PHARMACISTS' EXPECTATIONS OF A PHARMACY NETWORK: A BASELINE EVALUATION

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Pharmacists' Expectations of a Pharmacy Network: A Baseline Evaluation

by

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A thesis submitted to the

School of Graduate Studies

in partial fulfilment for the degree of

Masters in Community Health

Division of Community Health, Faculty of Medicine

Memorial University of Newfoundland

2004

St. John's Newfoundland

Your file Votre référence
ISBN: 0-612-99092-3
Our file Notre référence
ISBN: 0-612-99092-3

DEDICATION

To my father-in-law, Leo Dinn, who always said that
I must be some "stunned",
given I was still going to school at age 35.

ACKNOWLEDGEMENTS

I would like to thank members of my committee: Professor Doreen Neville, whose dedication, guidance and encouragement was always there; Professor Maria Mathews, whose commitment to my thesis proved invaluable; and Mr. Steve O'Reilly whose feedback with respect to the technical and editorial aspects of my thesis grounded my thesis in reality.

I would also like to acknowledge the community pharmacists who participated in the survey. Their cooperation was greatly appreciated.

Thanks is also extended to the Newfoundland Pharmaceutical Association, in particular, Mr. Don Rowe, for their assistance in setting up the study's population frame.

A special thank you is given to Ms. Doris Goobie, Executive Secretary, NLCHI, whose expertise in managing the survey responses was greatly appreciated.

A thank you goes to my secretary, Ms. Alison Collier, who performed numerous formatting miracles.

I would also like to thank my parents, Margaret and Wally, who let me go to work in a warehouse immediately after graduating from high school. It was only then that I realized I needed to further my education.

And a special thank you to my wife, Lorraine, and children Jared and Reghan, the three main reasons I have made it this far.

ABSTRACT

Pharmacists' Expectations of a Pharmacy Network: A Baseline Evaluation

This study was carried out to determine community pharmacists' perceived value of a pharmacy network prior to its implementation. A questionnaire was mailed to all 435 community pharmacists practicing in Newfoundland and Labrador in 2002, with 217 completed questionnaires returned (49.9% response rate). Overall, 90.3% of community pharmacists agreed drug utilization review would be an important function of the Pharmacy Network; reducing prescribing problems was found to have the strongest support (91.3%). For eight measures of computerized physician order entry, agreement ranged from 69.6% to 97.2%, with removing problems with illegible hand writing receiving the strongest support. Although suspected adverse reactions appears to be under reported, 87.6% of community pharmacists indicated they would report more if it could be done electronically. Considerable support was found for four measures related to payment for pharmaceutical services (range 82.9% to 89.4%), with a higher proportion of female pharmacists indicating they would expect payment. Younger pharmacists, and/or those working in urban areas, had a higher perceived value of a pharmacy network than older pharmacists and/or those working in rural areas. Differences in perceived value of a pharmacy network was also found between education levels and years practicing and gender.

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CHAPTER I

INTRODUCTION

Pharmacy has evolved through phases of increasing functionality and complexity: compounding and dispensing, clinical pharmacy, and pharmaceutical care (Holland and Nimmo, 1999). In the past, pharmacists were expected to prepare and dispense medications, and therefore, required skills in mixing different types of drugs. As the complexity of drugs grew, large drug companies assumed the role of preparing medications and pharmacists were left with the responsibility of dispensing medications (Al-Shaqha & Zairi, 2001).

In the late-1960s there was a shift towards pharmacists playing more of a clinical role (Hepler & Strand, 1990). Clinical pharmacy is defined as the provision of structured services by pharmacists to meet the drug-related needs of patients, physicians and nurses in a commitment to the optimization of drug therapy (Al-Shaqha & Zairi, 2001). Clinical pharmacy evolved in the hospital setting where pharmacy managers were able to convince hospital administrators that clinical pharmacy would reduce the incidence of adverse drug reactions and thus save hospital days (Penna, 1987). In an effort to enhance patient care, pharmacists were made part of a care management team in the hospital setting. As part of this team, the pharmacist provided clinical pharmacy services to ensure that drug therapy was appropriate and cost-effective (Al-Shaqha & Zairi, 2001). In delivering such services, the pharmacist exercised professional judgment and accepted the responsibility for the quality of drug-related patient care outcomes (Hepler, 1985;

Hepler & Strand, 1990). Clinical pharmacy has resulted in safe, accurate, effective and efficient drug therapy. However, the clinical role of pharmacists has generally been restricted to hospitals, nursing homes and ambulatory clinics, with minimal extension to community pharmacies (Penna, 1987; Church, 1989; Al-Shaqha & Zairi, 2001).

The pharmacist's role is expanding to include the delivery of pharmaceutical care, a model of care where the pharmacist works in partnership with other health care professionals to maximize the health outcomes of their patients. These outcomes are: (1) cure of a disease, (2) elimination or reduction of a patient's symptomatology, (3) arrest or slowing of a disease process, or (4) prevention of a disease or symptomatology (Hepler & Strand, 1990).

Pharmaceutical care includes monitoring a patient's symptoms, counseling, resolving drug-related problems, communicating with the prescriber, and intervening when appropriate. This shift to pharmaceutical care has presented challenges. Lack of training, confidence and time in the pharmacist's practice have been found to be barriers to embracing this new model of care. Given that present day pharmacies are profit driven, it has been suggested that these obstacles may be difficult to overcome (Amsler, Murray, Tierney, Brewer, Harris, Marrero & Weinberger, 2001).

Community pharmacies continue to introduce new processes into their business practices to facilitate movement toward pharmaceutical care (Dupclay, Rupp, Bennett & Jarnagin, 1999), such as the introduction of advanced technologies in support of service delivery. When technology was introduced into pharmacies in the 1970's, it was usually referred to as *pharmacy informatics.* Pharmacy informatics included in-house

computerized medication profiles and inventory management systems. In recent years, the term *Pharmacy Network* has emerged, which is the linking of individual computerized pharmacies to a network. A Pharmacy Network is a comprehensive set of modules and processes that includes: establishing a relationship with the patient, creating a database, listing and ranking problems, providing options, and planning and monitoring (Felkey & Barker, 1996). A Pharmacy Network will enable pharmacists to embrace an even more enhanced role in the delivery of pharmaceutical care, while maintaining business profitability.

Rationale

Nine of the ten provinces currently have some form of pharmacy network. Most of these networks connect community retail pharmacies and provincially funded drug programs. The most advanced networks include the ability to provide complete drug profiles to pharmacists at the point of distribution. Such systems have been implemented in four provinces: Alberta (WellNet), Prince Edward Island (Pharmacy Network), British Columbia (PharmaNet) and Manitoba's Drug Programs Information Network (DPIN). Each of these provinces, to varying degrees, have incorporated the following functions in designing their Pharmacy Network: on-line real time adjudication, checks for duplication and double-doctoring, drug utilization reviews, checks for patient eligibility, drug profiles, connection to hospitals and physician offices, and electronic prescribing.

Studies were not carried out in these provinces to determine the perceived value to community pharmacists before and after the implementation of a Pharmacy Network.

In Manitoba, a post-implementation study was carried out that measured community pharmacists perceived benefit of the Drug Programs Information Network approximately three years after implementation (Kozyrskyj, Brown & Mustard, 1998). However there was no comparable pre-implementation component to the study.

The Newfoundland and Labrador Centre for Health Information (NLCHI), on behalf of the provincial health system and the Government of Newfoundland and Labrador, has been mandated to build a provincial Health Information Network (HIN). The first phase of the HIN, the Unique Personal Identifier/Client Registry is complete. The second phase of the HIN is the Newfoundland and Labrador Pharmacy Network (Pharmacy Network). The core function of the Pharmacy Network will be to provide integration between community and institutional pharmacies, the Newfoundland and Labrador Prescription Drug Program, hospital emergency rooms and physician offices.

The work currently being carried out by NLCHI presents a unique opportunity to determine the perceived value to community pharmacists of the Pharmacy Network before it is implemented. This study investigated the perceptions of community pharmacists on such issues as the value of a complete patient profile, the usefulness of drug utilization reviews, and electronic prescribing and payment for pharmaceutical care. The results of this study provides benchmarks for future comparative studies that measure perceived value post-implementation of the Pharmacy Network. Other jurisdictions will be able to use the results of this study as pre-implementation benchmarks for future pharmacy networks.

Objectives

The objectives of this study were:

1) To measure the perceived value to community pharmacists of specific role enhancements (i.e., pharmaceutical care) as a result of implementing the Pharmacy Network.
2) To measure the perceived impact that changes in business practices will have on community pharmacists as a result of the Pharmacy Network.
3) To identify key functions of the Pharmacy Network, and to determine the perceived benefit to community pharmacists of these functions.

Literature Review

A review of relevant literature concerning (1) the evolution of community pharmacies, (2) functions of Pharmacy Networks, (3) existing Pharmacy Networks in Canada, (4) proposed functions of the Newfoundland and Labrador Pharmacy Network, (5) perceived value of a Pharmacy Network to community pharmacists pre-implementation, and (6) payment for pharmaceutical care is presented below.

Evolution of Community Pharmacies

For hundreds of years, the primary role of pharmacists was to prepare and dispense medications (Al-Shaqha & Zairi, 2001). In the mid-1960's, there was a shift in the role of pharmacists that led to them taking on more clinical involvement in the care of

their patients (Hepler & Strand, 1990). Clinical pharmacy evolved based on the philosophy that pharmacists needed to expand their functions to include other health care professionals in the process of dispensing medications (Penna, 1987). During this time, pharmacists began to incorporate new functions, which was then followed by a period of enhancement to these functions based on their practical applications (Hepler & Strand, 1990). The era of clinical care moved the pharmacist role from one of only providing a dispensing service to one where they played an active part in determining the most appropriate treatment for patients. From a conceptual perspective, clinical pharmacy is the combination of knowledge, skills and ethics that allows for optimal safety in the distribution and use of medications (Brodie, 1986, as cited in Penna, 1987).

The role of today's pharmacist is now shifting from clinical care to pharmaceutical care, a system of medication prescribing shared by pharmacists and other health care professionals. Pharmaceutical care incorporates both traditional dispensing roles with the more established functions of clinical care; pharmacists share this responsibility with other health professionals in providing optimum patient care (Babb & Babb, 2003). Hepler & Strand (1990) predict the role of the pharmacist, in partnership with other health care professionals, will be enhanced to a point where pharmacists will design, implement and monitor therapeutic plans for their patients.

There are three major components to pharmaceutical care: (1) identifying potential and actual drug-related problems, (2) resolving actual drug-related problems and (3) preventing potential drug-related problems (Al-Shaqha & Zairi, 2001). A study carried out by Amsler et al., (2001) found that pharmacists believed pharmaceutical care

included "educating patients on medicine and disease states" and "telling patients why they take a medicine, the effects, the side effects, and the outcomes, and checking medication compliance" (p. 851).

The acceptance of pharmaceutical care as the new way for pharmacists to do business has not been without its challenges. The actual layout of most pharmacies does not allow for one-on-one consultations with patients (Amsler, et al., 2001), and even though pharmacists today spend less time dispensing medications than in the past, they still have little time to devote to patient care activities (Schommer, Petersen, Doucette, Gaither & Mott, 2002). The minimal amount of time pharmacists currently spend on pharmaceutical care is also related to the fact that they are paid for dispensing medications, not for pharmaceutical care services (Bennett, Blank, Bopp, James & Osterhaus, 2000). While pharmacists believe in the value of such services, and feel they are capable of providing them, they also expect to be reimbursed for these services (Miller & Ortmeier, 1995; Kozyrskyi, et al., 1998; Christensen, Neil, Fassett, Smith, Holmes & Stergachis, 2000). The resistance by other health care professionals to pharmacists taking a more active role in patient care has also been identified as a barrier to pharmaceutical care (Amsler, et al., 2001; Hepler & Strand, 1990). Even when cooperation exists between pharmacists and other providers, the lack of technological communication between institutional and community based information systems, or services, makes it difficult to share patient information.

In spite of these barriers, the adoption of the pharmaceutical care model by pharmacists must be realized if the pharmacy profession is to survive. Advances in

technology will be accompanied by more mail order pharmacies and automated dispensing systems, which will make the traditional dispensing role of a pharmacist obsolete (Hepler, 1988). Pharmacists can play an important role in reducing patient morbidity and mortality through pharmaceutical care, and patients are willing to pay extra for this service (Suh, 2000; Larson, 2000). In the long term, pharmacists can expect to make greater profits from pharmaceutical care than from simply dispensing medications (Bennett, et al., 2000), although the transition period may be expensive (Norwood, Sleath, Caiola & Lien, 1998).

Functions of Pharmacy Networks

In any health care system there are four distinct levels of technological architecture: (1) the foundation layer formed by a transaction-processing system, (2) a management information system, (3) decision support and (4) advanced informatics systems (Felkey, 1997). A transaction-processing system is one which captures an event (transaction) and from this an output is produced (process). An example of a transaction-process would be the prescribing of a drug by a physician (transaction) and the filling of that prescription by a pharmacist (process). A management information system generates reports that provide managers with information about what is occurring in the transaction-processing system. An example of this system would be a drug inventory management system for a pharmacy. The decision support layer provides real time access to information used in deciding appropriate patient care. For example, immediate access to clinical practice guidelines prior to filling a prescription is a common decision support

tool used in pharmacies. The final level would include advanced informatics applications such as artificial intelligence systems. Artificial intelligence is a recent branch of science which simulates the functions of the human brain to solve various problems using computers. A study by Akl, Sobh, Enab & Tattersall (2001) concluded artificial intelligence provided enhanced patient care in the prescription and monitoring of hemodialysis therapy.

