My research will take place in the Hamilton and Greater Toronto Area. It will focus particularly on opinions on the type of data that should be transferred from a doctor's office to a community pharmacy and vice versa, any issues of access to specific data, and any security and privacy concerns patients may have for their data. We also want to find out if pharmacists like you have any other concerns with such a large-scale system in place.
As a concerned community pharmacist your opinions and insights are important in the implementation of a Drug Information System. Please help us by filling out this survey. It should only take you 15 minutes to fill it out.

Your Involvement
The survey includes questions on how you view the way prescriptions are processed in Ontario now. We will also describe how electronic prescribing will likely work and ask your opinion on these new processes. We will describe what a drug information system is and how the current prescription system will change once the Drug Information System is implemented.

Participation in the survey is entirely voluntary. Completing the survey does not have any known or anticipated risks other than taking out 15 minutes to fill it. You may decline to answer any of the questions. Further, you may stop the questionnaire at any time. All information you provide is confidential and the data collected will be completely anonymous. *We will give our findings to eHealth Ontario for their consideration; Therefore, you can influence the planning and implementation of electronic prescribing by filling in this questionnaire.*

We would appreciate it if you could return the questionnaire as soon as possible or before October 31, 2011

Contact Information
If you have any questions about this study, or would like additional information about participation, please contact me at ***416-258-1150*** or by email ***quresh5@mcmaster.ca.*** You can also contact my supervisor ***Dr. Ann McKibbon*** by telephone at 1-905-525-9140 ext. ***22803*** or by email at ***mckib@mcmaster.ca.***

A website describing the project in more detail is also available at eHealth Ontario's website:
http://www.ehealthontario.on.ca/News/2011/March28_2011.asp

A more detailed, technical document, *'Perceptions of Ontario's First Upcoming Drug Information System: Narrating the story of prescribers, dispensers and patients'* is still under development but can be emailed to you upon request once it is completed. Please let us know if you would like to request a copy by filling out the last question of this questionnaire. We would like to hear from you.

This study has received ethics approval through the Office of Research Ethics at the McMaster University. If you have any comments or concerns resulting from you participation in this study, please contact, **The Office of the Chair, HHS/FHS REB** at 1-905-521-2100 ext. **42013**. Thank you in advance for your interest and assistance with this research.

Yours very truly,

Hafsa Qureshi Grymek
M.Sc. Candidate

CONSENT FORM

By signing this consent form, you are not waiving your legal rights or releasing the investigator(s) or involved institution(s) from their legal and professional responsibilities.

I have read the information presented in the information letter about a study being conducted by **Hafsa Qureshi Grymek** of the eHealth Program at McMaster University, under the supervision of **Professor *Ann McKibbon***. I have had an opportunity to ask any questions related to this study, to receive satisfactory answers to my questions, and any additional details I wanted.

I am also aware that excerpts from the survey may be included in the thesis and/or publications to come from the research, with the understanding that quotations will be anonymous.

I was informed that I may withdraw my consent at any time without penalty by advising the researcher.

This project has been reviewed by and received ethics clearance through, the Office of Research Ethics at the McMaster University. I was informed that if I have any comments or concerns resulting from my participation in this study, I may contact, **The Office of the Chair, HHS/FHS REB** at 1-905-521-2100 ext. **42013**.

With full knowledge of all foregoing, I agree, of my own free will, to participate in this study.

☐ Yes ☐ No

I agree to the use of anonymous quotations in any thesis or publication that comes of this research.

☐ Yes ☐ No

Participant Name:_____(Please print)

Participant Signature: _____

Date:

Completing the questionnaire

This questionnaire differs from others you may have completed in that it mostly relates to a hypothetical situation, not your personal experiences.

- We estimate that it will take approximately **10-15 minutes** to read and complete the questionnaire.
- Once you have finished, please submit the questionnaire electronically to quresh5@mcmaster.ca or if you received a paper copy a paper copy, return it back to the distributor and we will ensure to collect your questionnaire from them.

A. Patient choice of pharmacy

In some countries such as Holland and Denmark where the electronic transfer of prescriptions already exists, the family physician or clinic staff asks the patient from which pharmacy they would like to collect their medication. The prescription is then sent directly to the pharmacy of the patient's choice. Please read the following statements and indicate to what extent you agree or disagree with them.

	Strongly agree	Agree	Unsure	Disagree	Strongly disagree	No opinion	*FURTHER COMMENTS*
1. For physicians or nurse practitioners to send the electronic prescription directly to a pharmacy chosen by the patient is unacceptable to me.	☐	☐	☐	☐	☐	☐	
2. For physicians or nurse practitioners to send the electronic prescription directly to a pharmacy chosen by the patient is not different in principle to a prescription collection service.	☐	☐	☐	☐	☐	☐	

Please add any further comments about 'Patient choice of pharmacy'.

_____

B. Pharmacist access to Drug Information System

Electronic prescribing could mean that community pharmacists will have access to more patient information than is currently available to them. However, the need for adequate information to provide effective clinical services must be balanced against provision of too much information, which might overload the user or present problems of confidentiality.

The table below lists the type of patient information that might be available to community pharmacists. Bearing in mind the caveats above (information overload and confidentiality), how useful do you think it would be to have access to these data. Which do you think is the best source of this information? Please check one box in the 'usefulness' column and one in the 'source' column for each row.

	Usefulness of information?				Source of information?			
	a) Always useful	b) Sometimes useful	c) Never useful	d) Don't know	e) Medical records	f) Ask patient/ representative	g) Both	h) Don't know
3. Sex	☐	☐	☐	☐	☐	☐	☐	☐

4. Age	☐	☐	☐	☐	☐	☐	☐	☐
5. Drug allergies	☐	☐	☐	☐	☐	☐	☐	☐
6. Other allergies	☐	☐	☐	☐	☐	☐	☐	☐
Diagnoses ☐	☐	☐	☐	☐	☐	☐	☐	☐
Diagnoses ☐	☐	☐	☐	☐	☐	☐	☐	☐
7. Drug history (*previous 6 months*)	☐	☐	☐	☐	☐	☐	☐	☐
8. ADEs	☐	☐	☐	☐	☐	☐	☐	☐
9. Hospital discharge summaries	☐	☐	☐	☐	☐	☐	☐	☐
Screening tests ☐	☐	☐	☐	☐	☐	☐	☐	☐
Screening tests ☐	☐	☐	☐	☐	☐	☐	☐	☐
Screening tests ☐	☐	☐	☐	☐	☐	☐	☐	☐
Laboratory results ☐	☐	☐	☐	☐	☐	☐	☐	☐
Laboratory results ☐	☐	☐	☐	☐	☐	☐	☐	☐
Others (please specify)	☐	☐	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐	☐	☐

Further comments:

_____

_____

C. Electronic communication with Family Physicians

10. If family physicians considered it advantageous to know about Over The Counter (OTC) purchases of medicines, would you be prepared to ask the patient if you could pass the information to the family physicians or clinic?

    Yes ☐ No ☐ Don't know ☐

11. Would you be prepared to enter such OTC information onto a computer for transmission to the family physicians?

    Yes ☐ No ☐ Don't know ☐
    If yes, please specify:

    _____

12. Is there any other information that you think would be useful to transfer electronically from you, back to the family physician or clinic (i.e., in preference to phoning or writing for example)?

    Yes ☐ No ☐ Don't know ☐
    If yes, please specify:

    _____

13. Would you rather send this information directly to the family physician or clinic or to a central database from where the family physician and nurse practitioners could access it?

    Direct to family physician ☐ Store in central database ☐ Don't know ☐
    If yes, please specify:

---

14. Other than the information currently sent to the Ontario Drug Benefit (ODB) Program on the paper prescription is there anything else that you feel could be usefully transferred electronically to the ODB Program?

    Yes ☐ No ☐ Don't know ☐
    If yes, please specify:

---

15. Is there any information you think would be useful to receive electronically from the ODB Program?

    Yes ☐ No ☐ Don't know ☐
    If yes, please specify:

D. Pharmacist review of patient medication

Depending on the type of information, which is made available, it may be possible for community pharmacists to briefly review patient's medication at the point of dispensing. How do you feel about this? Please indicate to what extent you agree or disagree with the following statements.

	Strongly agree	Agree	Unsure	Disagree	Strongly disagree	No opinion	Further comments
16. I would welcome the chance to play a greater part in the review of the patient's medication(s).	☐	☐	☐	☐	☐	☐	
17. My current practice would not allow enough time to review patients' medication(s) in any more detail than I do at the moment.	☐	☐	☐	☐	☐	☐	
18. Further review of patient's medication(s) other than Medscheck would only be possible if more time were made available to me.	☐	☐	☐	☐	☐	☐	
19. Further review of patient's medication(s) would only be possible if more money were made available to me.	☐	☐	☐	☐	☐	☐	
20. Patient care would improve through	☐	☐	☐	☐	☐	☐	

increased pharmacist intervention of the type described above.

21. Community pharmacists are not trained to interpret clinical data such as lab results, screening test results etc. ☐ ☐ ☐ ☐ ☐ ☐
22. Community pharmacists should not try to make decisions based on clinical data. ☐ ☐ ☐ ☐ ☐ ☐
23. When patients who are not regular customers come to my pharmacy, it would be helpful to be able to review their complete medication record. ☐ ☐ ☐ ☐ ☐ ☐
24. I would be happy to accept any extra liability, which might be associated with increased access to confidential patient information. ☐ ☐ ☐ ☐ ☐ ☐
25. I could provide improved care for the patient if I knew the diagnosis. ☐ ☐ ☐ ☐ ☐ ☐

Please add any further comments about 'Pharmacist review of patient medication'.

_____

_____

E. Repeat prescriptions

26. Would you like to operate prescription collection service (service that allows pharmacists to directly collect prescriptions from physician's office) for local family practices?
    Yes ☐ No ☐

Electronic prescribing might provide an opportunity for pharmacists to become more involved in management of repeat prescriptions.
For example: *The family physician or nurse practitioner authorizes a repeat prescription, which lasts for 24 weeks BUT which can only be dispensed at intervals of no less than four weeks. Only one authorisation process is required at the family doctor's office for each 24-week prescription (e.g. electronic signature). The patient has no need to visit the doctor's office for the 24-week period to collect or request further prescriptions. They can simply request each monthly instalment at the community pharmacy of their choice. Using an agreed protocol, the pharmacist interviews the patient at each monthly dispensing of the prescription to check for specific information, e.g. compliance, adverse drug events and for the need to supply each item on the prescription. Following dispensing of each monthly instalment, the pharmacist can submit information about what has been dispensed to the ODB Program for reimbursement.*

Below is a list of statements of possible advantages and disadvantages, which might result from implementation of this type of repeat prescribing. Please indicate to what extent you agree or disagree with each statement.