Existing Pharmacy Networks in Canada

Information systems developed to capture data related to prescription medications are variable in function across Canada. In the past these systems were developed to process claims for government-funded drug programs. Technological advances in the last 10 years now allow for more enhanced functionality of medication systems (Pharmacy Networks). These systems provide an opportunity to capture real time medication data, which can lead to health, economic and financial benefits for both governments and individual patients (Benefits Driven Business Case, NLCHI, 1998).

Nine of the ten provinces currently provide adjudication functions for government drug programs. However four provinces, Manitoba, British Columbia, Alberta and Prince Edward Island have implemented (or are planning to implement) systems with more comprehensive functional capability. The main enhancement found in these systems is the ability to provide real time patient drug profiles at the time the prescription is filled by the pharmacist (Pharmacy Network Briefing Note, NLCHI, 2002).

The four provinces that have in place, or are in the process of implementing, comprehensive Pharmacy Networks have developed similar functions. A comparative listing of these functions is provided in Table 1, followed by a brief description of each of these province's networks.

Table 1
Functions of Selected Provincial Pharmacy Networks

Function	Alberta (2002)	British Columbia (1995)	Manitoba (1994)	PEI (1999)
On-line real time adjudication and transmission	✓	✓	✓	✓
Checks for duplication	✓	✓	✓	✓
Checks for double-doctoring	✓	✓	✓	✓
Provides full retrospective drug use evaluation/review on patient profile	✓	✓	✓	✓
Tracks patient's deductible on co-pay	✓	✓	✓	✓
Patient eligibility checked	✓	✓	✓	✓
Immediately identifies what is and is not a benefit	✓	✓	✓	✓
Pharmacare Status	✓	✓	✓	✓
Drug Profiles	✓	✓	✓	✓
Drug Profiles history on each patient	✓	✓	✓	✓
Records Rx dispensed for all or select group of patients	Will record all prescriptions	All prescriptions are recorded	Note: not mandatory for aboriginals, but most recorded.	Will report all prescriptions
Ability to record non-dispensing events	✓			
Connected with hospitals	✓	✓		
Connected with physician offices/desk top prescribing	✓			
Other Notes	Currently in a 6 month pilot stage.		Five year plan.	In the development stage.

Pharmacy Scoping Project Briefing Note, 2002 (NLCHI)

Manitoba

In 1994, the province of Manitoba implemented the Drug Programs Information Network (DPIN). The DPIN system was the first system in Canada that connected all community pharmacies. There are currently no linkages of community physicians to hospitals, although these connections are part of Manitoba's five-year business plan for the DPIN. The DPIN was originally developed to provide complete prescription profiles to pharmacists at the time of dispensing, as well as enhanced drug utilization reviews. The functions of the DPIN system are similar to other provinces with Pharmacy Networks (see Table 1), although in Manitoba it is not mandatory for pharmacists to record prescriptions filled by Registered Indians (Kozyrskyj, et al., 1998).

British Columbia

The British Columbia PharmaNet initiative was implemented in 1995 in an attempt to contain escalating costs to the government drug program, and to improve the health of the population through the provision of drug therapy decision tools. The network allows for the exchange of medication information between pharmacists and hospital emergency rooms, however there are no linkages to community physicians.

An additional function of the PharmaNet system is the Pharmacare Trial Prescription Program. This module was developed to reduce expenditures for patients who are put on a new medication and for some reason must discontinue its use. A patient

is given only a portion of the new drug, and their health care provider then monitors their progress. If for some reason the drug must be discontinued, the full prescription has not been wasted.

Alberta

The Pharmaceutical Information Network (PIN) is being developed in Alberta as part of the Alberta Wellnet initiative. The objective of the PIN project is to provide health care professionals with the information necessary to make optimal decisions on drug therapy. The network will not only provide adjudication functions for Alberta's government drug plan, it will also connect community pharmacists, physicians and hospitals to allow for the exchange of patient information. This will allow a physician to monitor a patient's current, as well as, historical drug profile, create/modify prescriptions through Computerized Physician Order Entry (CPOE), and access decision support tools to assist in drug therapy decisions. The PIN project in Alberta was approved for implementation based on the estimated $69 million the province would save annually as a result of a reduction in adverse drug events (Pharmaceutical Information Network – Medication Information Strategy (White Paper), Western Health Information Collaborative, April 2002).

Prince Edward Island

Prince Edward Island is the latest province to begin developing a Pharmacy Network. At present this system is still in the implementation stage and much of the system development documentation is classified as proprietary. It is known that in 1997 the province implemented a Pharmaceutical Informatics Project (PhIP) system, which provided province-wide networking for the submission of pharmacists' claims to the government drug program. In 1999, this system was enhanced to allow fee-for-service physicians to submit medical claims to government for payment. Recently, the Province has started a process towards developing a Pharmacy Network that would enhance the role of the pharmacist by providing comprehensive functionality. It is not unreasonable to assume this system would include similar functions found in the three provinces with established Pharmacy Networks.

Proposed Functions of the Newfoundland and Labrador Pharmacy Network

Although provinces vary in the comprehensiveness of functions of their Pharmacy Networks, the main functions include real time adjudication of claims, checks for duplication and double-doctoring, retrospective drug reviews, drug profiles, and electronic interfaces between community pharmacies, hospitals and physicians (Pharmacy Network Briefing Note, NLCHI, 2002). A detailed summary of the results from the scoping exercise carried out by the Newfoundland and Labrador Pharmacy Network Project Team is provided in Appendix "A". In Newfoundland and Labrador it has been proposed that the Pharmacy Network would support a) drug utilization reviews, b) computerized physician order entry, c) post-market surveillance (Adverse Drug Reaction reporting) and d) complete patient medication profiles. (Stakeholder Consultation Presentation, NLCHI, 2002). Each of these four functions are discussed below.

a) Drug Utilization Review

Drug interactions are well known to cause adverse drug events, but most information captured on such events has occurred in hospitals (Cited in Halkin, Katzir, Kurman, Jan & Mlakin, 2001). Originally, DURs were designed to contain the costs of drug therapy for patients covered by Medicaid in the United States and were performed retrospectively. Most drug utilization reviews (DUR) currently in use today alert the pharmacist in *real time* that there may be a problem with dispensing a prescription. In

recent years DURs have expanded to identify potential prescribing problems. Generally, DUR alerts identify the possibility of therapeutic duplication, drug interactions, low/high dose, drug over-use/under-use and drug-pregnancy conflicts (Armstong & Denemark, 1998). A meta-analysis of 39 prospective studies estimated the incidence of serious adverse drug reactions (ADRs) requiring hospital admissions was 4.7%, while a further 2.5% of ADRs occurred for patients already admitted (Lazarou, Pomeranz & Corey, 1998). A more recent study concluded that 5% of all hospital admissions were the result of ADRs (Ring & Brockow, 2002). In spite of the established benefits of real time access to DURs, community pharmacists have been slow to accept this function, given that most pharmacies do not have the necessary technology in place that would support electronic communication with ambulatory and acute care information systems (Wertheimer & Kralewski, 1993). If such network interfaces were available to community pharmacies, pharmacists would be able to make more informed decisions, resulting in better clinical decisions (Warholak-Juarez, Rupp, Salazar & Foster, 2000).

b) Computerized Physician Order Entry

Medication errors occur frequently and have both financial and clinical consequences (Kaushal & Bates, 2002). Unfortunately, there has been limited research on the value of computerized support tools in reducing medication errors in the primary care setting, as the setting for most such studies are hospitals (Hunt, Haynes, Hanna & Smith K, 1996). A recent study of primary care physicians in Quebec found 18% less

potentially inappropriate prescriptions dispensed per 1,000 patient visits in the physician group using computerized decision-making support (CDS) tools, than the physician group not using CDS (Tamblyn, Huang, Perreault, Jacques, Roy, Hanley, McLeod and Laprise, 2003).

It has been estimated that as much as 30% of all hospital admissions resulting from adverse drug reactions are preventable (Bates, Cullen, Laird, Pertersen, Small, Servi, Laffel, Sweitzer, Shea, Hallisey, et al., 1995). The pediatric population is at increased risk of medication error, given that most pediatric dosing is weight based, and therefore can benefit greatly from electronic prescribing (Fortescue, Kaushal, Landrigan, McKenna, Clapp, Federico, Goldman & Bates, 2003). The fact that errors occur in the dispensing of medications cannot be blamed solely on the healthcare provider. Most often it is the result of the provider being part of a poorly designed communication network (Leape, Bates, Cullen, Cooper, Demonaco, Gallivan, Hallisey, Ives, Laird, Laffel, et al., 1995; Kuperman & Gibson, 2003). There is considerable evidence that there are major problems with the order entry stage of prescribing medications. Computerized Physician Order Entry (CPOE) is one strategy that has gained wide acceptance towards improving this process.

CPOE, also referred to as electronic prescribing, can enhance patient safety during the dispensing process in many ways. Benefits of a CPOE include: default doses for "normal" conditions, removing problems inherent with illegible handwriting, checking dose-ceilings and patient allergy information, screening for drug-drug interactions, reviewing medication history, providing real time information on dose

algorithms, medication appropriateness, and providing less expensive alternatives (Briceland, 2001).

Medication errors resulting from handwritten prescriptions has been widely studied. (Peterson, Wu & Bergin, 1999; Ferren, 2002). A recent study by Bizvoi, Beckley, McDade, Adams, Lowe, Zechnich & Hedges (2002), found that prescriptions filled through CPOE were three times less likely to contain errors and five times less likely to require pharmacist intervention than handwritten prescriptions. A hospital based study by Lee, Teich, Spurr & Bates (1996) found nurses valued the clear, unambiguous, typed medication orders provided through CPOE. The value of CPOE in addressing illegible handwriting has now branched out to other areas in the health sector. A study by Khorasani (2001) concluded that if CPOE were to be implemented in radiology departments, the accuracy of information would improve, which would assist the radiologist in making a more informed diagnosis.

CPOE can provide valuable information on what is considered the normal dosage (i.e., strength), route (e.g., by mouth), frequency (e.g., twice a day) and quantity of specific medications. Other instructions for proper usage, such as taking medication with food, can also be provided. In a study of cardiovascular patients by Lapointe & Jollis (2003), it was estimated that 35.3% of all pharmacist interventions were the result of inaccurate medication dosage, while a study of pediatric patients by Fortescue, et al., (2003) found 28% of medication errors were errors in dosing, 18% route and 9% frequency. An adult based hospital study by Lustig (2000) found that 27.5% of medication errors were errors in dosing, 11.2% errors in route and 11.2% errors in

frequency. Bates, Teich, Lee, Seger, Kuperman, Ma'Luf, Boyle & Leape (1999) found the most frequent error typse were dosage errors, followed by frequency and route errors.

While a CPOE system can provide guidelines, offer alternatives and recommend appropriate doses, route and frequencies, there are also individual characteristics that need to be taken into consideration. Dose algorithms, based primarily on laboratory tests, can suggest appropriate dosing for specific drugs by checking laboratory tests and individual patient characteristics such as age, weight and sex (Bates, Leape, Cullen, Laird, Petersen, Teich, Burdick, Hickey, Kleefield, Shea, Vliet & Seger, 1998). Providing real time information on dose algorithms is particularly important for pediatric (Kaushal, Bates, Landrigan, McKenna, Clapp, Federico & Goldmann, 2001) and geriatric patients (Venot, 1999).

Medication errors resulting from known allergies, while among the rarest of errors have the potential to cause the most harm (Bates et al., 1999). Evans, Pestotnik, Classen, Base & Burke (1992) found that computer-assisted decision support tools improved the quality of antibiotic prescribing, partly by decreasing the number of allergic reactions. In the study by Bates, et al., (1999), an 80% reduction in known allergy errors was found after the implementation of CPOE, while a adult study of a 650 bed community hospital concluded that a computer alert system could reduce all ADE injuries by as much as 64 per 1,000 patient admissions (Raschke, Gollihare, Winderlich, Guidry, Leibowitz, Peirce, Lemelson, Heisler and Susong, 1998). CPOE is a powerful tool which can solve many problems associated with medication use through providing information on drug selection, prescription checks and information on drugs and prescriptions (Venot, 1999).

In 1999 the *Institute of Medicine* generated considerable public interest in the problem of medical errors when it released its report *To Err is Human* (1999). The report called for more extensive use of available technologies to improve medication safety.

In spite of the recent attention to enhanced patient safety, the widespread implementation of CPOE has yet to occur. Recent studies of US hospitals found that only 4.3%-15.0% of hospitals have implemented CPOE (Kaushal, Shojania & Bates, 2003), while in Canada, only Alberta has connected physician offices with community pharmacies for the purpose of electronic prescribing (Pharmacy Scoping Project Briefing Note, NLCHI, 2002). The reasons for the slow pace at which CPOE has been implemented are varied. A study by Birkmeyer, Lee, Bates & Bickmeyer (2002) compared the cost of implementing CPOE to the potential savings through improved patient safety. The study concluded that implementing CPOE would be very costly for many organizations, and while potential savings may offset the implementation cost, they were difficult to quantify. Other barriers to the implementation of CPOE include the reluctance of physicians to change current practices (Foster & Antonelli, 2002), the lack of communication among physicians, nurses and pharmacists (Fortescue, et al., 2003), and the fact that earlier CPOE systems where not user-friendly, a legacy which continues to retard the use of today's more advanced (and user-friendly) CPOE systems (Parker, 2003).

More recent problems associated with CPOE are that as they become more advanced, the more critical it becomes to monitor performance. Abookire, Teich, Sandige, Paterno, Martin, Kuperman & Bates (2000) found that physicians regularly

allowed medication-allergy pairs, while a study of medical students and residents by Oppenheim, Vidal, Velasco, Boyer, Cooper, Hayes & Frayer (2002) found that trainees relied too much on the CPOE to create medication orders, and therefore were denied the experience of practical learning.

c) Post-Market Surveillance (Adverse Drug Reaction Reporting)

Adverse drug reactions (ADRs) result in a large number of hospital admissions and deaths (Lazarou, et. al., 1998; Green, Mottram, Rowe & Pirmohamed, 2000). Post-market surveillance is a system of responding to adverse events in a population due to prescription medications. There are variations in how these systems are implemented worldwide, however the underlying process is one whereby health professionals report adverse drug reactions to a national body, which in turn monitors the frequency of adverse events in the population.

In the United Kingdom (UK), the "Yellow Card Scheme" is considered one of the leading drug surveillance systems in the world. The system is based on voluntary reporting by health professionals of adverse drug events to the Committee on Safety of Medicines (CSM). A team of experts at the CSM investigates these reports, and if there appears to be a high frequency of adverse events associated with a particular drug, appropriate regulatory action is taken. (Sweis & Wong, 2000). In the UK, new products are identified with an inverted black triangle on the packaging for the first two years it is on the market. All suspected adverse reactions are to be reported for these new drugs. For

established drugs, only serious or unusual reactions are reported (Heeley, Riley, Layton, Wilton & Shakir, 2001)

The "Yellow Card Scheme" in the UK is not perfect. A prescription-event monitoring study by Mann (1998) estimated that only 58% of the forms were returned, and while this is a considerably higher rate of response than that of post-marketing surveillance systems in the US and Canada (approximately 10%), it still may contain sampling biases. For example, it is not known if there is any difference between physicians who return the forms, and those who do not return the form.

Despite the limitations in post-marketing drug surveillance, the data collected from such systems is essential given the limited information available on new drugs entering the market. In pre-market clinical trials subjects are carefully selected to have only one disease being treated by one drug. As a result of this selective sampling, few of the subjects are representative of the general population (Mann, 1998; Grootheest, Graaf & Berg, 2003; Puijenbroek, Diemont & Grootheest, 2003). It is not uncommon for a drug to get marketing approval only to be subsequently removed from the market because of a high incidence of ADRs (Boyd, 2002; Ajayi, Sun & Perry, 2000).

While post market surveillance has proven to be an effective means for identifying adverse drug events not detected in pre-market trials, under-reporting of such events is frequent. Sweis & Wong (2000) found that 49 of the 129 pharmacists (39%) who had identified an ADR did not report them. It is estimated that reporting of serious ADR's rarely exceeds 10% (Williams & Feely, 1999). Factors which are thought to influence under-reporting of ADR's include lack of confidence that the drug actually

caused the ADR, the ADR being trivial or too well known, and the extra time it takes to complete ADR reports (Eland, Belton, van Grootheest, Meiners, Rawlins & Stricker, 1999). Further education and training may be required to increase reporting (Green, Mottram, Rowe & Pirmohamed, 2001).

Medication therapies are becoming increasingly more complex; community pharmacists are now required to keep current on the vast amount of information now available (Tully & Seston, 2000). Pharmacists are becoming more involved in the process of patient care, and as a result they play an important role in reviewing and monitoring prescribing, rather than simply dispensing medications. The electronic reporting of ADRs via a Pharmacy Network may be an effective means to identify a wide variety of adverse reactions to medications in a population.

d) Prescription Profiling

Increasing costs and over utilization of prescription medications are concerns for both government subsidized drug programs and health professionals. Over-utilization of drugs contributes to the added burden of drug-induced disease in the general population (Moore, Lecointre, Noblet & Mabille, 1998). Prescription profiling can improve drug utilization and minimize drug duplication and interaction, while at the same time control costs (Cook Jr & Schuyler, 1985). Generally, prescription profiles contain demographic and medication information on each patient. Medication information on a prescription profile may include the type of medication, date of prescribing and dispensing, refill

dates, quantity, strength, and specific directions for administering the drug. As well as providing a heath professional with a list of current medications, most prescription profiles provide a 6-12 month prescribing history. Drug profiles have enhanced patient care through the identification of drug over/under-utilization, duplication, interactions and toxicity. A significant reduction in the average number of drugs prescribed per patient has been linked to the use of prescription profiles (Laucka & Hoffman, 1992; Britton & Lurvey, 1991). Prescription profiles have been found to provide valuable information to health professionals that was not previously available, while significantly reducing the amount of time spent by a health professional in determining a patient's drug history (Koepsell, Helfand, Diehr, Gurtel, Gleser & Tompkins, 1983). With the advancement of pharmacy networks, today's profiles can contain information on all prescriptions dispensed to a patient, regardless of where that prescription was filled.

Currently, in Newfoundland and Labrador, portions of a patient's medication profile is dispersed among all pharmacies which a patient uses to fill prescriptions, and any hospitals in which the patient may have received drugs. The proposed Pharmacy Network in Newfoundland and Labrador would link all community and hospital pharmacies, resulting in health professionals having immediate access to all medications dispensed to a patient (Stakeholder Consultation Presentation, NLCHI, 2002). Today's technology allows for complete medication profiles which can be used by health professionals in providing optimum care for their patients

Perceived Value of a Pharmacy Network to Community Pharmacists Pre-Implementation

No studies that investigated the perceived value to community pharmacists of a Pharmacy Network prior to its implementation could be located. However, a study by Kozyrskyj, et al., (1998) measured perceived value of Manitoba's DPIN system to community pharmacists approximately 3 years after the Pharmacy Network had been implemented. Krozyskyi, et al., found that 80% of community pharmacists surveyed agreed the DPIN system was beneficial, with the vast majority (94%) feeling that drug utilization reviews were an important function provided by the DPIN system. The identification of drug-related problems was felt to be beneficial by 87% of the pharmacists surveyed. This study also found areas where pharmacists were less than positive about the value of the DPIN system. The major concern, expressed by 75% of the pharmacists was that they were not reimbursed for DUR services. Other concerns identified were that the DPIN interfered with client service (29%), and that they were too busy to use the DPIN (26%).

Payment for Pharmaceutical Care

In the last 10 years, pharmacists have made enormous advances in the delivery of patient care through the development and implementation of a wide range of pharmaceutical care services. Pharmaceutical care includes counseling, monitoring

outcomes, assessing medication appropriateness based on a patient's medical history, and working with physicians to ensure that the best possible medications are prescribed (Larson, 2000). Despite these enhancements in patient care services, pharmacists face difficulties in obtaining compensation for these services. In Newfoundland and Labrador, community pharmacists receive no compensation from the provincial government for pharmaceutical care services they provide clients covered under the Newfoundland and Labrador Prescription Drug Program (NLPDP). The NLPDP is the provincial government drug program that provides prescription drug coverage to low-income residents of the province. Even in jurisdictions where pharmacists are compensated for pharmaceutical care services, the service is not universal. Pharmacists may feel that such services are part of their everyday responsibilities and should not be subject to additional fees. The argument that no other health professional would provide such services without appropriate compensation appears to be difficult to accept by pharmacists (Bennett et al., 2000). As well, pharmacists may lack confidence in their ability to provide pharmaceutical care and therefore are reluctant to charge for services they feel they are not qualified to provide (Bennett, et al., 2000). Still other barriers include the lack of private counseling areas within pharmacies, and the unease of pharmacists regarding the reaction of physicians to their enhanced role (Larson, 2000).

It is interesting to note that many patients are willing to pay for such services if they believe it would reduce the risk of adverse events, and that the willingness to pay increased proportionately with the decrease in risk of adverse events (Suh, 2000). And while payment by private insurance companies for pharmaceutical care is gaining

acceptance, the focus of third party payers has generally been on dispensing fees, rather than pharmaceutical care (Miller & Ortmeier, 1995; Larson, 2000).

Another source of revenue for pharmacists who provide pharmaceutical care is self-funded commercial employers. Employers with self-funded medical plans pay directly from their income (or assets) for medical claims on behalf of their employees. These employers are supportive of pharmaceutical care programs, as they reduce absenteeism due to illness, and therefore increase net profits (Bennett, et al., 2000). Many large commercial companies in the United States now have self-funded health plans for their employees (Employee Benefits Research Institute, Washington DC., 2000). While no self-funded studies in Canada could be found, it is reasonable to assume that such private company programs exist here as well.

CHAPTER II

METHODS

Target Population

The target population for this study was all 435 community pharmacists practicing in Newfoundland and Labrador in December 2002. For the purpose of this study, a community pharmacist was defined as a pharmacist who was employed in a community pharmacy which is either operated independently or part of a national chain. Pharmacists employed in either an educational or hospital setting were not part of the target population for this study.

Instrument

A four-part questionnaire was developed in consultation with the researcher's supervisory committee, NLCHI's Pharmacy Scoping Team, and through a literature search. The first section of the questionnaire captured demographic information, the second part identified those functions which community pharmacists feel are most crucial to the success of the Pharmacy Network, the third section measured support specific to reimbursement for pharmaceutical services, while the fourth section dealt with general issues. A five-point Likert scale and a dichotomous (e.g., yes/no) approach were used to

solicit responses for the majority of questions. An opportunity to provide general comments was provided by an open-ended question at the end of the questionnaire.

A draft of the questionnaire was presented informally to a group of five community pharmacists. The primary objective of the meeting was to obtain feedback from the pharmacists on the relevance of the survey questions in relation to the overall objectives of the study. After being given an overview of the study objectives, an opportunity was provided to recommend adding, dropping or modifying questions, and to suggest improvements to the general layout of the questionnaire. Based on feedback provided by the community pharmacists, minor revisions were made to the questionnaire, and the revised questionnaire was presented to the supervisory committee for approval.

Ethics

The companion cover letters (Appendix B), the final survey questionnaire (Appendix C), and completed Human Investigation Committee (HIC) application were submitted to Memorial University's HIC for ethics approval. Ethics approval was received on December 2, 2002 (Appendix D). In order to safeguard the privacy of respondents, all data were entered into SPSS and stored on the investigator's computer, which was password protected. The computer was located in an office with a door that can be locked when vacated. Other than the investigator, no other person was authorized to access this database. The completed questionnaires were stored in a locked filing

cabinet in the investigator's office. No personal identifiers were attached to the completed questionnaires or computer files.

Data Collection

Upon receiving ethics approval, a survey package was mailed out to the 435 community pharmacists in the province of Newfoundland and Labrador. The Newfoundland Pharmaceutical Association (NPhA) provided the mailing address of all pharmacies (n = 171) in the province, as well as the names of the pharmacists employed in each of these pharmacies. This mailing list is comprehensive, as all practicing pharmacists in Newfoundland and Labrador are required to register with the NPhA. To encourage pharmacists to respond, the survey was anonymous and a stamped return envelope was provided with each survey package. A unique random number was assigned to each return envelope and to the original mailing list of 435 community pharmacists. The first mail-out of 435 questionnaires was carried out on December 11, 2002. The Executive Secretary at NLCHI was responsible for maintaining the mailing list, and identifying non-responses. When a completed questionnaire was returned, the secretary removed that respondent's name from the mailing list by cross-referencing the random number on the return envelope to the corresponding random number on the mailing list. Once a respondent in the first mail-out was identified, the secretary destroyed the corresponding return envelope. The researcher was only provided the anonymous questionnaires.

At the end of three weeks the total number of questionnaires returned was 178, for a 40.9% response rate. On January 3, 2003, approximately three weeks after the initial mail-out, a second mail-out to non-respondents was carried out. On January 30, 2003, approximately four weeks after the second mail-out, the last completed questionnaire was received. The second mail-out provided an additional 41 completed questionnaires, for a total response rate of 50.3% (219/435)

Data Analysis

Responses were investigated using descriptive statistics (i.e., Pearson's Chi-square and Fisher's exact tests, and t-tests for equality of means). Given the relatively small sample size (n=219), and the high proportion of subjects responding towards either end of the 5-point likert scale, the 5-point scale was collapsed into a dichotomous variable for the purpose of developing 2x2 contingency tables. Those subjects responding either "strongly agree" or "somewhat agree" were recoded as "agree", while subjects responding "neither agree nor disagree", "somewhat disagree" or "strongly disagree" were recoded as "do not agree". This dichotomous "Level of Agreement" variable was investigated using Chi-square tests across age groupings, gender, education, years practicing and place of business. A p-value of 0.05 was chosen for determining statistical significance.