	Strongly agree	Agree	Unsure	Disagree	Strongly disagree	No opinion	Further comments
27. Patient care would improve through increased pharmacist intervention of the type described above.	☐	☐	☐	☐	☐	☐	
28. Any improvement in patient care would depend on the patient having each instalment dispensed at the same pharmacy.	☐	☐	☐	☐	☐	☐	
29. Patient care would be worse because the family physician has less involvement in managing the repeat prescription.	☐	☐	☐	☐	☐	☐	
30. It is important that each instalment could be submitted to the Ontario Drug Benefit Program at the time of dispensing so that reimbursement is not delayed.	☐	☐	☐	☐	☐	☐	
31. This system is likely to reduce wastage caused by dispensing of medication not required by patients.	☐	☐	☐	☐	☐	☐	
32. The monthly dispensing interval described above would have to be flexible to allow for unusual circumstances e.g. patient is going for a 2-month long holiday.	☐	☐	☐	☐	☐	☐	
33. The computer program should contain barriers to prevent further dispensing before the scheduled date.	☐	☐	☐	☐	☐	☐	
34. Using a protocol to interview patients prior to dispensing a repeat prescription would not significantly increase my workload.	☐	☐	☐	☐	☐	☐	

Please add any further comments about 'Repeat prescriptions'.

F. 'Advance dispensing' of prescriptions

Many pharmacies operating a repeat prescription collection service dispense the medication in advance of the patient arriving to collect it ('advance dispensing').

Electronic prescriptions might allow acute prescriptions to be dispensed in advance in the same way.

Please indicate to what extent you agree or disagree with each of the following statements.

	Strongly agree	Agree	Unsure	Disagree	Strongly disagree	No opinion	Further comments
35. It would be an advantage if Drug Information System allowed more advance dispensing.	☐	☐	☐	☐	☐	☐	
36. More advance dispensing would lead to deterioration of the patient/pharmacist professional relationship.	☐	☐	☐	☐	☐	☐	
37. Advance dispensing will compromise the quality of care a patient receives.	☐	☐	☐	☐	☐	☐	
38. Advance dispensing of this type will result in wastage through patients failing to collect their medication.	☐	☐	☐	☐	☐	☐	
39. Not having to collect repeat prescriptions from the family physician's office would be more convenient for me.	☐	☐	☐	☐	☐	☐	

Please add any further comments about 'Advance dispensing of prescriptions' below.

G. Security within the pharmacy

If implemented, a new Drug Information System is likely to mean some changes in computer use. Security and confidentiality will be paramount. Please indicate to what extent you agree or disagree with the following statements.

	Strongly agree	Agree	Unsure	Disagree	Strongly disagree	No opinion	Further comments
40. Each of the dispensing staff should log on separately to the computer when using it so that an accurate record can be kept of who accessed, dispensed and endorsed electronic prescriptions.	☐	☐	☐	☐	☐	☐	
41. Members of staff other than dispensary staff must not have access to the dispensary computers.	☐	☐	☐	☐	☐	☐	
42. Patient medical information available on our pharmacy computer (other than prescription information) should only be	☐	☐	☐	☐	☐	☐	

accessible to qualified pharmacists.

H. Training and support

A new Drug Information System might also mean investment in new software and hardware to enable implementation. This has funding, training and maintenance implications.

43. Do you think that training for Drug Information System should be provided for community pharmacists?

Yes ☐ No ☐ ***Go to Question 62*** Don't know ☐ 44. Who do you think should pay for this training *(please check one box only)*?

Pharmacy owner	☐	Other *(please specify)*	☐
Government	☐	Don't know	☐

45. What would be your preferred type of training? (*please check as many as you like*)

Manuals/distance learning	☐	Help desk (telephone support)	☐
Training course in own pharmacy	☐	Don't know	☐
Training course at central location	☐	Other (*please specify*)	☐

46. If your pharmacy needed software upgrades, who do you think should fund this *(please check one box only)*?

Pharmacy owner	☐	Other *(please specify)*	☐
Government	☐	Don't know	☐

47. If your pharmacy were to require new hardware who do you think should fund this *(please check one box only)*?

Pharmacy owner	☐	Other *(please specify)*	☐
Government	☐	Don't know	☐

48. Who do you think should pay for the ongoing maintenance of the pharmacy computer system *(please check one box only)*?

Pharmacy owner	☐	Other *(please specify)*	☐
Government	☐	Don't know	☐

Please add any further comments on the above questions:

_____

_____

49. Which pharmacy computer system do you currently use?

_____

I. Advantages and disadvantages of ePrescriptions

Drug Information System may radically change the way you handle prescriptions. Some of the most important changes, which might occur, are listed below. Please indicate how much of an advantage or disadvantage you consider these changes would be to your practice.

	Major advantage	Some advantage	Unsure	Some disadvantage	Major disadvantage	No opinion	Further comments
50. Less keying in of prescription/patient information.	☐	☐	☐	☐	☐	☐	
51. No paper copy of the prescription in your hand to refer to when dispensing.	☐	☐	☐	☐	☐	☐	
52. Accurate cumulative data available on what has been dispensed from your pharmacy.	☐	☐	☐	☐	☐	☐	
53. Earlier payment for dispensed medicines from ODB Program and other insurance programs.	☐	☐	☐	☐	☐	☐	
54. No need to clarify poorly written prescriptions.	☐	☐	☐	☐	☐	☐	
55. Downloading of prescriptions onto the pharmacy computer may take a few seconds.	☐	☐	☐	☐	☐	☐	
56. Fewer errors on prescriptions.	☐	☐	☐	☐	☐	☐	
57. Less need to contact family physicians, nurse practitioners or other practice staff by telephone.	☐	☐	☐	☐	☐	☐	
58. No paper prescription with which to identify patient or representative as rightful recipient of medication.	☐	☐	☐	☐	☐	☐	
59. No need to sort and count paper prescriptions at the end of the day.	☐	☐	☐	☐	☐	☐	

Please add any further comments about 'Advantages and disadvantages of electronic prescriptions' below.

_____

_____

J. And finally;

Although we are as yet uncertain about what system of electronic transfer of prescription data will be implemented, this questionnaire has hopefully given you some ideas as to what the possibilities are. Based on these ideas, please answer these final questions.

60. Were you aware of the Drug Information System (DIS) being implemented in Ontario in 2012 before filling out this survey?

    Yes ☐ No ☐ Don't know ☐

61. Do you think that the electronic transfer of prescription-related data is a good idea in principle?

    Yes ☐ No ☐ Don't know ☐

Comments:

_____

_____

62. Which type of system do you think would be the best method of electronic transfer of data? Please rank the following choices from 1 to 4 where 1 is your first choice and 4 your last.

Barcodes on paper prescriptions.	
E-mail (*family physician sends prescription data direct to pharmacy of patient's choice*).	
Clinic EMR system or related database (*can be accessed by pharmacy to download prescription related data*).	
Central database (*Physician sends prescription related data to central database which is accessible by pharmacy, family practice and ODB Program*).	

Please add any further comments about the Drug Information System (DIS)

_____

_____

_____

63. Would you like to receive the final report on this study, 'Perceptions of Ontario's First Upcoming Drug Information System: Narrating the story of prescribers, dispensers and patients' once it is complete? (please check boxes)

    Yes ☐ No ☐

    Email address on which we can email you the final report: _____

Thank you for completing this questionnaire. Please submit the questionnaire electronically to quresh5@mcmaster.ca or if you received a paper copy, return it back to the distributor before October 31 and we will ensure to collect your questionnaire from them.

APPENDIX 3: PHYSICIAN QUESTIONNAIRE

McMaster University

McMaster University
Faculties of Business, Health Sciences, and Engineering
MSc eHealth

Drug Information System Questionnaire For Primary Care Clinicians

Drug Information System

Please help us with this important research.

McMaster University
Faculties of Business, Health Sciences, and Engineering
MSc eHealth

McMaster University
1280 Main St. West
Hamilton, Ontario, Canada
L8S 4M4

905-525-9140 ext 22803
mckib@mcmaster.ca

Dear Family Physician,

This letter is an invitation to participate in a research study from McMaster University. I am a M.Sc. student in the ***eHealth*** Program. Part of my graduate work is to complete my thesis at the McMaster University under Dr. Ann McKibbon. I want to study how family physicians like you think and what information you have on Ontario's upcoming Drug Information System. Ontario is planning on moving to an electronic prescribing system that will allow physicians like you and nurse practitioners to prescribe drugs for patients by using their computers. Your computers with EMR solution will send information about the patient and their new or existing prescriptions to pharmacies. The pharmacists will take these electronic prescriptions and dispense the drugs for your patients to pick up. eHealth Ontario and other government organizations want to introduce their Drug Information System (electronic prescribing and electronic dispensing) in the next year. We are collecting data on what patients, community pharmacists, other prescribers such as nurse practitioners, and family physicians like you feel about the new electronic Drug Information System.

Study Overview

The fourth leading cause of death in Ontario is preventable adverse drug events[1]. eHealth Ontario plans to use electronic prescribing to reduce the number of these adverse drug events. Problems with drug prescribing occur for various reasons. For example, physicians may prescribe medications that are not effective for certain conditions or medications that may interact with each other; people may be taking their medications incorrectly; they may also have conflicting prescriptions from several physicians or nurse practitioners; or physicians may not monitor drug allergies in their patients or may prescribe the wrong dose[1].

eHealth Ontario, with funding from Canada Health Infoway, is considering introducing a system called Drug Information System. This system will introduce and integrate electronic prescribing, electronic dispensing and electronic data interchange* between the prescribers and dispensers, which could radically change the current process for prescribing and dispensing medicines. They are currently investigating various options. The eHealth program from McMaster University is studying the requirements of the people who will be most affected – the patients, the prescribers (family physicians and nurse practitioners) and community pharmacists.

*Electronic data interchange: It is the two way electronic order communication between physicians and pharmacists regarding the medications of patients.

eHealth Ontario feels that their Drug Information System that involves data collection and electronic prescribing will help prevent problems with medications as listed above. They suggest that electronic prescribing can reduce 217,000 adverse drug events, 132,000 physician office visits, 20,000 hospitalizations and 2,200 deaths related directly to problems with drugs each year. These reductions will cut healthcare spending by $350 million.

Before implementing such a large-scale system, the views of healthcare professionals like you who run the healthcare system should be sought. Therefore we are using questionnaires to discover what is important for people who need medications, doctors and nurses, and pharmacists. eHealth Ontario will review what we find to insure that Ontario's electronic prescribing system is as useful as possible for all.