An example of hypothesis testing employed in the analysis is as follows:

H_o: The age of the pharmacists (age groups) and their perceptions that DURs are of limited value without complete profile are independent;

vs

H_a: The age of the pharmacists (age groups) and their perceptions that DURs are of limited value without complete profile are not independent

Upon running the chi-square test, if the resulting p-value was < 0.05 we rejected the null hypothesis (H_o) and accepted the alternative hypothesis (H_a), that the perception that DURs are of limited value without complete profile is dependent on the age (grouping) of the community pharmacist. Conversely, if the p-value was => 0.05 we could not reject the null hypothesis and concluded that the perception that DURs are of limited value without complete profile is not dependent of the age (grouping) of the community pharmacist. The hypothesis for each chi-square table presented in the results section followed this approach.

To measure the internal consistency of the survey questionnaire reliability analysis was carried out on questions related to community pharmacists' perceived support for CPOE, DURs and Cognitive Services. Reliability analysis provides information about the relationships (or internal consistency) between any number of questions asked about a specific topic (e.g., CPOE). Using Cronbach's Alpha as the model it was found that each of these three scales used in the survey questionnaire had a high internal consistency: CPOE (0.86), DURs (0.80) and Cognitive Services (0.89).

The variable "Years Practicing" was selected for comparison to identify differences that may exist between the perceived value to pharmacists of a Pharmacy Network and number of years practicing in a community pharmacy. Years practicing was also an indicator investigated by Conard, Fortenberry, Blythe & Orr (2003) in their study

of pharmacists' attitudes towards providing services to adolescents. For this current study the variable "Years Practicing" was re-coded to pharmacists with less than 12 years and 12 or more years experience, as 12 years experience was the median number of years practicing for the sample. In 1990, the 4-year Diploma Program in Pharmacy was replaced with the current 5-year Bachelor of Science Degree offered by Memorial University of Newfoundland. In 1995, the first B.Sc. graduates entered the workforce, and in 2003 these graduates would have at most 8 years experience in a community pharmacy. By selecting the median cut-off of 12 years, the derived indictor "Years Experience" included pharmacists with both levels of education, while at the same time minimizing the potential for small cell counts (i.e., < 5) when generating 2x2 contingency tables.

Using the median age of the study sample as the cut-off, the continuous variable "Age" was recoded to a dichotomous "Age Group" variable; under the age of 37 and 37 years and older. A study by Dunlop & Shaw (2002) in New Zealand, that investigated community pharmacists' perceptions' on pharmaceutical care, looked at the differences in perception above and below the mean age of pharmacists. For this study the median age was selected as the measure for central tendency given the large standard deviation for the mean age of the study sample (38.5 ± 10.3).

The variable "Place of Business" was selected for comparison to identify differences in perceived value to a Pharmacy Network that may exist between pharmacists who work in an urban or rural community. Urban and rural differences were also studied by Conard, et al., (2003), although their cutoff for a rural area was a

population of < 30,000. For this study "Place of Business" was derived from the survey question "Is this pharmacy located in: (a) a city, (b) a community population > 10,000, but not a city, (c) a community < 10,000". Categories (a) and (b) were recoded to "Urban" and category (c) was re-labeled "Rural". The cut-off between urban and rural communities based on a population of 10,000 used in this study is consistent with Statistics Canada's definition of urban/rural communities (Rural and Small Town Canada Analysis Bulletin, Vol. 3, No. 3 November 2001).

Education was chosen for comparison as we wished to see if there were differences in perception between those pharmacists with a Pharmacy Diploma and those with a Bachelor of Science Degree.

All resulting cross-tabulations were 2x2 contingency tables where variables of interest were a combination of nominal (e.g., gender) and ordinal (i.e., level of agreement), or both were ordinal (e.g., age group and level of agreement). Given the contingency tables for this study sample are large (n = 217) the Pearson's Chi-square statistic was used to determine significance. In eleven (11) 2x2 contingency tables, the expected cell count for at least one cell was less than five. For these tables the 2-sided Fisher's exact test was used. All analyses were carried out using SPSS version 11.5 (SPSS Inc., Chicago, IL)

The single open ended question was analyzed by the researcher using a method of content analysis as described in the Methodology Manual published by the Texas State Auditor's Office (USA), 1995. Content analysis is a method used to determine the content of written communications by using a systematic, objective, and quantitative

procedure and is especially useful in quantifying responses to open-ended survey questions. There are five common coding units in content analysis: (1) words, (2), themes, (3) character, (4) items, and (5) space-and-time measures. In analyzing the open ended question asked in this study, two coding units were utilized; words and themes. Within the context of the study, words were classified into distinct groups (e.g., cost for software), and then these word groupings were aggregated to create separate themes (e.g., cost).

In an effort to determine whether the sample of respondents was representative of the population, the Newfoundland Pharmaceutical Association was asked to provide summary demographic statistics for their membership. Only gender, current position (i.e., manager, staff or relief) and education (B.Sc. or Diploma) were available.

CHAPTER III

FINDINGS

Response Rate

The survey was conducted from Dec 11, 2002 to January 30, 2003. Of the 435 surveys mailed out, 219 community pharmacists responded. In two cases the respondents did not complete the main part of the questionnaire, and only provided written comments. These two surveys were excluded from the quantitative analysis of the study. Therefore, the adjusted response rate to the survey was 49.9% (217/435).

Characteristics of the Sample

As shown in Table 3.1, 55.6% of community pharmacists who responded to the survey were male, ranging in age from 25-70 (mean = 41.6); female respondents were generally younger having an age range 24-62 (mean = 34.7). Approximately 37% percent of males and 10% of females were over the age of 44. There were almost equal proportions of job positions, with 45.6% being managers or owners, and 48.8% being staff pharmacists; 5.5% were relief pharmacists. There were similar gender distributions for the sample compared to the population, however there was a higher proportion of managers/owners in the sample than in the population.

Table 3.1

Characteristics of the Sample
Gender, Age and Current Position

Variable	Sample		Population Value*
	n	%	
Gender			
Male	120	55.6%	56.1%
Female	96	44.4%	43.9%
Age			
Male			
< 25	0	0.0%	n/a
25-34	36	31.9%	n/a
35-44	35	31.0%	n/a
45-54	27	23.9%	n/a
55-64	12	10.6%	n/a
65+	3	2.7%	n/a
Mean Age	113	41.6	n/a
Median Age	113	42.0	n/a
Range in Years	113	25-70	n/a
Female			
< 25	3	3.2%	n/a
25-34	48	51.1%	n/a
35-44	34	36.2%	n/a
45-54	8	8.5%	n/a
55-64	1	1.1%	n/a
65+	0	0.0%	n/a
Mean Age	94	34.7	n/a
Median Age	94	33.5	n/a
Range in Years	94	24-62	n/a
Current Position			
Manager/Owner	99	45.6%	33.6%
Staff	106	48.8%	65.7%
Relief	12	5.5%	0.7%

* Newfoundland Pharmaceutical Association (NPhA)

As shown in Table 3.2, 58.9% of the respondents had obtained a Bachelor of Science (B.Sc.) in Pharmacy, while 41.1% graduated from college with a diploma in pharmacy. This distribution was the reverse in the population, with 41.0% of community pharmacists having a B.Sc. and 59.0% having graduated with a diploma. Managers worked longer hours per week than both staff and relief pharmacists (means 41.0, 35.9 and 29.3, respectively) with 30.3% of managers and 2.8% of staff pharmacists working more than 40 hours a week.

Table 3.2

Characteristics of the Sample
Education and Hours Worked

Variable	Sample		Population Value
	n	%	
Education Level			
Bachelor of Science	123	58.9%	41.0%
Diploma	86	41.1%	59.0%
Hours Worked			
Manager			
<35	13	13.1%	n/a
35-40	56	56.6%	n/a
41+	30	30.3%	n/a
Mean Hours Worked	99	41.0	n/a
Median Hours Worked	99	40.0	n/a
Range in Hours	99	8.0-80	n/a
Staff			
<35	20	18.9%	n/a
35-40	83	78.3%	n/a
41+	3	2.8%	n/a
Mean Hours Worked	106	35.9	n/a
Median Hours Worked	106	40.0	n/a
Range in Hours	106	8.0-45.0	n/a
Relief			
<35	6	50.0%	n/a
35-40	4	33.3%	n/a
41+	2	16.7%	n/a
Mean hours Worked	12	29.3	n/a
Median hours Worked	12	32.5	n/a
Range in Hours	12	9.0-50.0	n/a

Table 3.3 presents indicators based on years practicing in a community pharmacy. Male pharmacists averaged 17.3 years experience (range 1-49), whereas females averaged 11.5 years (range 1-41). A higher proportion of male pharmacists were found to have more than 21 years experience than their female counterparts (41.2% versus 19.8%). Population values for number of years practicing was not available.

Table 3.3

Characteristics of the Sample
Years Practicing

Variable	Sample	
	n	%
Years Practicing		
Male		
<5	21	17.6%
5-10	19	16.0%
11-15	16	13.4%
16-20	14	11.8%
21+	49	41.2%
Mean Years Practicing	119	17.3
Median Years Practicing	119	17.0
Range in Years Practicing	119	1-49
Female		
<5	26	27.1%
5-10	28	29.2%
11-15	10	10.4%
16-20	13	13.5%
21+	19	19.8%
Mean years practicing	96	11.5
Median Years Practicing	96	9.0
Range in years practicing	96	1-41

Table 3.4 presents indicators based on years working in a community pharmacy. Overall, the average time a community pharmacist was employed at the pharmacy during the time of the survey was 7.1 years, with a further 7.1 years experience in another community pharmacy. Population values for number of years practicing was not available.

Table 3.4
Characteristics of the Sample
Years Working

Variable	Sample	
	n	Value
Years Working		
Current Pharmacy		
<5 Years	106	48.8%
5-10 years	54	24.9%
11+ Years	57	26.3%
Mean Years Working	217	7.1
Median Years Working	217	5.0
Range in Years Working	217	0-38
Previous Community Pharmacy	216	7.1
<5 Years	113	52.3%
5-10 Years	49	22.7%
11+ Years	54	25.0%
Mean years working	216	7.1
Median Years Working	216	4.0
Range in years working	216	0-45

As presented in Table 3.5, all pharmacists worked either in a chain store (66.2%) or in an independent store (33.8%), with approximately half (47.7%) working in pharmacies located in communities with populations less than 10,000. A minority of pharmacists worked in more than one store (12.9%), with relief pharmacists having this work arrangement more often than managers and staff (58.3%, 8.1% and 12.3%, respectively) The majority of respondents (86.6%) worked in pharmacies that employed 1-3 pharmacists. Population values for these indicators were not available.

Table 3.5

Characteristics of the Sample
Type of Pharmacy, Working in More than One Store,
Community Population and Number of Pharmacists Working in Pharmacy

Variable	Sample	
	n	%
Type of Pharmacy		
Chain Store	143	66.2%
Independent Store	73	33.8%
Work in more than one Store	217	(28) 12.9%
Manager/Owner	99	(8) 8.1%
Staff	106	(13) 12.3%
Relief	12	(7) 58.3%
Community Population		
A City	83	38.8%
Community > 10,000	29	13.6%
Community < 10,000	102	47.7%
Pharmacists in Pharmacy		
One	27	12.5%
Two	71	32.9%
Three	89	41.2%
Four or more	29	13.4%

Perceived Value of Pharmacy Network Functions

Section II of the questionnaire measured the perceived value to community pharmacists of four specific Pharmacy Network functions: 1) drug utilization reviews, 2) computerized physician order entry, 3) post-market surveillance (adverse drug reaction reporting), and 4) prescription profiling. As well as providing descriptive measures, Chi-square tests of significance were performed to determine statistical significance in the perceived value of each of these pharmacy network functions with respect to the five demographic variables; age, gender, education, years practicing and place of business (i.e., urban or rural).

1. Drug Utilization Review

Table 3.6 presents the perceived value to community pharmacists of including drug utilization reviews (DURs) in the development of the Pharmacy Network. The majority of respondents (89.4%) agreed DURs would have limited value unless carried out on the complete patient profile. With access to complete medication profiles, 91.3% respondents agreed that DURs would significantly reduce prescribing problems such as drug interactions and drug duplication, while 80.2% believed DURs would significantly reduce hospital admissions. Overall, 90.3% of community pharmacists agreed DURs would be an important function of the Pharmacy Network, although only 69.6% believed DUR services would be valued by their clients.

Table 3.6

Pharmacists' Perception of the Value of Drug Utilization Reviews
(n=217)

Drug Utilization Reviews	Total Response	Level of Agreement				
		Strongly Agree	Somewhat Agree	Neither Agree or Disagree	Somewhat Disagree	Strongly Disagree
Limited value without complete patient profile	217	134 (61.8)	60 (27.6)	13 (6.0)	8 (3.7)	2 (0.9)
Will reduce prescribing problems	217	118 (54.4)	80 (36.9)	14 (6.5)	5 (2.3)	0 (0.0)
Will reduce hospital admissions	217	82 (37.8)	92 (42.4)	37 (17.1)	5 (2.3)	1 (0.5)
Clients will value DUR services	217	57 (26.3)	94 (43.3)	52 (24.0)	13 (6.0)	1 (0.5)
DUR important function of Pharmacy Network	217	114 (52.5)	82 (37.8)	16 (7.4)	2 (0.9)	3 (1.4)

Table 3.7 presents the results of the tests for significance when community pharmacists' level of agreement that DURs would have limited value without having a complete patient profile were cross-tabulated by the five select demographic variables. No statistically significant difference between age groups, gender, education, years practicing or place of business were identified.

Table 3.7

Pharmacists' Perception of Drug Utilization Reviews Being of Limited Value Without a Complete Patient Profile, by Select Demographics

Variable	Level	Limited value without complete patient profile		Row Total	p-value
		Agree	Do Not Agree		
Age	<37	92(89.3%)	11(10.7%)	103	0.800
	37+	94(90.4%)	10(9.6%)	104	
	Col Total	186(89.9%)	21(10.1%)	207	
Gender	Male	103(85.8%)	17(14.2%)	120	0.061
	Female	90(93.8%)	6(6.2%)	96	
	Col Total	193(89.4%)	23(10.6%)	216	
Education	B.Sc.	107(87.0%)	16(13.0%)	123	0.268
	Diploma	79(91.9%)	7(8.1%)	86	
	Col Total	186(89.0%)	23(11.0%)	209	
Years Practicing	<12	95(89.6%)	11(10.4%)	106	0.899
	12+	98(89.1%)	12(10.9%)	110	
	Col Total	193(89.4%)	23(10.6%)	216	
Place of Business	Urban	101(90.2%)	11(9.8%)	112	0.817
	Rural	91(89.2%)	11(10.8%)	102	
	Col Total	192(89.7%)	22(10.3%)	214	

Table 3.8 presents the results of the tests for significance when community pharmacists' level of agreement that DURs would reduce prescribing problems were cross-tabulated by the five select demographic variables. No statistically significant difference between age groups, gender, education, years practicing or place of business were identified.

Table 3.8

Pharmacists' Perceptions that Drug Utilization Reviews will Reduce Prescribing Problems, by Select Demographics

Variable	Level	Will reduce prescribing problems		Row Total	p-value
		Agree	Do Not Agree		
Age	<37	97(94.2%)	6(5.8%)	103	0.213
	37+	93(89.4%)	11(10.6%)	104	
	Col Total	190(91.8%)	17(8.2%)	207	
Gender	Male	106(88.4%)	14(11.6%)	120	0.096
	Female	91(94.8%)	5(5.2%)	96	
	Col Total	197(91.2%)	19(8.8%)	216	
Education	B.Sc.	111(90.2%)	12(9.8%)	123	0.689
	Diploma	79(91.9%)	7(8.1%)	86	
	Col Total	190(90.9%)	19(9.1%)	209	
Years Practicing	<12	98(92.5%)	8(7.5%)	106	0.682
	12+	100(90.9%)	10(9.1%)	110	
	Col Total	198(91.7%)	18(8.3%)	216	
Place of Business	Urban	105(93.8%)	7(6.2%)	112	0.157
	Rural	90(88.2%)	12(11.8%)	102	
	Col Total	195(91.1%)	19(8.9%)	214	

Table 3.9 presents the results of the tests for significance when community pharmacists' level of agreement that DURs will be an important function of the Pharmacy Network were cross-tabulated by the five select demographic variables. A statistically significant difference was found for gender, suggesting that a larger proportion of female pharmacists feel that DURs will be an important function of the Pharmacy Network

Table 3.9

Pharmacists' Perceptions that Drug Utilization Reviews will be an Important Function of the Pharmacy Network, by Select Demographics

Variable	Level	DUR an important function of the Pharmacy Network		Row Total	p-value
		Agree	Do Not Agree		
Age	<37	97(94.2%)	6(5.8%)	103	0.213
	37+	93(89.4%)	11(10.6%)	104	
	Col Total	190(91.8%)	17(8.2%)	207	
Gender	Male	104(86.7%)	16(13.3%)	120	0.045
	Female	91(94.8%)	5(5.2%)	96	
	Col Total	195(90.2%)	21(9.8%)	216	
Education	B.Sc.	109(88.6%)	14(11.4%)	123	0.443
	Diploma	79(91.9%)	7(8.1%)	86	
	Col Total	188(90.0%)	21(10.0%)	209	
Years Practicing	<12	97(91.5%)	9(8.5%)	106	0.702
	12+	99(90.0%)	11(10.0%)	110	
	Col Total	196(90.7%)	20(9.3%)	216	
Place of Business	Urban	104(92.8%)	8(7.2%)	112	0.246
	Rural	90(88.2%)	12(11.8%)	102	
	Col Total	194(90.7%)	19(9.3%)	214	

Table 3.10 presents the results of the tests for significance when community pharmacists' level of agreement that DURs will significantly reduce hospital admissions were cross-tabulated by the five select demographic variables. No statistically significant difference between age groups, gender, education, years practicing or place of business were identified.

Table 3.10

Pharmacists' Perceptions that Drug Utilization Reviews will Significantly Reduce Hospital Admissions, by Select Demographics

Variable	Level	Will significantly reduce hospital admissions		Row Total	p-value
		Agree	Do Not Agree		
Age	<37	84(81.6%)	19(18.5%)	103	0.750
	37+	83(79.8%)	21(20.2%)	104	
	Col Total	167(80.7%)	40(19.3%)	207	
Gender	Male	92(76.7%)	28(23.3%)	120	0.159
	Female	81(84.4%)	15(15.6%)	96	
	Col Total	173(80.1%)	43(19.9%)	216	
Education	B.Sc.	94(76.4%)	29(23.6%)	123	0.199
	Diploma	72(83.7%)	14(16.3%)	86	
	Col Total	166(79.4%)	43(20.6%)	209	
Years Practicing	<12	84(79.2%)	22(20.8%)	106	0.633
	12+	90(81.8%)	20(18.2%)	110	
	Col Total	174(80.6%)	42(19.4%)	216	
Place of Business	Urban	95(84.8%)	17(15.2%)	112	0.086
	Rural	77(75.5%)	25(24.5%)	102	
	Col Total	172(80.4%)	42(19.6%)	214	

Table 3.11 presents the results of the tests for significance when community pharmacists' level of agreement that their clients would value the services they would be able to provide through their use of the Pharmacy Network were cross-tabulated by the five select demographic variables. A statistically significant difference was found between age groups, gender and education, suggesting that a larger proportion of older pharmacists, female pharmacists, and/or pharmacists who graduated with a diploma perceive their clients would value the services they would be able to provide through their use of the Pharmacy Network.

Table 3.11

Pharmacists' Perception that Clients will Value Drug Utilization Review Services, by Select Demographics

Variable	Level	Clients will value DUR services		Row Total	p-value
		Agree	Do Not Agree		
Age	<37	66(64.1%)	37(35.9%)	103	0.043
	37+	80(76.9%)	24(23.1%)	104	
	Col Total	146(70.5%)	61(29.5%)	207	
Gender	Male	74(61.7%)	46(38.3%)	120	0.006
	Female	76(79.2%)	20(20.8%)	96	
	Col Total	150(69.4%)	66(30.6%)	216	
Education	B.Sc.	78(63.4%)	45(36.6%)	123	0.041
	Diploma	66(76.7%)	20(23.3%)	86	
	Col Total	144(68.9%)	65(31.1%)	209	
Years Practicing	<12	69(65.1%)	37(34.9%)	106	0.130
	12+	82(74.5%)	28(25.5%)	110	
	Col Total	151(69.9%)	65(30.1%)	216	
Place of Business	Urban	81(72.3%)	31(27.7%)	112	0.369
	Rural	68(66.7%)	34(33.3%)	102	
	Col Total	149(69.6%)	65(30.4%)	214	

2. Computerized Physician Order Entry

Table 3.12 presents the perceived value to community pharmacists of a Computerized Physician Order Entry (CPOE) function in enhancing patient safety. Approximately two-thirds of respondents agreed that CPOE would be useful by providing default doses for normal conditions, while 71.1% felt there was value in having access to information on medication appropriateness. The majority of respondents agreed the ability to automatically check for dose ceilings (83.1%) and screen for drug interactions (83.7%) were important functions. More than 80% of respondents believed checking on allergy information, having access to complete profiles and providing real time information were valuable tools. The greatest perceived enhancement to patient safety of the CPOE (97.2%) was the removal of problems associated with errors in interpreting physician handwriting.

Table 3.12

Pharmacists' Perception of the Value of Computerized Physician Order Entry
(n=217)

CPOE will enhance Patient safety by:	Total	Level of Agreement				
		Strongly Agree	Somewhat Agree	Neither Agree or Disagree	Somewhat Disagree	Strongly Disagree
Providing default doses	214	41 (19.2)	108 (50.5)	49 (22.9)	11 (5.1)	5 (2.3)
Removing problems with illegible handwriting	215	178 (82.8)	31 (14.4)	3 (1.4)	3 (1.4)	0 (0.0)
Checking dose ceilings	214	60 (28.0)	118 (55.1)	29 (13.6)	5 (2.3)	2 (0.9)
Checking allergy information	215	71 (33.0)	112 (52.1)	21 (9.8)	11 (5.1)	0 (0.0)
Screening for drug interactions	214	84 (39.3)	95 (44.4)	23 (10.7)	11 (5.1)	1 (0.5)
Providing complete profile	213	113 (53.1)	68 (31.9)	23 (10.8)	8 (3.8)	1 (0.5)
Providing real time information	213	74 (34.7)	102 (47.9)	32 (15.0)	4 (1.9)	1 (0.5)
Providing information on medication appropriateness	214	56 (26.2)	97 (45.3)	49 (22.9)	11 (5.1)	1 (0.5)

Table 3.13 presents the results of the tests for significance when community pharmacists' level of agreement that CPOE will result in enhanced safety by providing default doses for normal conditions were cross-tabulated by the select demographic variables. No statistically significant difference between age groups, gender, education, years practicing or place of business were identified.

Table 3.13

Pharmacists' Perception that CPOE will Enhance Patient Safety by Providing Default Doses, by Select Demographics

Variable	Level	Providing default doses for normal conditions		Row Total	p-value
		Agree	Do Not Agree		
Age	<37	74(71.8%)	29(28.2%)	103	0.807
	37+	71(70.3%)	30(29.7%)	101	
	Col Total	145(71.1%)	59(28.9%)	204	
Gender	Male	84(71.2%)	34(28.8%)	118	0.548
	Female	64(67.4%)	31(32.6%)	95	
	Col Total	148(69.5%)	65(30.5%)	213	
Education	B.Sc.	84(68.9%)	38(31.1%)	122	0.880
	Diploma	57(67.9%)	27(32.1%)	84	
	Col Total	141(68.4%)	65(31.5%)	206	
Years Practicing	<12	74(69.8%)	32(30.2%)	106	0.964
	12+	75(70.1%)	32(29.9%)	107	
	Col Total	149(70.0%)	64(30.0%)	213	
Place of Business	Urban	81(73.6%)	29(26.4%)	110	0.145
	Rural	65(64.4%)	36(35.6%)	101	
	Col Total	146(69.2%)	65(30.8%)	211	

Table 3.14 presents the results of the tests for significance when community pharmacists' level of agreement that CPOE will result in enhanced safety by removing problems with illegible handwriting were cross-tabulated by the select demographic variables. A statistically significant difference was found between gender, suggesting that a larger proportion of female pharmacists feel that CPOE will result in enhanced safety by removing problems with illegible handwriting. It should be noted that all 2x2 tables in Table 3.14 had at least one cell where the expected cell count was less than 5, therefore the 2-sided Fisher's exact test was used to determine significance.

Table 3.14

Pharmacists' Perceptions that CPOE will Enhance Patient Safety by Removing Problems with Illegible Handwriting, by Select Demographics

Variable	Level	Removing problems with illegible handwriting		Row Total	p-value
		Agree	Do Not Agree		
Age	<37	102(99.0%)	1(1.0%)	103	0.212*
	37+	98(96.1%)	4(3.9%)	102	
	Col Total	200(97.6%)	5(2.4%)	205	
Gender	Male	102(94.4%)	6(5.6%)	108	0.034*
	Female	96(100.0%)	0(0.0%)	96	
	Col Total	198(92.5%)	6(7.5%)	204	
Education	B.Sc.	118(96.7%)	4(3.3%)	122	1.000*
	Diploma	83(97.6%)	2(2.4%)	85	
	Col Total	201(97.1%)	6(2.9%)	207	
Years Practicing	<12	104(98.1%)	2(1.9%)	106	0.683*
	12+	104(96.2%)	4(3.8%)	108	
	Col Total	208(97.2%)	6(2.8%)	214	
Place of Business	Urban	108(98.2%)	2(1.8%)	110	0.431*
	Rural	98(96.1%)	4(3.9%)	102	
	Col Total	206(97.2%)	6(2.8%)	212	

* 2-Sided Fisher's Exact Test

Table 3.15 presents the results of the tests for significance when community pharmacists' level of agreement that CPOE would enhance patient safety by checking for dose-ceilings were cross-tabulated by the five select demographic variables. There was a statistically significant difference found for years practicing, suggesting that a larger proportion of community pharmacists with 12+ years experience value the function of checking for dose-ceilings than community pharmacists with <12 years experience.