My research will take place in the Hamilton and Greater Toronto Area. It will focus particularly on opinions on the type of data that should be transferred from a doctor's office to a community pharmacy and vice versa, any issues of access to specific data, and any security and privacy concerns patients may have for their data. We also want to find out if physicians like you have any other concerns with such a large-scale system in place.

As a concerned family practitioner, your opinions and insights are important in the implementation of a Drug Information System. Please help us by filling out this survey. It should only take you 15 minutes to fill out.

Your Involvement
The survey includes questions on how you view the way prescriptions are processed in Ontario now. We will also describe how electronic prescribing will likely work and ask your opinion on these new processes. We will describe what a drug information system is and how the current prescription system will change once the Drug Information System is implemented.

Participation in the survey is entirely voluntary. Completing the survey does not have any known or anticipated risks other than taking out 15 minutes to fill it. You may decline to answer any of the questions. Further, you may stop the questionnaire at any time. All information you provide is confidential and the data collected will be completely anonymous. *We will give our findings to eHealth Ontario for their consideration; therefore, you can influence the planning and implementation of electronic prescribing by filling in this questionnaire.*

We would appreciate it if you could return the questionnaire as soon as possible or before October 31, 2011.

Contact Information
If you have any questions about this study, or would like additional information about participation, please contact me at ***416-258-1150*** or by email ***quresh5@mcmaster.ca.*** You can also contact my supervisor ***Dr. Ann McKibbon*** by telephone at 1-905-525-9140 ext. ***22803*** or by email at ***mckib@mcmaster.ca.***

A website describing the project in more detail is also available at eHealth Ontario's website:
http://www.ehealthontario.on.ca/News/2011/March28_2011.asp

A more detailed, technical document, *'Perceptions of Ontario's First Upcoming Drug Information System: Narrating the story of prescribers, dispensers and patients'* is still under development but can be emailed to you or your organization upon request once it is completed. Please let us know if you would like to request a copy by filling out the last question of this questionnaire. We would like to hear from you.

This study has received ethics approval through the Office of Research Ethics at the McMaster University. If you have any comments or concerns resulting from your participation in this study, please contact, **The Office of the Chair, HHS/FHS REB** at 1-905-521-2100 ext. **42013**. Thank you in advance for your interest and assistance with this research.

Yours very truly,

Hafsa Qureshi Grymek
M.Sc. Candidate

CONSENT FORM

By signing this consent form, you are not waiving your legal rights or releasing the investigator(s) or involved institution(s) from their legal and professional responsibilities.

I have read the information presented in the information letter about a study being conducted by **Hafsa Qureshi** of the eHealth Program at McMaster University, under the supervision of **Professor *Ann McKibbon***. I have had an opportunity to ask any questions related to this study, to receive satisfactory answers to my questions, and any additional details I wanted.
I am also aware that excerpts from the survey may be included in the thesis and/or publications to come from the research, with the understanding that quotations will be anonymous.

I was informed that I may withdraw my consent at any time without penalty by advising the researcher.

This project has been reviewed by and received ethics clearance through, the Office of Research Ethics at the McMaster University. I was informed that if I have any comments or concerns resulting from my participation in this study, I may contact, **The Office of the Chair, HHS/FHS REB** at 1-905-521-2100 ext. **42013**.

With full knowledge of all foregoing, I agree, of my own free will, to participate in this study.

☐ Yes ☐ No

I agree to the use of anonymous quotations in any thesis or publication that comes of this research.

☐ Yes ☐ No

Participant Name: _____(Please print)

Participant Signature: _____
Date:

Completing the questionnaire

This questionnaire differs from others you may have completed in that it mostly relates to a hypothetical situation, not your personal experiences.

- We estimate that it will take approximately **10-15 minutes** to read and complete the questionnaire.
- Once you have finished, please submit the questionnaire electronically to quresh5@mcmaster.ca or if you received a paper copy a paper copy, return it back to the distributor and we will ensure to collect your questionnaire from them.

A. Current computer use

1. Are you a: (select from the boxes below)

Physician ☐ Nurse Practitioner ☐ Other Prescriber ☐

2. Does your clinic currently have an electronic medical record system?

Yes ☐ No ☐ (*Go to Section B*) Don't know ☐ (*Go to Section B*)

3. Does it include a facility for issuing prescriptions?

Yes ☐ No ☐ (*Go to Section B*) Don't know ☐ (*Go to Section B*)

4. How often do you personally use the computer to print out acute prescriptions (check one)?

Always	☐
Most times	☐
Sometimes	☐
Never	☐

5. How often do you or other members of the clinic staff use the computer to print out repeat prescriptions (check one)?

Always	☐
Most times	☐
Sometimes	☐
Never	☐

6. What patient information do you routinely store in the electronic medical records (please check all that apply)?

Laboratory results	☐	Patient medication records	☐
Screening test results	☐	Summary sheet	☐
Primary care patient notes	☐	Appointments	☐
Others (please specify below)	☐		

B. Funding ePrescriptions

Implementing electronic prescriptions is likely to require some initial investment, while using and maintaining the system will also have cost implications. How do you think this should be funded? Please indicate on the table below, which funding option you consider to be most appropriate.

	Government funded	Physician funded	Shared funding (Physician + Gov't)	**Further comments**
7. New hardware/ software (if required)	☐	☐	☐	
8. Training costs	☐	☐	☐	

9. Running costs (e.g. telephone bills)	☐	☐	☐
10. Maintenance costs (e.g. repair bills, troubleshooting)	☐	☐	☐

C. Pharmacist access to patient information

11. Have you ever had a pharmacist working in your clinic (e.g. for prescription review, formulary advice etc.)?
    Yes ☐ No ☐ Don't know ☐

The system which is ultimately developed to allow electronic transfer of prescription data could potentially be modified to allow community pharmacists to gain access to certain types of patient information from clinic records. Some people think that by making information about a patient's diagnosis and history available to pharmacists, the pharmacists will be able to offer a more comprehensive medicine management service and patient care will improve. What are your views?

	Totally agree	**Partly agree**	**Totally disagree**	**Don't know**	**Further comments**
12. I believe that patient care could improve if community pharmacists had access to certain confidential patient information	☐	☐	☐	☐	

13. I am opposed to community pharmacists having access to any confidential patient information from the electronic medical records
    Yes ☐ No ☐ Don't know ☐ (*go to Section D*)

If 'Yes' to Question 13, please explain why and then go to Section D.

_____

If 'No' to Question 13, please indicate which of the following categories of information you would be happy for community pharmacists to access from electronic medical records (check all the apply).

14. Sex		☐
15. Age		☐
16. Drug allergies		☐
17. Other allergies		☐
Diagnoses	18. Only relevant ones	☐
	19. All	☐
20. Drug history (previous 6 months)		☐
21. Clinic/patient notes		☐
22. ADEs		☐
23. Hospital discharge summaries		☐

Screening tests	24. Cholesterol	☐
	25. Blood glucose	☐
	26. Blood pressure	☐
Laboratory results	27. Blood tests	☐
	28. Urine tests	☐
29. Information which would identify a patient as exempt from paying prescription charges		☐
Others (please specify)		

D. Advantages and disadvantages of electronic data interchange

Electronic transfer of prescription data to community pharmacists has the potential to bring about various changes in the prescribing process. Family physicians could also receive information about which medicine(s) a patient is using. Please read the following potential changes and indicate how much of an advantage or disadvantage each would be **for your practice**.

	Major advantage	**Some advantage**	**Neither advantage nor disadvantage**	**Some disadvantage**	**Major disadvantage**	**Don't know**	**Further comments**
30. Information on which prescribed items were not dispensed	☐	☐	☐	☐	☐	☐	
31. Collection of data on individual patient Over The Counter purchases from community pharmacies	☐	☐	☐	☐	☐	☐	
32. Ease of collection of data to satisfy clinical governance demands	☐	☐	☐	☐	☐	☐	
33. Fewer queries from pharmacists concerning illegible/incorrect scripts	☐	☐	☐	☐	☐	☐	
34. No paper prescription in your hand to check what you have prescribed	☐	☐	☐	☐	☐	☐	
35. Less personal contact with community pharmacists e.g., fewer telephone calls	☐	☐	☐	☐	☐	☐	
36. Improved patient medication monitoring	☐	☐	☐	☐	☐	☐	

E. Implementation of a Drug Information System

Changes to a prescribing system of the type described in this questionnaire will obviously mean changes in the primary care working methods. Which of the following statements do you agree with?

	Strongly agree	Agree	Unsure	Disagree	Strongly disagree	Further comments
37. To keep an accurate electronic record of patient visits I would need to enter the data myself	☐	☐	☐	☐	☐	
38. I would be unwilling to try a system I am uncertain of in front of my patients	☐	☐	☐	☐	☐	
39. Electronic prescribing will reduce physician workload	☐	☐	☐	☐	☐	
40. Electronic prescribing will reduce staff workload	☐	☐	☐	☐	☐	
41. Electronic prescribing will reduce prescribing costs	☐	☐	☐	☐	☐	
42. If electronic prescriptions are introduced, all those who prescribe should use them	☐	☐	☐	☐	☐	

F. Repeat prescriptions

Electronic transfer of prescription data could allow changes in the way repeat prescriptions are issued. One example of a repeat prescribing system has been described below:

The family physician authorizes a repeat prescription which lasts for 24 weeks BUT which can only be dispensed at intervals of no less than four weeks. Only one authorization process is required at the family physician's office for each 24-week prescription (e.g. electronic signature). The patient has no need to visit the physician for the 24-week period to collect or request further prescriptions. They can simply request each monthly installment at the community pharmacy of their choice. Using an agreed protocol, the pharmacist interviews the patient at each monthly dispensing of the prescription to check for e.g. compliance, adverse drug events and for the need to supply each item on the prescription.

Please read the following statements associated with this hypothetical repeat prescribing system and indicate to what extent you agree or disagree with each.

	Strongly agree	Agree	Unsure	Disagree	Strongly disagree	Further comments
43. Family physician workload would decrease if such a repeat system was to be implemented	☐	☐	☐	☐	☐	
44. Clinic staff workload would decrease if	☐	☐	☐	☐	☐	

such a repeat system was to be implemented

45. Patient care would improve through increased pharmacist intervention of the type described above ☐ ☐ ☐ ☐ ☐
46. Patient care would be worse because the prescriber has less involvement in managing the repeat prescription ☐ ☐ ☐ ☐ ☐
47. No one system would be suitable for all repeat patients ☐ ☐ ☐ ☐ ☐

G. And finally;

48. Do you think that the electronic transfer of prescription related data is a good idea in principle?

Yes ☐ No ☐ Don't know ☐

49. Were you aware of the Drug Information System (DIS) being implemented in Ontario in 2012 before you filled out this survey?

Yes ☐ No ☐ Don't know ☐

50. Should prescribers other than physicians be permitted to use the Drug Information System?

Yes ☐ No ☐ Don't know ☐

51. What are your expectations from the Drug Information System?

_____

_____

52. Are there any particular features that you would like the Drug Information System to have?

_____

_____

Please add any further comments about the Drug Information System

_____

53. Would you like to receive the final report on this study, *'Perceptions of Ontario's First Upcoming Drug Information System: Narrating the story of prescribers, dispensers and patients'* once it is complete?
Yes ☐ No ☐

Email address to which we can email you the final report: _____

Thank you for completing this questionnaire. Please submit the questionnaire electronically to quresh5@mcmaster.ca or if you received a paper copy, return it back to the distributor before October 31, 2011 and we will ensure to collect your questionnaire from them.

APPENDIX 4: PATIENT RESULTS

A. Use of prescriptions and community pharmacies

		(n=37)	%
1a. Approximately how many prescriptions do you get dispensed for yourself	At least one every 3 months	18	49%
	At least one a year	11	30%
	Less than one a year	7	19%
	Never had a prescription dispensed	0	0%
	Missing	1	3%
1b. Approximately how many prescriptions do you get dispensed for other people?	At least one every 3 months	7	19%
	At least one a year	7	19%
	Less than one a year	0	0%
	Never had a prescription dispensed	1	3%
	Missing	22	59%

		(n=37)	%
2. How much do you usually pay for your prescriptions?	I pay full prices for my drugs	7	19%
	I pay the dispensing fee and my work or other insurance pays the rest	25	68%
	I am a senior and pay $6.11 per prescription with a $100 deductible per year	3	8%
	I am a senior and I pay $2 per prescription (Ontario Drug Benefit)	0	0%
	Other	2	5%
3. Do you always use the same pharmacy to have prescriptions dispensed?	Yes, always	12	32%
	Usually	16	43%
	No	9	24%
4. How important is it to you to be able to choose a different pharmacy each time you have prescriptions dispensed?	Not at all, I will always use the same one	8	22%
	Not important – although I do not always use the same pharmacy, I would not mind if I had to use the same one all the time	10	27%
	Quite important, I like the flexibility of getting my prescription dispensed where convenient	16	43%
	Very important, it would be impossible for me to use the same pharmacy all the time	3	8%
5. If the pharmacy you took the prescription to didn't have some or all of the medicine(s) in stock, would you want to be able to take the prescription to another pharmacy rather than return at a later time?	No, never	6	16%
	Yes, sometimes	17	46%
	Yes, always	14	38%
	Missing	0	0%
6. Does your family physician	Yes	11	30%

or nurse practitioner already use a computer to print out paper prescriptions?	No	20	54%
	Don't know	6	16%
	Missing	0	0%

		(n=37)	%
7. If 'yes' to Q6, are you annoyed or 'put off' by the family physician or nurse practitioner typing on the computer during your clinic visit?	Yes	0	0%
	No	10	27%
	Don't know	0	0%
	said no to Q6 and skipped to Q8	26	70%
	Missing	1	3%

		(n=37)	%
8. Would it bother you if your family physician or nurse practitioner did not give you a paper prescription, which you could read for yourself, but instead, only sent an electronic message to the pharmacy?	Yes	13	35%
	No	19	51%
	Don't know	4	11%
	Missing	1	3%

B. Repeat prescriptions

		(n=37)	%
9. Do you receive at least one regular (repeat) prescription from your family physician or nurse practitioner?	Yes	18	49%
	No	18	49%
	Don't know	1	3%
	Missing	0	0%

		(n=37)	%
10. If 'yes', how long does your repeat prescription usually last?	One month	2	5%
	Two months	1	3%
	Three months	9	24%
	More than 3 months	7	19%
	said no to Q9 and skipped	18	49%

		(n=7)	%
10a. For repeats more than 3 months how long do they last?	4 months	0	0%
	6 months	2	29%
	9 months	0	0%
	12 months	4	57%
	24 months	0	0%
	Missing	1	14%

		(n=37)	%
11. Would you like your family physician's	Yes	17	46%

office (or your regular pharmacy) to offer a repeat prescription collection service where your prescription is sent to your chosen pharmacy (so that you do not need to visit the clinic or hand in your prescription to the pharmacy in person?)	No	2	5%
	Don't know	1	3%
	said no to Q9 and skipped	17	46%

		(n=37)	%
12. Would you like a Drug Information System like the one described where your repeat prescription would last for 6 months' by the use of electronic prescribing	Strongly agree	12	32%
	Agree	5	14%
	Don't know	0	0%
	Disagree	1	3%
	Strongly disagree	1	3%
	said no to Q9 and skipped	17	46%
	Missing	1	3%

		(n=37)	%
13. Would you like a repeat prescription which lasts for 6-months even if it means always using the same pharmacy	Strongly agree	9	24%
	Agree	5	14%
	Don't know	2	5%
	Disagree	2	5%
	Strongly disagree	0	0%
	said no to Q9 and skipped	17	46%
	said no to Q12 and skipped	1	3%
	Missing	1	3%

		(n=37)	%
13. Would you like a repeat prescription which lasts for 6-months even if it means always using the same pharmacy	Strongly agree	9	24%
	Agree	5	14%
	Don't know	2	5%
	Disagree	2	5%
	Strongly disagree	0	0%
	said no to Q9 and skipped	17	46%
	said no to Q12 and skipped	1	3%
	Missing	1	3%

		(n=37)	%
14. What is the maximum number of times you would find it acceptable to visit the pharmacy during this 6-month period?	Once a month	6	16%
	Once every two months	3	8%
	Once every three months	7	19%
	Only once in the 6 months	3	8%
	said no to Q9 and skipped	17	46%
	said no to Q12 and skipped	1	3%

15. For some people with a repeat prescription containing more than one item, different medicine(s) sometimes run out at different times making it necessary for them to contact the clinic for another prescription multiple times. Does this ever happen to you?	No, never	15	41%
	Yes, occasionally	3	8%
	Yes, frequently	1	3%
	said no to Q9 and skipped	16	43%
	said no to Q12 and skipped	2	5%
	Missing	0	0%

		(n=37)	**%**
16. If the new repeat system allowed your pharmacist to dispense the quantities of medicine(s) you need within the 6-month period in a more flexible way (to avoid having to return to the clinic), how much of an advantage would that be for you?	Major advantage	6	16%
	Some advantage	5	14%
	No advantage	1	3%
	said no to Q9 and skipped	17	46%
	said no to Q12 and skipped	7	19%
	said no to Q15 and skipped	1	3%
	Missing	0	0%

		(n=37)	**%**
17. One feature of an electronic prescription might be that you could have your repeat prescription dispensed anywhere in Ontario without needing to hand in a paper prescription form. How much of an advantage would that be for you?	Major advantage	8	22%
	Some advantage	2	5%
	No advantage	2	5%
	said no to Q9 and skipped	17	46%
	said no to Q12 and skipped	1	3%
	said no to Q15 and skipped	7	19%
	Missing	0	0%

C. Sharing information

18. Which of the following list of subjects (if any) would you be happy to discuss with the pharmacist? (Please check all that apply)

		(n=37)	**%**
I would not want to discuss ANY of my medical records with a pharmacist		2	5%
The medicines on the prescription you have come to collect		35	95%
Other medicines you are taking just now		32	86%
Medicines you have taken in the past		28	76%
Your current medical problems		27	73%
Medical problems you have had in the past		20	54%
Test results	Blood tests	17	46%
	Urine tests	17	46%
	Blood pressure	19	51%
	Lung function tests	17	46%
Any allergies you may have		29	78%
Lifestyle factors	Smoking	23	62%
	Drinking alcohol	23	62%
Your age		27	73%

		(n=37)	%
19. Does the pharmacy you use most often have a separate area where you can speak to the pharmacist in private without other customers overhearing your conversation?	Yes	7	19%
	No	23	62%
	Don't know	7	19%

20. If you answered 'no' or 'don't know' to Q19, do you think you would be happier to discuss any of the subjects listed if a private area was available in the pharmacy?

		(n=30)	%
I would not want to discuss ANY of my medical records with a community pharmacist, even in a private area		2	7%
The medicines on the prescription you have come to collect		24	80%
Other medicines you are taking just now		23	77%
Medicines you have taken in the past		19	63%
Your current medical problems		20	67%
Medical problems you have had in the past		18	60%
Test results	Blood tests	17	57%
	Urine tests	17	57%
	Blood pressure	15	50%
	Lung function tests	15	50%
Any allergies you may have		19	63%
Lifestyle factors	Smoking	13	43%
	Drinking alcohol	13	43%
Your age		17	57%

22. Please indicate which of the following types of information (*if any*) you would accept the pharmacist passing onto your family physician and other clinic staff (*Please check all that apply*)

	(n=37)	%
Any medicines from your prescription which you choose not to have dispensed	31	84%
Problems you might be having with your medicines e.g. if they are not treating your symptoms or are causing side effects	33	89%
Medicines that you buy 'over the counter'	20	54%
Information about your health in general	23	62%
I would not want a community pharmacist to pass on **ANY** information about me to my family physician	3	8%

		(n=37)	%
23. How confident are you that it will be possible to make the system secure from unauthorized individuals?	Very confident	10	27%
	Some what confident	22	59%
	Not at all confident	5	14%

	(n=37)	%

24. Do you think it would be a good idea to automate exemption information?	Yes	29	78%
	No	1	3%
	Don't know	7	19%

D. Which system

25. Rank the 3 possible electronic prescription systems in order of preference	**(n=37)**							
	Rank 1		**Rank 2**		**Rank 3**		**Missing**	
	34	**%**	**33**	**%**	**33**	**%**	**11**	**%**
Direct to pharmacy from physician	15	44%	8	24%	11	33%	3	27%
Complete choice of pharmacy until last minute	8	24%	13	39%	12	36%	4	36%
Smart card	11	32%	12	36%	10	30%	4	36%

E. ePrescriptions in general

		(n=37)	**%**
26a. Do you think that the electronic transfer of prescription-related data is a good idea in principle?	Yes	32	86%
	No	5	14%
	Don't know	0	0%
26b. Did you know about the Drug Information System that will be implemented in Ontario by 2012 before you filled out this survey?	Yes	8	22%
	No	27	73%
	Don't know	2	5%