Table 3.15

Pharmacists' Perceptions that CPOE will Enhance Patient Safety by Checking for Dose Ceilings, by Select Demographics

Variable	Level	Checking dose ceilings		Row Total	p-value
		Agree	Do Not Agree		
Age	<37	80(78.4%)	22(21.6%)	102	0.089
	37+	90(87.4%)	13(12.6%)	103	
	Col Total	170(82.9%)	35(17.1%)	205	
Gender	Male	80(85.1%)	14(14.9%)	94	0.487
	Female	97(81.5%)	22(18.5%)	119	
	Col Total	177(83.1%)	36(16.9%)	213	
Education	B.Sc.	96(79.3%)	25(20.7%)	121	0.055
	Diploma	76(89.4%)	9(10.6%)	85	
	Col Total	172(83.5%)	34(16.5%)	206	
Years Practicing	<12	82(78.1%)	23(21.9%)	105	0.034
	12+	96(88.9%)	12(11.1%)	108	
	Col Total	178(83.6%)	35(16.4%)	213	
Place of Business	Urban	90(81.8%)	20(18.2%)	110	0.652
	Rural	85(84.2%)	16(15.8%)	101	
	Col Total	175(82.9%)	36(17.1%)	211	

Table 3.16 presents the results of the tests for significance when community pharmacists' level of agreement that CPOE would enhance patient safety by checking for allergy information were cross-tabulated by the five select demographic variables. No statistically significant difference between age groups, gender, education, years practicing or place of business were identified.

Table 3.16

Pharmacists' Perceptions that CPOE will Enhance Patient Safety by Checking Allergy Information, by Select Demographics

Variable	Level	Checking allergy information		Row Total	p-value
		Agree	Do Not Agree		
Age	<37	88(85.4%)	15(14.6%)	103	1.000
	37+	88(85.4%)	15(14.6%)	103	
	Col Total	176(85.4%)	30(14.6%)	206	
Gender	Male	83(87.4%)	12(12.6%)	95	0.395
	Female	99(83.2%)	20(16.8%)	119	
	Col Total	182(85.0%)	32(15.0%)	214	
Education	B.Sc.	104(85.2%)	18(14.8%)	122	0.737
	Diploma	71(83.5%)	14(16.5%)	85	
	Col Total	175(84.5%)	32(15.5%)	207	
Years Practicing	<12	91(85.8%)	15(14.2%)	106	0.744
	12+	91(84.3%)	17(15.7%)	108	
	Col Total	182(85.0%)	32(15.0%)	214	
Place of Business	Urban	98(89.1%)	12(10.9%)	110	0.112
	Rural	83(81.4%)	19(18.6%)	102	
	Col Total	181(85.4%)	31(14.6%)	212	

Table 3.17 presents the results of the tests for significance when community pharmacists' level of agreement that CPOE would enhance patient safety by screening for drug interactions were cross-tabulated by the five select demographic variables. No statistically significant difference between age groups, gender, education, years practicing or place of business were identified.

Table 3.17

Pharmacists' Perception that CPOE will Enhance Patient Safety by Screening for Drug Interactions, by Select Demographics

Variable	Level	Screening for drug interactions		Row Total	p-value
		Agree	Do Not Agree		
Age	<37	87(85.3%)	15(14.7%)	102	0.869
	37+	87(84.5%)	16(15.5%)	103	
	Col Total	174(84.9%)	31(15.1%)	205	
Gender	Male	98(82.4%)	21(17.6%)	119	0.590
	Female	80(85.1%)	14(14.9%)	94	
	Col Total	178(83.6%)	35(16.4%)	213	
Education	B.Sc.	101(83.5%)	20(16.5%)	121	0.833
	Diploma	70(82.4%)	15(17.6%)	85	
	Col Total	171(83.0%)	35(17.0%)	206	
Years Practicing	<12	87(82.9%)	18(17.1%)	105	0.782
	12+	91(84.3%)	17(15.7%)	108	
	Col Total	178(83.6%)	35(16.4%)	213	
Place of Business	Urban	94(86.2%)	15(13.8%)	109	0.377
	Rural	83(81.4%)	19(18.6%)	102	
	Col Total	177(83.9%)	34(16.1%)	211	

Table 3.18 presents the results of the tests for significance when community pharmacists' level of agreement that CPOE would enhance patient safety by providing a complete patient profile were cross-tabulated by the five select demographic variables. A statistically significant difference was found for place of business, suggesting that a larger proportion of pharmacists who work where there is a high volume of prescriptions dispensed (i.e, urban centres) value a complete patient profile.

Table 3.18

Pharmacists' Perceptions that CPOE will Enhance Patient Safety by Providing a Complete Patient Profile, by Select Demographics

Variable	Level	Providing complete patient profile		Row Total	p-value
		Agree	Do Not Agree		
Age	<37	85(84.2%)	16(15.8%)	101	0.510
	37+	90(87.4%)	13(12.6%)	103	
	Col Total	175(85.8%)	29(14.2%)	204	
Gender	Male	98(83.8%)	19(16.2%)	117	0.605
	Female	82(86.3%)	13(13.7%)	95	
	Col Total	180(84.9%)	32(15.1%)	212	
Education	B.Sc.	101(84.2%)	19(15.8%)	120	0.736
	Diploma	73(85.9%)	12(14.1%)	85	
	Col Total	174(84.9%)	31(15.1%)	205	
Years Practicing	<12	87(83.7%)	17(16.3%)	104	0.617
	12+	93(86.1%)	15(13.9%)	108	
	Col Total	180(84.9%)	32(15.1%)	212	
Place of Business	Urban	98(90.7%)	10(9.3%)	108	0.021
	Rural	81(79.4%)	21(20.6%)	102	
	Col Total	179(85.2%)	31(14.8%)	210	

Table 3.19 presents the results of the tests for significance when community pharmacists' level of agreement that CPOE would enhance patient safety by providing real time information on dose algorithms were cross-tabulated by the five select demographic variables. No statistically significant difference between age groups, gender, education, years practicing or place of business were identified.

Table 3.19

Pharmacists' Perceptions that CPOE will Enhance Patient Safety by Providing Real Time Information, by Select Demographics

Variable	Level	Providing real time information		Row Total	p-value
		Agree	Do Not Agree		
Age	<37	84(82.4%)	18(17.6%)	102	0.707
	37+	86(84.3%)	16(15.7%)	102	
	Col Total	170(83.3%)	34(16.7%)	204	
Gender	Male	97(82.2%)	21(17.8%)	118	0.833
	Female	78(83.0%)	16(17.0%)	94	
	Col Total	175(82.5%)	37(17.5%)	212	
Education	B.Sc.	98(81.0%)	23(19.0%)	121	0.688
	Diploma	70(83.3%)	14(16.7%)	84	
	Col Total	168(82.0%)	37(18.0%)	205	
Years Practicing	<12	86(81.9%)	19(18.1%)	105	0.807
	12+	89(83.2%)	18(16.8%)	107	
	Col Total	175(82.5%)	37(17.5%)	212	
Place of Business	Urban	94(86.2%)	15(13.8%)	109	0.127
	Rural	79(78.2%)	22(11.8%)	101	
	Col Total	173(82.4%)	37(17.6%)	210	

Table 3.20 presents the results of the tests for significance when community pharmacists' level of agreement that CPOE would enhance patient safety by providing information on medication appropriateness were cross-tabulated by the five select demographic variables. A statistically significant difference was found for place of business, suggesting that a larger proportion pharmacists who work where there is a high volume of prescriptions dispensed (i.e., urban centres) value the ability to identify medication appropriateness based on patients medical history.

Table 3.20

Pharmacists' Perception that CPOE will Enhance Patient Safety by Providing Information on Medication Appropriateness, by Select Demographics

Variable	Level	Providing information on medication appropriateness		Row Total	p-value
		Agree	Do Not Agree		
Age	<37	72(70.6%)	30(29.4%)	102	0.609
	37+	76(73.8%)	27(26.2%)	103	
	Col Total	148(72.2%)	57(27.8%)	205	
Gender	Male	71(75.5%)	23(24.5%)	94	0.231
	Female	81(68.1%)	38(31.9%)	119	
	Col Total	152(71.4%)	61(28.6%)	213	
Education	B.Sc.	84(69.4%)	37(30.6%)	121	0.463
	Diploma	63(74.1%)	22(25.9%)	85	
	Col Total	147(71.4%)	59(28.6%)	206	
Years Practicing	<12	74(70.5%)	31(29.5%)	105	0.778
	12+	78(72.2%)	30(27.8%)	108	
	Col Total	152(71.4%)	61(28.6%)	213	
Place of Business	Urban	85(78.0%)	24(22.0%)	109	0.047
	Rural	67(66.7%)	35(33.3%)	102	
	Col Total	152(72.0%)	59(28.0%)	211	

3. Post-Market Surveillance (Adverse Drug Reaction Reporting)

Community pharmacists in this study reported an average of 2.5 adverse drug reactions (ADRs) a year. A statistically significant difference in the average number ADRs reported was found between age groups, gender, education and years practicing, suggesting that a larger proportion of pharmacists who are older, are male, graduated with a Diploma in Pharmacy, and/or have more experience, will report more ADR's.

Table 3.21

Average Number of Adverse Drug Reactions (ADRs) Reported in One Year

Variable	Level	Pharmacists Responding	Mean ADRs Reported	p-value
Age	<37	100	1.3	0.017
	37+	100	3.7	
Gender	Male	117	3.6	0.004
	Female	92	1.0	
Education	B.Sc.	120	1.5	0.030
	Diploma	83	4.0	
Years Practicing	<12	103	1.4	0.025
	12+	106	3.5	
Place of Business	Urban	106	1.9	0.196
	Rural	101	3.1	

The majority of community pharmacists (87.6%) indicated they would report more adverse events if it could be done electronically through the Pharmacy Network. As shown in Table 3.22, there was no statistically significant difference in the perceived potential for increased reporting of ADRs between age groups, gender, education, years practicing, or place of business.

Table 3.22

Pharmacists' Perception of the Likelihood of Reporting More Adverse Drug Reactions if Available Electronically Through the Pharmacy Network, by Select Demographics

Variable	Level	Report more ADRs		Row Total	p-value
		Agree	Do not agree		
Age	<37	93(91.2%)	9(8.8%)	102	0.367
	37+	89(87.3%)	13(12.7%)	102	
	Col Total	182(89.2%)	22(10.8%)	204	
Gender	Male	103(86.5%)	16(13.5%)	119	0.258
	Female	86(91.5%)	8(8.5%)	94	
	Col Total	189(88.7%)	24(11.3%)	213	
Education	B.Sc.	111(91.0%)	11(9.0%)	122	0.156
	Diploma	71(84.5%)	13(15.5%)	84	
	Col Total	182(88.3%)	24(11.7%)	206	
Years Practicing	<12	98(93.3%)	7(6.7%)	105	0.055
	12+	92(85.2%)	16(14.8%)	108	
	Col Total	190(89.2%)	23(10.8%)	213	
Place of Business	Urban	103(92.8%)	8(7.2%)	111	0.070
	Rural	85(85.0%)	15(15.0%)	100	
	Col Total	188(89.1%)	23(10.9%)	211	

4. Prescription Profiling

In order to determine what medications a client is currently receiving, 59.9% of community pharmacists indicated they asked the client, 15.5% asked other health care providers, 12.5% asked members of the clients family, and 11.5% would use their own computer profile. To a lesser extent, community pharmacists would ask the client to bring all current medications into the pharmacy (9.5%).

When asked if they knew the total number of medications that were prescribed to their patients, 34.6% of community pharmacists agreed that they did. As shown in Table 3.23, there was no statistically significant difference in level of agreement that pharmacists' knew the total number of medications that were prescribed to their patients between age groups, gender, education, years practicing, or place of business.

Table 3.23

Pharmacists' Perceived Knowledge of the Total Number of Medications Prescribed to Patients, by Select Demographics

Variable	Level	Know total medications prescribed to patient		Row Total	p-value
		Agree	Do not agree		
Age	<37	32(31.1%)	71(68.9%)	103	0.330
	37+	39(37.5%)	65(62.5%)	104	
	Col Total	71(34.3%)	136(65.7%)	207	
Gender	Male	35(36.4%)	61(63.6%)	96	0.542
	Female	39(32.5%)	81(67.5%)	120	
	Col Total	74(34.3%)	142(65.7%)	216	
Education	B.Sc.	38(30.9%)	85(69.1%)	123	0.261
	Diploma	33(38.4%)	53(61.6%)	86	
	Col Total	71(34.0%)	138(66.0%)	209	
Years Practicing	<12	34(32.1%)	72(67.9%)	106	0.423
	12+	41(37.3%)	69(62.7%)	110	
	Col Total	75(34.7%)	141(65.3%)	216	
Place of Business	Urban	39(34.8%)	73(65.2%)	112	0.942
	Rural	36(35.3%)	66(64.7%)	102	
	Col Total	75(35.0%)	139(65.0%)	214	

Payment for Pharmaceutical Care

Table 3.24 presents the results when pharmacists were asked if they should be reimbursed for 1) providing counseling, 2) monitoring outcomes, 3) identifying medication appropriateness based on a patient's medical history, and 4) working with physicians to ensure the best possible medications are prescribed. The majority (89.3%) agreed they should be compensated for working with physicians in providing the best possible care for the client. There was also considerable agreement that compensation should be provided for monitoring outcomes (88.9%), identifying medication appropriateness (86.6%), and providing counseling (82.8%).