F. Demographics

27. Age group	**(n=37)**	**%**
20-29 years	13	35%
30-39 years	7	19%
40-49 years	7	19%
50-59 years	6	16%
60-69 years	4	11%
70 years and over	0	0%

28. Sex	**(n=37)**	**%**
Male	9	24%
Female	28	76%

28. Final Report	**(n=37)**	**%**
Yes	10	27%
No	27	73%

APPENDIX 5: PHARMACIST RESULTS

A. Patient choice of pharmacy

		(n=36)	%
1. For physicians or nurse practitioners to send the electronic prescription directly to a pharmacy chosen by the patient is unacceptable to me.	Strongly agree	2	6%
	Agree	7	19%
	Unsure	2	6%
	Disagree	11	31%
	Strongly disagree	13	36%
	No opinion	0	0%
	Missing	1	3%
2. For physicians or nurse practitioners to send the electronic prescription directly to a pharmacy chosen by the patient is not different in principle to a prescription collection service.	Strongly agree	5	14%
	Agree	9	25%
	Unsure	11	31%
	Disagree	2	6%
	Strongly disagree	2	6%
	No opinion	7	19%

B. Pharmacist access to patient information

		Usefulness of information?							
		a) Always useful		b) Sometimes useful		c) Never useful		d) Don't know/ Missing	
Values expressed in percentages (n=36)		**N (36)**	**%**	**N (36)**	**%**	**N (36)**	**%**	**N(36)**	**%**
3. Sex		30	83%	6	17%	0	0%	0	0%
4. Age		33	92%	3	8%	0	0%	0	0%
5. Drug allergies		35	97%	1	3%	0	0%	0	0%
6. Other allergies		23	64%	10	28%	0	0%	3	8%
Diagnoses	Only relevant ones	17	47%	11	31%	0	0%	8	22%
7. Drug history (*previous 6 months*)		27	75%	8	22%	0	0%	1	3%
8. Adverse drug events		29	81%	6	17%	0	0%	1	3%
9. Hospital discharge summaries		17	47%	15	42%	3	8%	1	3%
Screening tests	Cholesterol Blood glucose Blood pressure	7	19%	17	47%	1	3%	11	31%
Laboratory results	Blood tests	8	22%	19	53%	2	6%	7	19%

Source of information?

		e) Medical records		f) Ask patient/ representative		g) Both		h) Don't know/ Missing	
Values expressed in percentages (n=36)		**N (36)**	**%**	**N (36)**	**%**	**N (36)**	**%**	**N (36)**	**%**
3. Sex		8	22%	9	25%	13	36%	6	17%
4. Age		6	17%	7	19%	17	47%	6	17%
5. Drug allergies		7	19%	6	17%	17	47%	6	17%
6. Other allergies		6	17%	7	19%	13	36%	10	28%
Diagnoses	Only relevant ones	15	42%	2	6%	6	17%	13	36%
7. Drug history (*previous 6 months*)		17	47%	1	3%	10	28%	8	22%
8. Adverse drug events		11	31%	2	6%	15	42%	8	22%
9. Hospital discharge summaries		23	64%	1	3%	5	14%	7	19%
Screening tests	Cholesterol Blood glucose Blood pressure	20	56%	0	0%	0	0%	16	44%
Laboratory results	Blood tests Urine tests	21	58%	0	0%	0	0%	15	42%

C. Electronic communication with Family Physicians

		(n=36)	%
10. If family physicians considered it advantageous to know about Over The Counter (OTC) purchases of medicines, would you be prepared to ask the patient if you could pass the information to the family physicians or clinic?	Yes	33	92%
	No	3	8%
	Don't know	0	0%
	Missing	0	0%
11. Would you be prepared to enter such OTC information onto a computer for transmission to the family physicians?	Yes	25	69%
	No	5	14%
	Don't know	6	17%
12. Is there any other information that you think would be useful to transfer electronically from you, back to the family physician or clinic (i.e., in preference to phoning or writing for example)?	Yes	21	58%
	No	8	22%
	Don't know	7	19%
	Missing	0	0%
13. Would you rather send this information directly to the family physician or clinic or to a central database from where the family physician and nurse practitioners could access it?	Yes	15	42%
	Store in central database	15	42%
	Don't know	6	17%
14. Other than the information currently sent to the Ontario Drug Benefit (ODB) Program on the paper prescription is there anything else that you feel could be usefully transferred electronically to the ODB Program?	Yes	8	22%
	No	15	42%
	Don't know	13	36%
	Missing	0	0%
15. Is there any information you think would be useful to receive electronically from the ODB Program?	Yes	15	42%
	No	12	33%
	Don't know	9	25%

D. Pharmacist review of patient medication

		(n=36)	%
16. I would welcome the chance to play a greater part in the review of the patient's medication(s).	Strongly agree	22	61%
	Agree	12	33%
	Unsure	2	6%
	Disagree	0	0%
	Strongly disagree	0	0%
	No opinion	0	0%
17. My current practice would not allow enough time to review patients' medication(s) in any more detail than I do at the moment.	Strongly agree	4	11%
	Agree	13	36%
	Unsure	5	14%
	Disagree	9	25%
	Strongly disagree	4	11%
	No opinion	1	3%
18. Further review of patient's medication(s) other than Medscheck would only be possible if more time were made available to me.	Strongly agree	8	22%
	Agree	16	44%
	Unsure	4	11%
	Disagree	8	22%
	Strongly disagree	0	0%
	No opinion	0	0%
19. Further review of patient's medication(s) would only be possible if more money were made available to me.	Strongly agree	10	28%
	Agree	15	42%
	Unsure	3	8%
	Disagree	7	19%
	Strongly disagree	0	0%
	No opinion	1	3%
20. Patient care would improve through increased pharmacist intervention of the type described above.	Strongly agree	20	56%
	Agree	16	44%
	Unsure	0	0%
	Disagree	0	0%
	Strongly disagree	0	0%
	No opinion	0	0%
21. Community pharmacists are not trained to interpret clinical data such as lab results, screening test results etc.	Strongly agree	1	3%
	Agree	8	22%
	Unsure	8	22%
	Disagree	12	33%
	Strongly disagree	7	19%
	No opinion	0	0%
22. Community pharmacists should not try to make decisions based on clinical data.	Strongly agree	1	3%
	Agree	11	31%
	Unsure	4	11%
	Disagree	9	25%
	Strongly disagree	11	31%

	No opinion	0	0%
23. When patients who are not regular customers come to my pharmacy, it would be helpful to be able to review their complete medication record.	Strongly agree	18	50%
	Agree	17	47%
	Unsure	0	0%
	Disagree	1	3%
	Strongly disagree	0	0%
	No opinion	0	0%
24. I would be happy to accept any extra liability, which might be associated with increased access to confidential patient information.	Strongly agree	6	17%
	Agree	21	58%
	Unsure	5	14%
	Disagree	2	6%
	Strongly disagree	2	6%
	No opinion	0	0%
25. I could provide improved care for the patient if I knew the diagnosis.	Strongly agree	16	44%
	Agree	18	50%
	Unsure	2	6%
	Disagree	0	0%
	Strongly disagree	0	0%
	No opinion	0	0%

E. Repeat prescriptions

		(n=36)	%
26. Would you like to operate prescription collection service (service that allows pharmacists to directly collect prescriptions from physician's office) for local family practices?	Yes	25	69%
	No	7	19%
	Missing	4	11%

		(n=36)	%
27. Patient care would improve through increased pharmacist intervention of the type described above.	Strongly agree	12	33%
	Agree	20	56%
	Unsure	3	8%
	Disagree	1	3%
	Strongly disagree	0	0%
	No opinion	0	0%
28. Any improvement in patient care would depend on the patient having each installment dispensed at the same pharmacy.	Strongly agree	13	36%
	Agree	15	42%
	Unsure	3	8%
	Disagree	5	14%
	Strongly disagree	0	0%
	No opinion	0	0%
29. Patient care would be worse because the family physician has less involvement in managing the repeat prescription.	Strongly agree	0	0%
	Agree	4	11%
	Unsure	6	17%
	Disagree	20	56%

	Strongly disagree	6	17%
	No opinion	0	0%
30. It is important that each installment could be submitted to the Ontario Drug Benefit Program at the time of dispensing so that reimbursement is not delayed.	Strongly agree	13	36%
	Agree	20	56%
	Unsure	3	8%
	Disagree	0	0%
	Strongly disagree	0	0%
	No opinion	0	0%
31. This system is likely to reduce wastage caused by dispensing of medication not required by patients.	Strongly agree	9	25%
	Agree	15	42%
	Unsure	8	22%
	Disagree	3	8%
	Strongly disagree	0	0%
	No opinion	0	0%
	Missing	1	3%
32. The monthly dispensing interval described above would have to be flexible to allow for unusual circumstances e.g. patient is going for a 2-month long holiday.	Strongly agree	19	53%
	Agree	12	33%
	Unsure	4	11%
	Disagree	0	0%
	Strongly disagree	0	0%
	No opinion	1	3%
33. The computer program should contain barriers to prevent further dispensing before the scheduled date.	Strongly agree	9	25%
	Agree	15	42%
	Unsure	2	6%
	Disagree	7	19%
	Strongly disagree	3	8%
	No opinion	0	0%
34. Using a protocol to interview patients prior to dispensing a repeat prescription would not significantly increase my workload.	Strongly agree	2	6%
	Agree	7	19%
	Unsure	9	25%
	Disagree	10	28%
	Strongly disagree	8	22%
	No opinion	0	0%

F. Advance dispensing of prescriptions

		(n=36)	**%**
35. It would be an advantage if Drug Information System allowed more advance dispensing.	Strongly agree	6	17%
	Agree	15	42%
	Unsure	12	33%
	Disagree	1	3%
	Strongly disagree	0	0%
	No opinion	2	6%
36. More advance dispensing would lead to	Strongly agree	1	3%

deterioration of the patient/pharmacist professional relationship.	Agree	2	6%
	Unsure	18	50%
	Disagree	11	31%
	Strongly disagree	3	8%
	No opinion	1	3%
37. Advance dispensing will compromise the quality of care a patient receives.	Strongly agree	0	0%
	Agree	4	11%
	Unsure	14	39%
	Disagree	13	36%
	Strongly disagree	4	11%
	No opinion	1	3%
38. Advance dispensing of this type will result in wastage through patients failing to collect their medication.	Strongly agree	1	3%
	Agree	17	47%
	Unsure	8	22%
	Disagree	7	19%
	Strongly disagree	2	6%
	No opinion	1	3%
39. Not having to collect repeat prescriptions from the family physician's office would be more convenient for me.	Strongly agree	6	17%
	Agree	17	47%
	Unsure	11	31%
	Disagree	1	3%
	Strongly disagree	0	0%
	No opinion	1	3%

G. Security within the pharmacy

		(n=36)	%
40. Each of the dispensing staff should log on separately to the computer when using it so that an accurate record can be kept of who accessed, dispensed and endorsed electronic prescriptions.	Strongly agree	17	47%
	Agree	15	42%
	Unsure	2	6%
	Disagree	2	6%
	Strongly disagree	0	0%
	No opinion	0	0%
41. Members of staff other than dispensary staff must not have access to the dispensary computers.	Strongly agree	20	56%
	Agree	11	31%
	Unsure	1	3%
	Disagree	2	6%
	Strongly disagree	2	6%
	No opinion	0	0%
42. Patient medical information available on our pharmacy computer (other than prescription information) should only be accessible to qualified pharmacists.	Strongly agree	11	31%
	Agree	11	31%
	Unsure	2	6%
	Disagree	9	25%
	Strongly disagree	3	8%

	No opinion	0	0%

H. Training and support

		(n=36)	%
43. Do you think that training for Drug Information System should be provided for community pharmacists?	Yes	32	89%
	No	2	6%
	Don't know	2	6%

		(n=36)	%
44. Who do you think should pay for this training (please check one box only)?	Pharmacy owner	2	6%
	Government	27	75%
	Don't know	3	8%
	Other	2	6%
	said no to Q43 and skipped to 62	2	6%

45. What would be your preferred type of training? (please check as many as you like)	Manuals/distance learning	21	58%
	Help desk (telephone support)	18	50%
	Training course in own pharmacy	16	44%
	Training course at central location	12	33%
	Don't know	1	3%
	Other (please specify)	3	8%

		(n=36)	%
46. If your pharmacy needed software upgrades, who do you think should fund this (please check one box only)?	Pharmacy owner	8	22%
	Government	20	56%
	Other	4	11%
	Don't know	2	6%
	said no to Q43 and skipped to 62	2	6%
47. If your pharmacy were to require new hardware who do you think should fund this (please check one box only)?	Pharmacy owner	12	33%
	Government	16	44%
	Other	4	11%
	Don't know	2	6%
	Missing	0	0%
	said no to Q43 and skipped to 62	2	6%
48. Who do you think should pay for the ongoing maintenance of the pharmacy computer system (please check one box only)?	Pharmacy owner	20	56%
	Government	9	25%
	Other	2	6%
	Don't know	2	6%
	Missing	1	3%
	said no to Q43 and skipped to 62	2	6%

		(n=36)	%
49. Which pharmacy	Fillware and Flexiplum	3	8%

computer system do you use?	Health Watch (Shoppers)	1	3%
	Kroll	15	42%
	Meditech	1	3%
	Nexxsys	10	28%
	More than 1 at the same time	1	3%
	Missing	5	14%

I. Advantages and disadvantages of ePrescriptions

		(n=36)	%
50. Less keying in of prescription/patient information.	Major advantage	18	50%
	Some advantage	13	36%
	Unsure	3	8%
	Some disadvantage	0	0%
	Major disadvantage	0	0%
	No opinion	0	0%
	said no to Q43 and skipped to 62	1	3%
	Missing	1	3%
51. No paper copy of the prescription in your hand to refer to when dispensing.	Major advantage	18	50%
	Some advantage	13	36%
	Unsure	3	8%
	Some disadvantage	0	0%
	Major disadvantage	0	0%
	No opinion	0	0%
	said no to Q43 and skipped to 62	1	3%
	Missing	1	3%
52. Accurate cumulative data available on what has been dispensed from your pharmacy.	Major advantage	20	56%
	Some advantage	10	28%
	Unsure	3	8%
	Some disadvantage	0	0%
	Major disadvantage	1	3%
	No opinion	0	0%
	said no to Q43 and skipped to 62	1	3%
	Missing	1	3%
53. Earlier payment for dispensed medicines from ODB Program and other insurance programs.	Major advantage	13	36%
	Some advantage	11	31%
	Unsure	7	19%
	Some disadvantage	1	3%
	Major disadvantage	0	0%
	No opinion	2	6%
	said no to Q43 and skipped to 62	1	3%
	Missing	1	3%
54. No need to clarify	Major advantage	28	78%

poorly written prescriptions.	Some advantage	4	11%
	Unsure	2	6%
	Some disadvantage	0	0%
	Major disadvantage	0	0%
	No opinion	1	3%
	said no to Q43 and skipped to 62	1	3%
55. Downloading of prescriptions onto the pharmacy computer may take a few seconds.	Major advantage	8	22%
	Some advantage	7	19%
	Unsure	13	36%
	Some disadvantage	5	14%
	Major disadvantage	1	3%
	No opinion	1	3%
	said no to Q43 and skipped to 62	1	3%
56. Fewer errors on prescriptions	Major advantage	23	64%
	Some advantage	6	17%
	Unsure	5	14%
	Some disadvantage	0	0%
	Major disadvantage	0	0%
	No opinion	1	3%
	said no to Q43 and skipped to 62	1	3%
57. Less need to contact family physicians, nurse practitioners or other practice staff by telephone.	Major advantage	20	56%
	Some advantage	10	28%
	Unsure	3	8%
	Some disadvantage	1	3%
	Major disadvantage	0	0%
	No opinion	1	3%
	said no to Q43 and skipped to 62	1	3%
58. No paper prescription with which to identify patient or representative as rightful recipient of medication.	Major advantage	9	25%
	Some advantage	6	17%
	Unsure	7	19%
	Some disadvantage	11	31%
	Major disadvantage	0	0%
	No opinion	2	6%
	said no to Q43 and skipped to 62	1	3%
59. No need to sort and count paper prescriptions at the end of the day.	Major advantage	12	33%
	Some advantage	13	36%
	Unsure	7	19%
	Some disadvantage	1	3%
	Major disadvantage	1	3%
	No opinion	1	3%
	said no to Q43 and skipped to 62	1	3%

J. And finally……

		(n=36)	%
60. Were you aware of the Drug Information	Yes	17	47%

System (DIS) being implemented in Ontario in 2012 before filling out this survey?	No	18	50%
	Don't know	1	3%

61. Do you think that the electronic transfer of prescription-related data is a good idea in principle?	Yes	33	92%
	No	1	3%
	Don't know	2	6%

62. Which type of system do you think would be the best method of electronic transfer of data? Please rank the following choices from 1 to 4 where 1 is your first choice and 4 last.

	Ranked (1-4)									
	Rank 1		**Rank 2**		**Rank 3**		**Rank 4**		**Missing**	
Values (n=36)	**n(36)**	**%**	**n(36)**	**%**	**n(36)**	**%**	**n(36)**	**%**	**n(36)**	**%**
Bar code on paper prescription	2	6%	6	17%	10	28%	12	33%	6	17%
Email prescriptions directly to pharmacy	9	25%	3	8%	12	33%	9	25%	3	8%
Clinic EMR system or related database	5	14%	17	47%	3	8%	5	14%	6	17%
Central database	18	50%	4	11%	5	14%	4	11%	5	14%

63. Would you like to receive Final Report	**(n=36)**	**%**
Yes	20	56%
No	16	44%

K. Demographics

64. Sex	**(n=36)**	**%**
Male	16	44%
Female	20	56%

65. Pharmacy Location	**(n=36)**	**%**
Hamilton	14	39%
Markham	2	6%
Mississauga	5	14%
Oakville	5	14%
Waterloo	2	6%
Ajax	2	6%
North York	1	3%
Toronto	5	14%

66. Type of Pharmacy	**(n=36)**	**%**
Large multiple outlets	5	14%
Single business	31	86%

67. Pharmacist Status	**(n=36)**	**%**
Employee	22	61%
Owner	14	39%

APPENDIX 6: PHYSICIAN RESULTS

A. Current computer use

1. Are you a: (select from the boxes below)	**(n=23)**	**%**
Family Physician	23	100%
Nurse Practitioner	0	0%
Other	0	0%

		(n=23)	**%**
2. Does your clinic currently have an electronic medical record system?	Yes	20	87%
	No	3	13%
	Don't Know	0	0%
	Missing	0	0%
3. Does it include a facility for issuing prescriptions?	Yes	20	87%
	Not applicable	3	13%
	Don't Know	0	0%

		(n=23)	**%**
4. How often do you personally use the computer to print out acute prescriptions (check one)?	Always	16	70%
	Most times	2	9%
	Sometimes	2	9%
	Never	3	13%
5. How often do you or other members of the clinic staff use the computer to print out repeat prescriptions (check one)?	Always	10	43%
	Most times	3	13%
	Sometimes	4	17%
	Never	6	26%
6. What patient information do you routinely store in the electronic medical records (please check all that apply)?	Lab results	20	87%
	Patient medication records	20	87%
	Screening test results	18	78%
	Summary sheet	14	61%
	primary care patient notes	20	87%
	Appointments	19	83%
	Others	4	17%

B. Funding ePrescriptions

Implementing electronic prescriptions is likely to require some initial investment, while using and maintaining the system will also have cost implications. How do you think this should be funded?

		(n=23)	**%**
7. New hardware/software (if required)	Government funded	13	57%
	Physician funded	1	4%
	Shared (physician + Government)	9	39%
8. Training costs	Government funded	14	61%

	Physician funded	3	13%
	Shared (physician + Government)	6	26%
9. Running costs	Government funded	6	26%
	Physician funded	8	35%
	Shared (physician + Government)	9	39%
10. Maintenance costs	Government funded	4	17%
	Physician funded	8	35%
	Shared (physician + Government)	11	48%

C. Pharmacist access to information

		(n=23)	%
11. Have you ever had a pharmacist working in your clinic (e.g. for prescription review, formulary advice etc.)?	Yes	12	52%
	No	10	43%
	Don't Know	1	4%

12. I believe that patient care could improve if community pharmacists had access to certain confidential patient information	Totally agree	6	26%
	Partly agree	13	57%
	Totally disagree	3	13%
	Don't know	0	0%
	Missing	1	4%
13. I am opposed to community pharmacists having access to any confidential patient information from the electronic medical records	Yes	7	30%
	No	11	48%
	Don't know	5	22%

Which of the following categories of patient information would you be happy for community pharmacists to access from practice records?