Table 3.24

Pharmacists' Perceptions Regarding Reimbursement, by Type of Pharmaceutical Service Provided
(n=217)

Service	Total Response	Level of Agreement				
		Strongly Agree	Somewhat Agree	Neither Agree or Disagree	Somewhat Disagree	Strongly Disagree
Providing Counseling	216	131 (60.6)	48 (22.2)	23 (10.6)	4 (1.9)	10 (4.6)
Monitoring Outcomes	216	146 (67.6)	46 (21.3)	17 (7.9)	2 (0.9)	5 (2.3)
Medication Appropriateness	216	124 (57.4)	63 (29.2)	18 (8.3)	6 (2.8)	5 (2.3)
Working with Physicians	216	134 (62.0)	59 (27.3)	16 (7.4)	4 (1.9)	3 (1.4)

Table 3.25 presents the results of the tests for significance for community pharmacists' level of agreement that they should be reimbursed for providing counseling, cross-tabulated by the five select demographic variables. A statistically significant difference was found for gender, suggesting that a larger proportion of female pharmacists expect payment for counseling services.

Table 3.25

Pharmacists' Opinion on Whether they Should Receive Payment for Providing Counseling, by Select Demographics

Variable	Level	Providing Counseling		Row Total	p-value
		Yes	No		
Age	<37	89(86.4%)	14(13.6%)	103	0.142
	37+	81(78.6%)	22(21.4%)	103	
	Col Total	170(82.5%)	36(17.5%)	206	
Gender	Male	90(75.6%)	29(24.4%)	119	0.002
	Female	88(91.7%)	8(8.3%)	96	
	Col Total	178(82.8%)	37(17.2%)	215	
Education	B.Sc.	103(84.4%)	19(15.6%)	122	0.720
	Diploma	71(82.6%)	15(17.4%)	86	
	Col Total	174(83.7%)	34(16.3%)	208	
Years Practicing	<12	90(85.7%)	15(14.3%)	105	0.267
	12+	88(80.0%)	22(20.0%)	110	
	Col Total	178(82.8%)	37(17.2%)	215	
Place of Business	Urban	95(85.6%)	16(14.4%)	111	0.312
	Rural	82(80.4%)	20(19.6%)	102	
	Col Total	177(83.1%)	36(16.9%)	213	

Table 3.26 presents the results of the tests for significant difference when community pharmacists' level of agreement that they should be reimbursed for monitoring patient outcomes were cross-tabulated with the five select demographic variables. A statistically significant difference was found for gender, suggesting that a larger proportion of female pharmacists feel they should be reimbursed for monitoring patient outcomes. It should be noted that the gender table in Table 3.26 had one cell where the expected cell count was less than 5, therefore the 2-sided Fisher's exact test was used to determine significance.

Table 3.26

Pharmacists' Opinion on Whether they Should Receive Payment for Monitoring Outcomes by, Select Demographics

Variable	Level	Monitoring Outcomes		Row Total	p-value
		Yes	No		
Age	<37	92(89.3%)	11(10.7%)	103	0.825
	37+	91(88.3%)	12(11.7%)	103	
	Col Total	183(88.8%)	23(11.2%)	206	
Gender	Male	99(83.2%)	20(16.8%)	119	0.004*
	Female	92(95.8%)	4(4.2%)	96	
	Col Total	191(88.8%)	24(11.2%)	215	
Education	B.Sc.	110(90.2%)	12(9.8%)	122	0.503
	Diploma	75(87.2%)	11(12.8%)	86	
	Col Total	185(88.9%)	23(11.1%)	208	
Years Practicing	<12	96(91.4%)	9(8.6%)	105	0.238
	12+	95(86.4%)	15(13.6%)	110	
	Col Total	191(88.8%)	24(11.2%)	215	
Place of Business	Urban	102(91.9%)	9(8.1%)	111	0.128
	Rural	87(85.3%)	15(14.7%)	102	
	Col Total	189(88.7%)	24(11.3%)	213	

* 2-sided Fisher's exact test

Table 3.27 presents the results of the tests for significant difference when community pharmacists' level of agreement that they should be reimbursed for identifying medication appropriateness based on a patient's medical history were cross-tabulated with the five select demographic variables A statistically significant difference was found for age groups, gender, and years practicing suggesting that a larger proportion of younger pharmacists, female pharmacists and/or those pharmacists with less years experience feel they should be reimbursed for identifying medication appropriateness.

Table 3.27

Pharmacists' Opinion on Whether they Should Receive Payment for Identifying Medication Appropriateness, by Select Demographics

Variable	Level	Medication Appropriateness		Row Total	p-value
		Yes	No		
Age	<37	94(91.3%)	9(8.7%)	103	0.042
	37+	84(81.6%)	19(18.4%)	103	
	Col Total	178(86.4%)	28(13.6%)	206	
Gender	Male	96(80.7%)	23(19.3%)	119	0.005
	Female	90(93.8%)	6(6.2%)	96	
	Col Total	186(86.1%)	29(13.9%)	215	
Education	B.Sc.	108(88.5%)	14(11.5%)	122	0.221
	Diploma	71(82.6%)	15(17.4%)	86	
	Col Total	179(86.1%)	29(13.9%)	208	
Years Practicing	<12	96(91.4%)	9(8.6%)	105	0.039
	12+	90(81.8%)	20(18.2%)	110	
	Col Total	186(86.5%)	29(13.5%)	215	
Place of Business	Urban	101(91.0%)	10(9.0%)	111	0.062
	Rural	84(82.4%)	18(17.6%)	102	
	Col Total	185(86.9%)	28(13.1%)	213	

Table 3.28 presents the results of the tests for significant difference when community pharmacists' level of agreement that they should be reimbursed for working with physicians to ensure the best possible medications were cross-tabulated with the five select demographic variables. No statistically significant difference between age groups, gender, education, years practicing or place of business were identified.

Table 3.28

Pharmacists' Opinion on Whether they Should Receive Payment for Working with Physicians, by Select Demographics

Variable	Level	Working with Physicians		Row Total	p-value
		Yes	No		
Age	<37	92(89.3%)	11(10.7%)	103	1.000
	37+	92(89.3%)	11(10.7%)	103	
	Col Total	184(89.3)	22(10.7%)	206	
Gender	Male	102(85.7%)	17(14.3%)	119	0.058
	Female	90(93.4%)	6(6.6%)	96	
	Col Total	192((89.3%)	23(10.7%)	215	
Education	B.Sc.	108(88.5%)	14(11.5%)	122	0.819
	Diploma	77(89.5%)	9(10.5%)	86	
	Col Total	185(88.9%)	23(11.1%)	208	
Years Practicing	<12	95(90.5%)	10(9.5%)	105	0.586
	12+	97(88.2%)	13(11.8%)	110	
	Col Total	192(89.3%)	23(10.7%)	215	
Place of Business	Urban	101(91.0%)	10(9.0%)	111	0.509
	Rural	90(88.2%)	12(11.8%)	102	
	Col Total	191(89.7%)	22(10.3%)	213	

Additional Feedback

When asked about training, 93.1% of community pharmacists agreed that a comprehensive orientation process would be required prior to implementation of the Pharmacy Network (see Table 3.29). A strong majority (95.0%) agreed the Pharmacy Network would benefit their practice, whereas only 65.0% believed it would improve their relationship with physicians. A minority of community pharmacists felt the Pharmacy Network would interfere with customer service (8.3%), while 31.3% believed their dispensary would be too busy to respond to the information available from the Pharmacy Network. Very few community pharmacists (17.2%) felt that the Pharmacy Network would not be relevant to them even if the majority of their clients were regular customers.

Table 3.29

Additional Feedback
(n=217)

Indicator	Total Response	Level of Agreement				
		Strongly Agree	Somewhat Agree	Neither Agree or Disagree	Somewhat Disagree	Strongly Disagree
Orientation required	217	143 (65.9)	59 (27.2)	12 (5.5)	2 (0.9)	1 (0.5)
Benefit practice	217	126 (58.1)	80 (36.9)	10 (4.6)	1 (0.5)	0 (0.0)
Too busy for Pharmacy Network	217	5 (2.3)	63 (29.0)	55 (25.3)	63 (29.0)	31 (14.2)
Not relevant to clients	216	4 (1.9)	33 (15.3)	55 (25.5)	85 (39.4)	39 (18.2)
Improve relationship with physicians	217	42 (19.4)	99 (45.6)	60 (27.6)	14 (6.5)	2 (0.9)
Interfere with service	216	3 (1.4)	15 (6.9)	67 (31.0)	77 (35.6)	54 (25.0)

Table 3.30 presents the results of the tests for significant difference when community pharmacists' level of agreement that a comprehensive orientation process will be required prior to the implementation phase of the pharmacy network were cross-tabulated with the five select demographic variables. No statistically significant difference between age groups, gender, education, years practicing or place of business were identified. It should be noted that the gender table in Table 3.30 had one cell where the expected cell count was less than 5, therefore the 2-sided Fisher's exact test was used to determine significance.

Table 3.30

Pharmacists' Perceptions that an Orientation Process will be Required Prior to Pharmacy Network Implementation, by Select Demographics

Variable	Level	Orientation required		Row Total	p-value
		Yes	No		
Age	<37	97(94.2%)	6(5.8%)	103	0.593
	37+	96(92.3%)	8(7.7%)	104	
	Col Total	193(93.2%)	14(6.8%)	207	
Gender	Male	109(90.8%)	11(9.1%)	120	0.184*
	Female	92(95.8%)	4(4.2%)	96	
	Col Total	201(93.1%)	15(6.9%)	216	
Education	B.Sc.	115(93.5%)	8(6.5%)	123	0.652
	Diploma	79(91.8%)	7(8.2%)	86	
	Col Total	194(92.8%)	15(7.2%)	209	
Years Practicing	<12	101(95.3%)	5(4.7%)	106	0.206
	12+	100(90.9%)	10(9.1%)	110	
	Col Total	201(93.1%)	15(6.9%)	216	
Place of Business	Urban	106(94.6%)	6(5.4%)	112	0.463
	Rural	94(92.2%)	8(7.8%)	102	
	Col Total	200(93.5%)	14(6.5%)	214	

*2-sided Fisher's Exact Test

Table 3.31 presents the results of the tests for significant difference when community pharmacists' level of agreement that the Pharmacy Network would benefit their practice were cross-tabulated with the five select demographic variables. A statistically significant difference was found for gender and place of business, suggesting that a larger proportion of female pharmacists and/or those working in urban locations feel that the Pharmacy Network would benefit their practice. The age, gender, years practicing and place of business tables in Table 3.31 each had one cell where the expected cell count was less than 5, therefore the 2-sided Fisher's exact test was used to determine significance.

Table 3.31

Pharmacists' Perceptions that a Pharmacy Network would Benefit their Practice, by Select Demographics

Variable	Level	Benefit practice		Row Total	p-value
		Yes	No		
Age	<37	100(97.1%)	3(2.9%)	103	0.498*
	37+	98(94.2%)	6(5.8%)	104	
	Col Total	198(95.7%)	9(4.3%)	207	
Gender	Male	110(91.7%)	10(8.3%)	120	0.025*
	Female	95(99.0%)	1(1.0%)	96	
	Col Total	205(94.9%)	11(5.1%)	216	
Education	B.Sc.	118(95.9%)	5(4.1%)	123	0.354
	Diploma	80(93.0%)	6(7.0%)	86	
	Col Total	198(94.7%)	11(5.3%)	209	
Years Practicing	<12	104(98.1%)	2(1.9%)	106	0.102*
	12+	102(92.7%)	8(7.3%)	110	
	Col Total	206(95.4%)	10(4.6%)	216	
Place of Business	Urban	110(98.2%)	2(1.8%)	112	0.028*
	Rural	93(91.2%)	9(8.8%)	102	
	Col Total	203((94.9%)	11(5.1%)	214	

* 2-sided Fisher's Exact test.

Table 3.32 presents the results of the tests for significant difference when community pharmacists' level of agreement that their dispensary would be too busy to respond to the information provided by the Pharmacy Network were cross-tabulated with the five select demographic variables. A statistically significant difference was found for gender, suggesting that a larger proportion of female pharmacists feel that they will be too busy to respond to the Pharmacy Network.