	(n=23)	%
14. Sex	12	55%
15. Age	12	55%
16. Drug allergies	13	59%
17. Other allergies	12	55%
18. Relevant diagnoses	10	45%
19. All diagnoses	4	18%
20. Drug history	13	59%
21. clinic/patient consultation notes	2	9%
22. Adverse drug events	12	55%
23. Hospital discharge summaries	3	14%
24. Cholesterol test results	4	18%
25. Blood glucose test results	4	18%
26. Blood pressure test results	4	18%
27. Blood test results	3	14%
28. Urine test results	4	18%
29. Exemption information	8	36%

D. Advantages and disadvantages of DIS

Please indicate how much of an advantage or disadvantage the following potential changes would be for your practice.

		(n=23)	%
30. Information on which prescribed items were not dispensed	Major advantage	14	61%
	Some advantage	5	22%
	Neither	0	0%
	Some disadvantage	1	4%
	Major disadvantage	0	0%
	Don't know	3	13%
31. Collection of data on individual patient Over The Counter purchases from community pharmacies	Major advantage	9	39%
	Some advantage	6	26%
	Neither	6	26%
	Some disadvantage	0	0%
	Major disadvantage	0	0%
	Don't know	2	9%
32. Ease of collection of data to satisfy clinical governance demands	Major advantage	5	22%
	Some advantage	10	43%
	Neither	6	26%
	Some disadvantage	0	0%
	Major disadvantage	0	0%
	Don't know	2	9%
33. Fewer queries from pharmacists concerning illegible/incorrect scripts	Major advantage	12	52%
	Some advantage	7	30%
	Neither	4	17%
	Some disadvantage	0	0%
	Don't know	0	0%
34. No paper prescription in your hand to check what you have prescribed	Major advantage	8	35%
	Some advantage	5	22%
	Neither	5	22%
	Some disadvantage	3	13%
	Major disadvantage	2	9%
	Don't know	0	0%
35. Less personal contact with community pharmacists e.g., fewer telephone calls	Major advantage	7	30%
	Some advantage	5	22%
	Neither	8	35%
	Some disadvantage	3	13%
	Major disadvantage	0	0%
	Don't know	0	0%
36. Improved patient medication monitoring	Major advantage	15	65%
	Some advantage	4	17%
	Neither	2	9%
	Some disadvantage	1	4%
	Don't know	1	4%

E. Implementation of an ePrescription system

		(n=23)	%
37. To keep an accurate electronic record of patient visits I would need to enter the data myself	Strongly agree	9	39%
	Agree	8	35%
	Unsure	3	13%
	Disagree	2	9%
	Strongly disagree	1	4%
38. I would be unwilling to try a system I am uncertain of in front of my patients	Strongly agree	5	22%
	Agree	7	30%
	Unsure	3	13%
	Disagree	7	30%
	Strongly disagree	1	4%
39. Electronic prescribing will reduce physician workload	Strongly agree	6	26%
	Agree	4	17%
	Unsure	6	26%
	Disagree	3	13%
	Strongly disagree	4	17%
40. Electronic prescribing will reduce staff workload	Strongly agree	6	26%
	Agree	5	22%
	Unsure	3	13%
	Disagree	7	30%
	Strongly disagree	2	9%
41. Electronic prescribing will reduce prescribing costs	Strongly agree	5	22%
	Agree	4	17%
	Unsure	8	35%
	Disagree	4	17%
	Strongly disagree	2	9%
42. If electronic prescriptions are introduced, all those who prescribe should use them	Strongly agree	5	22%
	Agree	9	39%
	Unsure	6	26%
	Disagree	1	4%
	Strongly disagree	2	9%

F. Repeat prescriptions

To what extent do you agree or disagree with the following statements about a 6-month repeat prescribing system managed by the community pharmacist?

		(n=23)	%
43. Family physician workload would decrease if such a repeat system was to be implemented	Strongly agree	5	22%
	Agree	9	39%
	Unsure	2	9%
	Disagree	6	26%
	Strongly disagree	0	0%
	Missing	1	4%
44. Clinic staff workload would decrease if such a repeat system	Strongly agree	4	17%
	Agree	8	35%

was to be implemented	Unsure	3	13%
	Disagree	7	30%
	Missing	1	4%
45. Patient care would improve through increased pharmacist intervention of the type described above	Strongly agree	2	9%
	Agree	6	26%
	Unsure	7	30%
	Disagree	6	26%
	Strongly disagree	1	4%
	Missing	1	4%
46. Patient care would be worse because the prescriber has less involvement in managing the repeat prescription	Strongly agree	3	13%
	Agree	2	9%
	Unsure	9	39%
	Disagree	8	35%
	Strongly disagree	1	4%
47. No one system would be suitable for all repeat patients	Strongly agree	8	35%
	Agree	6	26%
	Unsure	6	26%
	Disagree	3	13%
	Strongly disagree	0	0%

G. And finally;

		(n=23)	**%**
48. Do you think that the electronic transfer of prescription related data is a good idea in principle?	Yes	19	83%
	No	2	9%
	Don't know	2	9%
49. Were you aware of the Drug Information System (DIS) being implemented in Ontario in 2012 before you filled out this survey?	Yes	4	17%
	No	17	74%
	Don't know	2	9%
50. Should prescribers other than physicians be permitted to use the Drug Information System?	Yes	15	65%
	No	4	17%
	Don't know	4	17%
53. Would you like to receive the final report?	Yes	15	65%
	No	8	35%

55. Clinic Location	**(n=23)**	**%**
Guelph	3	13%
Hamilton	5	22%
Markham	3	13%
Mississauga	2	9%
Oakville	1	4%
Toronto	4	17%
Waterloo	5	22%
54. Sex	**(n=23)**	**%**
Male	12	52%
Female	11	48%

APPENDIX 7: THESIS POSTER 1

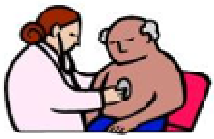
McMaster University
Inspiring Innovation and Discovery

MCMASTER UNIVERSITY
FACULTIES OF BUSINESS, HEALTH SCIENCES, AND ENGINEERING
M.Sc. EHEALTH

McMaster University
1280 Main St. West
Hamilton, Ontario, Canada
L8S 4M4
905-525-9140 Ext. 22803
mclib@mcmaster.ca

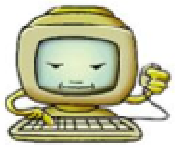
What is McMaster's Drug Information Study about?

eHealth Ontario and the Ministry of Health and Long Term Care are considering introducing a system called Drug Information System. This system will include electronic prescriptions, electronic dispensing and a two way electronic order communication between your family physicians and community pharmacists. When you visit or telephone your doctor and need a prescription, he/she would use a computer to send an electronic prescription to your drug store. You would then go to the pharmacy to collect the medicines the doctor or nurse practitioner have prescribed. Electronic prescriptions might completely replace paper prescriptions.



You visit your physician or nurse practitioner –

or phone in for a prescription



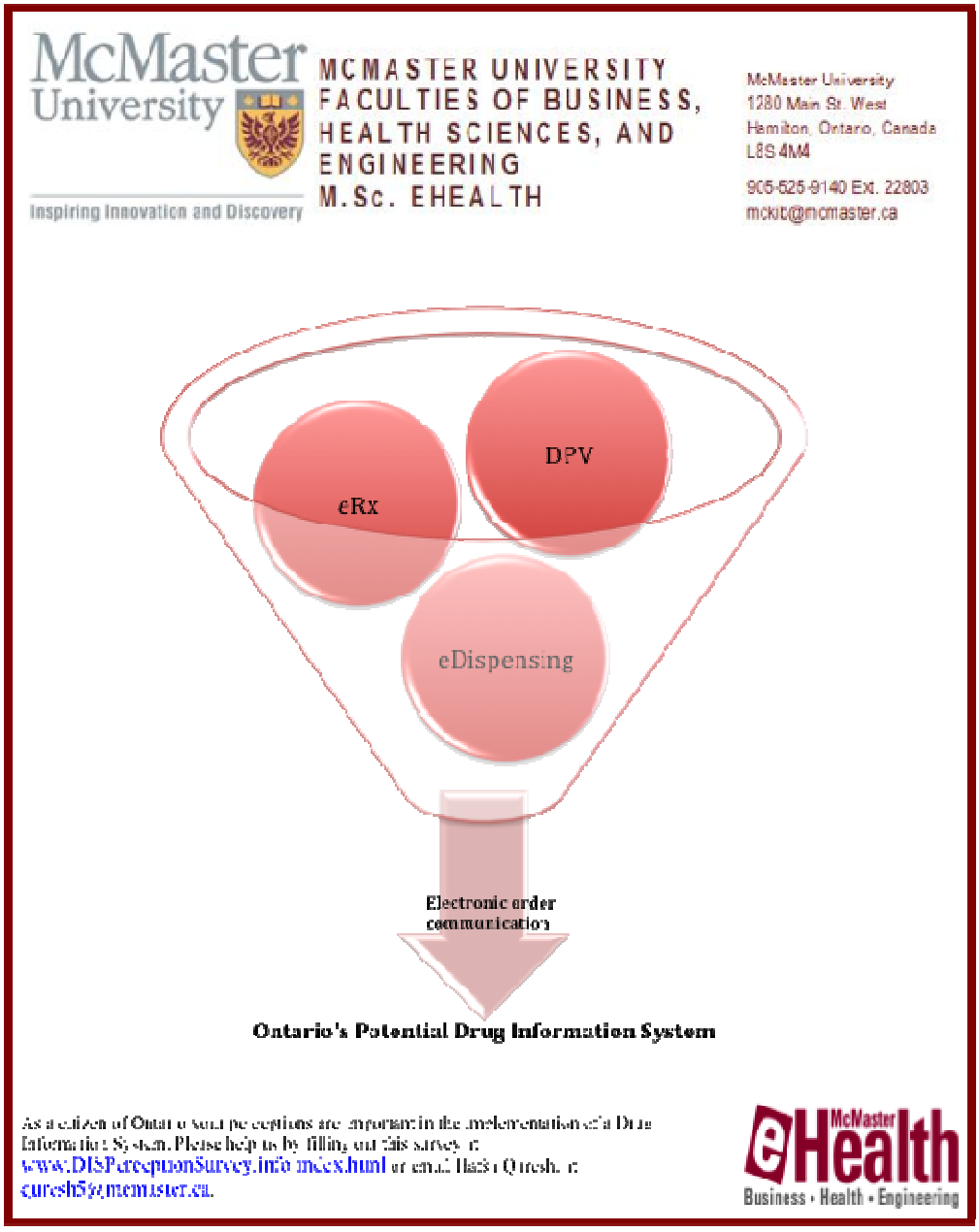
He/she writes and sends an electronic prescription 'message' using the clinic computer

Your chosen pharmacy receives the electronic prescription; checks for complete records and if needed verifies with your family physician on the pharmacy computer and dispenses your medicines.

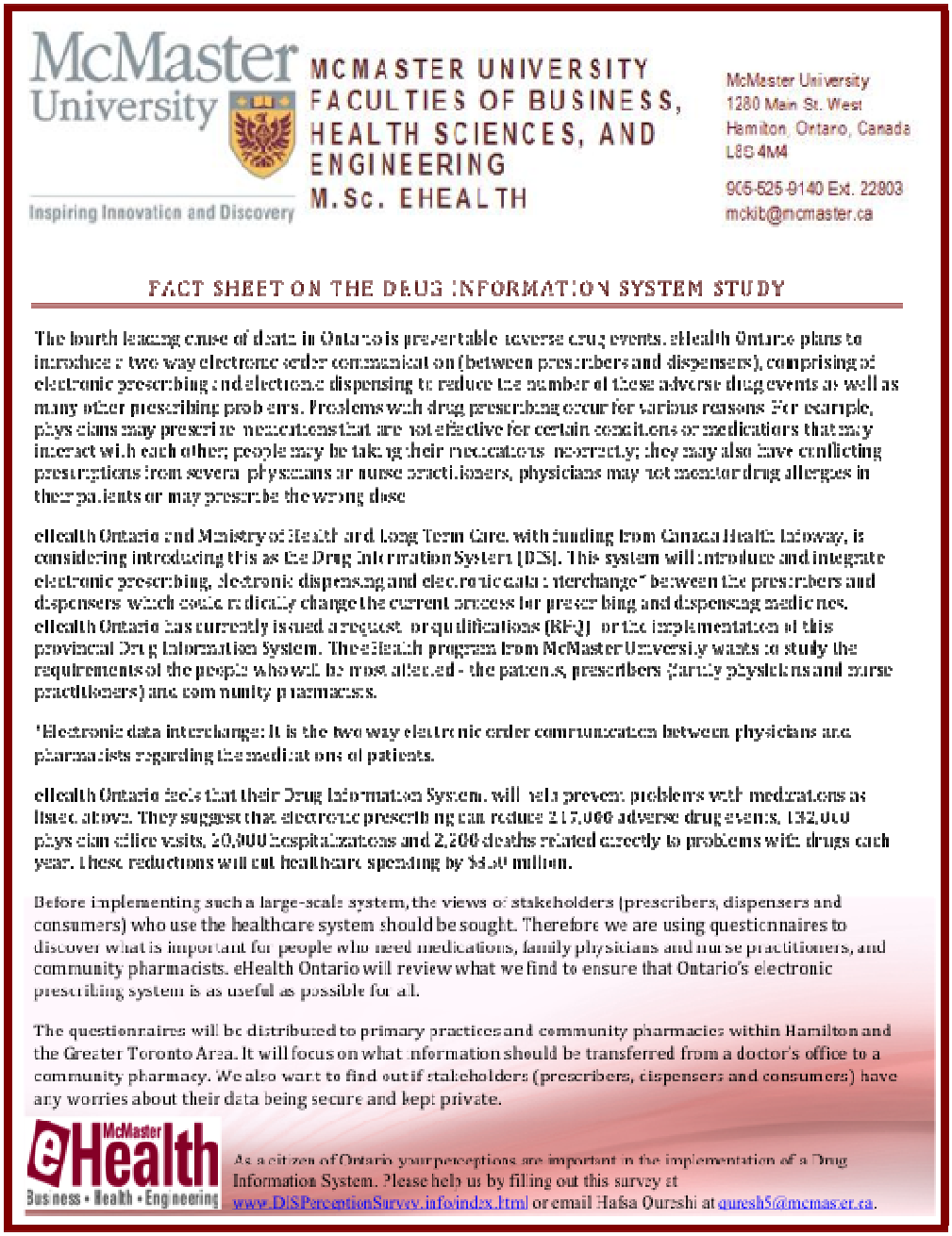
As a citizen of Ontario your perceptions are important in the implementation of a Drug Information System. Please help us by filling out this survey at: www.DISPerceptionSurvey.info/index.html or email Hafsa Qureshi Gevmak at qureh8@mcmaster.ca.

eHealth

APPENDIX 8: THESIS POSTER 2



APPENDIX 9: FACT SHEET



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FACT SHEET ON THE DRUG INFORMATION SYSTEM STUDY

The fourth leading cause of death in Ontario is preventable adverse drug events. eHealth Ontario plans to introduce a two way electronic order communication (between prescribers and dispensers), comprising of electronic prescribing and electronic dispensing to reduce the number of these adverse drug events as well as many other prescribing problems. Problems with drug prescribing occur for various reasons. For example, physicians may prescribe medications that are not effective for certain conditions or medications that may interact with each other; people may be taking their medications incorrectly; they may also have conflicting prescriptions from several physicians or nurse practitioners, physicians may not monitor drug allergies in their patients or may prescribe the wrong dose.

eHealth Ontario and Ministry of Health and Long Term Care, with funding from Canada Health Infoway, is considering introducing this as the Drug Information System (DIS). This system will introduce and integrate electronic prescribing, electronic dispensing and electronic data interchange* between the prescribers and dispensers which could radically change the current process for prescribing and dispensing medicines. eHealth Ontario has currently issued a request for qualifications (RFQ) for the implementation of this provincial Drug Information System. The eHealth program from McMaster University wants to study the requirements of the people who will be most affected - the patients, prescribers (family physicians and nurse practitioners) and community pharmacists.

*Electronic data interchange: It is the two way electronic order communication between physicians and pharmacists regarding the medications of patients.

eHealth Ontario feels that their Drug Information System will help prevent problems with medications as listed above. They suggest that electronic prescribing can reduce 217,000 adverse drug events, 132,000 physician office visits, 20,300 hospitalizations and 2,200 deaths related directly to problems with drugs each year. These reductions will cut healthcare spending by $35.0 million.

Before implementing such a large-scale system, the views of stakeholders (prescribers, dispensers and consumers) who use the healthcare system should be sought. Therefore we are using questionnaires to discover what is important for people who need medications, family physicians and nurse practitioners, and community pharmacists. eHealth Ontario will review what we find to ensure that Ontario's electronic prescribing system is as useful as possible for all.

The questionnaires will be distributed to primary practices and community pharmacies within Hamilton and the Greater Toronto Area. It will focus on what information should be transferred from a doctor's office to a community pharmacy. We also want to find out if stakeholders (prescribers, dispensers and consumers) have any worries about their data being secure and kept private.

McMaster eHealth
Business • Health • Engineering

As a citizen of Ontario your perceptions are important in the implementation of a Drug Information System. Please help us by filling out this survey at www.DISPerceptionSurvey.info/index.html or email Hafsa Qureshi at qureshi5@mcmaster.ca.

APPENDIX 10: TEMPLATE EMAIL

PATIENT EMAILS

Dear Sir or Madam:

My thesis is on the Drug Information System (DIS) that eHealth Ontario and Ministry of Health and Long Term Care, with funding from Canada Health Infoway, are considering introducing next year. This system will introduce and integrate electronic prescribing, electronic dispensing and electronic data interchange (two way electronic order communication between physicians and pharmacists regarding the medications of patients) between the prescribers and dispensers, which could radically change the current process for prescribing and dispensing medicines. For my thesis, I am studying perceptions of family physicians, pharmacists and patients on DIS before the system is implemented.

Here is where I need your help, I would like you all if you have had prescriptions (not over the counter drugs) in the past to fill out the patient questionnaire for me. Attached you will find patient questionnaire, alternatively you can also access these questionnaires from my website, www.disperceptionsurvey.info/. All information is on the questionnaire but just some points about the questionnaire:

This survey study is a pilot study designed to gain prescriber, dispenser and patient perceptions of Ontario's first upcoming Drug Information System (DIS) to be implemented in 2012.

- The survey should only take 5 - 10 minutes to complete
- Once completed the questionnaire electronically, you can email response back to Hafsa Qureshi Grymek at quresh5@mcmaster.ca or fax to 905-546-0401.
- Your perceptions are extremely important to me and all my findings will be provided to eHealth Ontario for their consideration; therefore you all can influence the planning of DIS by providing me your perceptions on the system

The deadline to complete the questionnaire is October 31, 2011. For any further information on the study, please visit my website at www.DISPerceptionSurvey.info/. The questionnaires are also available on the website.

Warm Regards,

Hafsa

PHARMACIST EMAILS

Dear Pharmacist,

I am immensely grateful to you for participating in the survey. This survey study is a pilot study designed to gain prescriber, dispenser and patient perceptions of Ontario's first upcoming Drug Information System (DIS) to be implemented in 2012. Please find the survey attached.

- The survey should only take 5 - 10 minutes to complete
- You can complete the questionnaire electronically and email your response back to Hafsa Qureshi Grymek at quresh5@mcmaster.ca or fax to 905-546-0401.

- Your perceptions are important to us and all our findings will be provided to eHealth Ontario for their consideration; therefore you can influence the planning of DIS by providing us your perceptions on the system

The deadline to complete the questionnaire is October 31, 2011. For further information on the study, please visit our website at www.DISPerceptionSurvey.info/.

Many Thanks & Best Wishes,

Hafsa

PHYSICIAN EMAILS

Dear Physician,

My thesis is on the perceptions of Drug Information System (DIS) that eHealth Ontario and Ministry of Health and Long Term Care, with funding from Canada Health Infoway, are considering introducing next year. This system will introduce and integrate electronic prescribing, electronic dispensing and electronic data interchange (two way electronic order communication between physicians and pharmacists regarding the medications of patients) between the prescribers and dispensers, which could radically change the current process for prescribing and dispensing medicines. I would greatly appreciate if you can fill out prescriber questionnaire for me. Please find the questionnaire attached.

This survey study is a pilot study designed to gain prescriber, dispenser and patient perceptions of Ontario's first upcoming Drug Information System (DIS) to be implemented in 2012.

- The survey should only take 5 - 10 minutes to complete
- You can complete the questionnaire electronically and email your response back to me at quresh5@mcmaster.ca or fax to 905-546-0401.
- Your perceptions are important to us and all our findings as (a group of course) will be provided to eHealth Ontario for their consideration; therefore you can influence the planning of DIS by providing us your perceptions on the system. You suggestions will remain anonymous

The deadline to complete the questionnaire is October 31, 2011. For any further information on the study, please visit my website at www.DISPerceptionSurvey.info/.

I will be extremely grateful to you for filling out this survey. In fact if possible if you can pass it onto any of your colleagues who can fill out my questionnaire, I would be immensely grateful to you. If you or they, like paper copies of the questionnaire better, I can personally come in and provide them for you.

Warm Regards,

Hafsa