Table 3.32

Pharmacists' Perceptions that the Dispensary will be too Busy to Respond to a Pharmacy Network, by Select Demographics

Variable	Level	Too Busy for Pharmacy Network		Row Total	p-value
		Yes	No		
Age	<37	31(30.1%)	72(69.9%)	103	0.688
	37+	34(32.7%)	70(67.3%)	104	
	Col Total	65(31.4%)	142(68.6%)	207	
Gender	Male	30(25.0%)	90(75.0%)	120	0.022
	Female	38(39.6%)	58(60.4%)	96	
	Col Total	68(31.5%)	148(68.5%)	216	
Education	B.Sc.	36(29.3%)	87(70.7%)	123	0.301
	Diploma	31(36.0%)	55(64.0%)	86	
	Col Total	67(32.1%)	142(67.9%)	209	
Years Practicing	<12	32(30.2%)	74(69.8%)	106	0.688
	12+	36(32.7%)	74(67.3%)	110	
	Col Total	68(31.5%)	148(68.5%)	216	
Place of Business	Urban	36(32.1%)	76(67.9%)	112	0.904
	Rural	32(31.3%)	70(68.7%)	102	
	Col Total	68(31.8%)	146(68.2%)	214	

Table 3.33 presents the results of the tests for significant difference when community pharmacists' level of agreement that the Pharmacy Network would not be relevant to their clients as most would be regular customers, were cross-tabulated with the five select demographic variables. A statistically significant difference was found for education and place of business, suggesting that a larger proportion of pharmacists graduating with a diploma and/or those working in rural areas feel that the Pharmacy Network would not be relevant to their clients, as most would be regular customers.

Table 3.33

Pharmacists' Perceptions that a Pharmacy Network would not be Relevant as all Clients are Regular Customers, by Select Demographics

Variable	Level	Not relevant to clients		Row Total	p-value
		Yes	No		
Age	<37	14(13.7%)	88(86.3%)	102	0.117
	37+	23(22.1%)	81(77.9%)	104	
	Col Total	37(18.0%)	169(82.0%)	206	
Gender	Male	20(16.8%)	99(83.2%)	119	0.862
	Female	17(17.7%)	79(82.3%)	96	
	Col Total	37(17.2%)	178(82.8%)	215	
Education	B.Sc.	15(12.3%)	107(87.7%)	122	0.014
	Diploma	22(25.6%)	64(74.4%)	86	
	Col Total	37(17.8%)	171(82.2%)	208	
Years Practicing	<12	15(14.3%)	90(85.7%)	105	0.267
	12+	22(20.0%)	88(80.0%)	110	
	Col Total	37(17.2%)	178(82.8%)	215	
Place of Business	Urban	12(10.7%)	100(89.3%)	112	0.007
	Rural	25(24.8%)	76(75.2%)	101	
	Col Total	37(17.4%)	176(82.6%)	213	

Table 3.34 presents the results of the tests for significant difference when community pharmacists' level of agreement that the Pharmacy Network would improve their relationship with physicians were cross-tabulated with the five select demographic variables. No statistically significant difference between age groups, gender, education, years practicing or place of business were identified.

Table 3.34

Pharmacists' Perceptions that a Pharmacy Network will Improve Relationship with Physicians, by Select Demographics

Variable	Level	Improve relationship with physicians		Row Total	p-value
		Yes	No		
Age	<37	71(68.9%)	32(31.1%)	103	0.264
	37+	64(61.5%)	40(38.5%)	104	
	Col Total	135(65.2%)	72(34.8%)	207	
Gender	Male	76(63.3%)	44(36.7%)	120	0.610
	Female	64(66.7%)	32(33.3%)	96	
	Col Total	140(64.8%)	76(35.2%)	216	
Education	B.Sc.	82(66.7%)	41(33.3%)	123	0.358
	Diploma	52(60.5%)	34(39.5%)	86	
	Col Total	134(64.1%)	75(35.9%)	209	
Years Practicing	<12	70(66.0%)	36(34..0%)	106	0.818
	12+	71(64.5%)	39(35.5%)	110	
	Col Total	141(65.3%)	75(34.7%)	216	
Place of Business	Urban	79(71.8%)	33(30.0%)	110	0.099
	Rural	61(59.8%)	41(40.2%)	102	
	Col Total	140(65.4%)	74(34.6%)	214	

Table 3.35 presents the results of the tests for significant difference when community pharmacists' level of agreement that the Pharmacy Network would interfere with customer service were cross-tabulated with the five select demographic variables. No statistically significant difference between age groups, gender, education, years practicing or place of business were identified.

Table 3.35

Pharmacists' Perceptions that a Pharmacy Network will Interfere with Customer Service, by Select Demographics

Variable	Level	Interfere with service		Row Total	p-value
		Yes	No		
Age	<37	6(5.8%)	97(94.2%)	103	0.213
	37+	11(10.6%)	93(89.4%)	104	
	Col Total	17(8.2%)	190(91.8%)	207	
Gender	Male	10(8.3%)	110(91.7%)	120	0.982
	Female	8(8.4%)	87(91.5%)	95	
	Col Total	18(8.4%)	197(91.6%)	215	
Education	B.Sc.	9(7.3%)	114(92.7%)	123	0.409
	Diploma	9(10.6%)	76(89.4%)	85	
	Col Total	18(8.7%)	190(91.3%)	208	
Years Practicing	<12	8(7.5%)	98(92.5%)	106	0.667
	12+	10(9.2%)	99(90.8%)	109	
	Col Total	18(8.4%)	197(91.6%)	215	
Place of Business	Urban	10(9.0%)	101(91.0%)	111	0.760
	Rural	8(7.8%)	94(92.2%)	102	
	Col Total	18(8.5%)	195(91.5%)	213	

Response to Open Ended Question

Of the 219 community pharmacists responding to the survey, 58 (26.5%) provided written comments when asked the open ended question "*Are there any other comments you would like to make about your expectations of a Pharmacy Network, and how the Pharmacy Network would impact upon you or your pharmacy*?". A content analysis of these responses using "words" and "themes" as coding units, as per content the methodology described in the Texas State Auditor's Office Methodology Manual (1995), found five common themes: 1) functions of the Pharmacy Network, 2) concerns about privacy and confidentiality, 3) costs associated with Pharmacy Network, 4) change management issues and 5) education and training. A sixth general category provides a summary of comments that did not fit into any of the five identified themes.

1) Functions of the Pharmacy Network

A major function identified by community pharmacists, that was not addressed in the questionnaire, was the ability to have immediate (electronic) submission of claims for prescriptions filled for clients covered under the Newfoundland and Labrador Prescription Drug Program (NLPDP). The NLPDP is the provincial government drug program that provides prescription drug coverage to low-income residents of the Province. The time currently required by community pharmacists to prepare, submit and receive payment for claims for NLPDP clients is felt to be considerable. It was also noted

that by providing an immediate adjudication function, special authorizations would be approved in a more timely manner for NLPDP clients.

The implementation of a pharmacy network was also perceived as a means for addressing the problems associated with patients getting prescriptions from more than one doctor (double-doctoring), or patients getting prescriptions filled at more than one pharmacy (pharmacy shopping). In particular, the monitoring of double-doctoring through real time DURs was thought to be one way to reduce the abuse of prescription narcotics.

Community pharmacists identified the value of including over the counter drugs (OTC's) in the patient profile. However it was also felt that the responsibility for capturing OTC information in the Pharmacy Network should fall to physicians.

2) Privacy and Confidentiality

The potential for abuse of the client's rights to privacy was of considerable concern to community pharmacists. Many respondents felt the Pharmacy Network should be used only as a tool by health professionals for the overall benefit of their patients. The Pharmacy Network should not be used by governments or insurance companies to identify patients who do not fit into what would be considered "normal" patterns of drug utilization; nor should it be used by large drug companies for marketing purposes. Several respondents, while expressing strong support for the Pharmacy Network, felt negative public opinion about a patient's right to privacy would prevent it from being implemented. Others felt privacy concerns could be addressed through appropriate

security measures and by following stringent rules regarding access to personal information.

3. Cost

Several issues concerning costs related to the Pharmacy Network were expressed. Many pharmacists believe they should not incur the costs for any software, hardware or training needed to connect to the Pharmacy Network. Several pharmacists indicated they might be forced to close if they are made to pick up the costs associated with accessing the Pharmacy Network. The Provincial Prescription Monitoring Program (PMP) was cited as one example where government-imposed programs that add costs to pharmacies are unlikely to succeed[1]. Others questioned who would pay for building the Pharmacy Network, and whether any portion of the savings resulting from better utilization of prescription drugs would be funneled back to pharmacists. If no additional payments are forthcoming, dispensing fees would need to be significantly increased to compensate for the provision of enhanced services.

[1]The PMP was set up by the Provincial Government to monitor utilization of prescriptions filled for drugs having a high potential for abuse and was later canceled.

4. Change Management

Enhanced services that would be available through the Pharmacy Network raised several change management issues among community pharmacists. Considerable time is currently spent filling and dispensing prescriptions, and unless the Pharmacy Network reduces this time, pharmacists feel they will not have time to use the Pharmacy Network. Generally, pharmacists are paid for filling prescriptions, and it would be unrealistic to expect them to enter additional data required for the Pharmacy Network without receiving additional compensation. This was believed to be a potential obstacle to realizing the full benefits of the Pharmacy Network. The additional time entering data would also take away from the time pharmacists currently spend counseling their patients. The process of accessing the Pharmacy Network for each new prescription would also consume considerable time, especially in pharmacies that deal with large volumes of prescriptions. However, it was noted that the perceived problems of additional workload could be addressed by developing a Pharmacy Network that is fast, efficient and 'extremely' user friendly.

The cooperation of physicians was also seen as a change management issue. If physicians do not welcome the input of pharmacists, and make themselves available for consultation, then the benefits of the Pharmacy Network will be substantially compromised.

5. Education and Training

Pharmacists felt they would require considerable training with respect to how to use the Pharmacy Network prior to its implementation. Education of the public was also seen as a critical success factor, so that the public could see pharmacists as professional people who do more than move pills from one bottle to another.

6. General

The majority of comments provided by community pharmacists were in support of the Pharmacy Network. The focus on safety, enhanced patient outcomes and better utilization of scarce health care dollars were seen as just a few of the benefits to individual patients and to the province overall. A small minority (3.4%) felt the Pharmacy Network was a waste of time and that it would never work (e.g., "Another make work program!!"). Those opposing the development of the Pharmacy Network provided no specific reasons why they felt the Pharmacy Network would not be successful.

CHAPTER IV

DISCUSSION OF RESULTS

A discussion of the results summarizing community pharmacists' perceptions of 1) drug utilization reviews, 2) computerized physician order entry, 3) post-market surveillance, 4) prescription profiling, 5) pharmaceutical care, and 6) payment for providing pharmaceutical care services is provided. Statistically significant differences in community pharmacists' perceptions when compared across age groups, gender, education, years practicing and place of business are also discussed (see Table 4.1).

Table 4.1

Summary of Tests for Significance

Function	Demographic	Measure	p-value
DUR	Age	Clients will value DUR services	0.043
	Gender	DUR an Important Function of the Pharmacy Network	0.045
	Gender	Clients will value DUR services	0.006
	Education	Clients will value DUR services	0.041
CPOE	Gender	Removing problems with illegible handwriting	0.034*
	Years Practicing	Checking dose ceilings	0.034
	Place of Business	Providing complete patient profile	0.021
	Place of Business	Providing information on medication appropriateness	0.047
Payment for Cognitive Services	Age	Medication Appropriateness	0.042
	Gender	Providing Counseling	0.002
	Gender	Monitoring Outcomes	0.004*
	Gender	Medication Appropriateness	0.005
	Years Practicing	Medication Appropriateness	0.039
Additional Feedback	Gender	Benefit Practice	0.025*
	Gender	To Busy for Pharmacy Network	0.022
	Education	Not Relevant to Clients	0.014
	Place of Business	Benefit Practice	0.028*
	Place of Business	Not Relevant to Clients	0.007

* 2-sided Fisher's exact tests

1) Perceived Value of Drug Utilization Reviews

The findings of this study indicate that community pharmacists believe drug utilization reviews (DURs) would prove valuable in delivering enhanced patient care. Of the five measures related to DURs, three were strongly supported (> 80% agreement): the need for complete medication profiles, reduced prescribing problems and reduced hospital admissions. To a lesser extent (69.6%), community pharmacists believed DUR functions would be valued by their clients. Overall, 90.3% of community pharmacists agreed DURs would be an important function of the Pharmacy Network.

The availability of a complete medication profile in performing DURs is core to a Pharmacy Network. However, if a pharmacist believes that his/her clients are regular customers and only have their prescriptions filled at their store, it would be expected that the value of the DUR function would diminish. Only 17.2% of pharmacists in this study indicated that they felt the Pharmacy Network would not be relevant to their clients as most of them are regular customers. This result is similar to the findings of Kozyrskyi, et al., (1998) who found 13.5% of pharmacists agreed that the DPIN was not relevant to their clients as most were regular customers. It is interesting to note that of those pharmacists who felt the Pharmacy Network would not be relevant (n = 37), 89.2% still agreed that DURs will be an important function of the Pharmacy Network.

Over 90% of community pharmacists in this present study agreed that DURs would reduce prescribing problems. The benefit of DURs in reducing prescribing problems is widely accepted. Armstrong & Denemark (1998) investigated 807,017

claims that resulted in 83,260 DUR alerts. Almost 21% of these 83,260 prescriptions were not dispensed because of the DUR message alerting the pharmacists to a potential problem. A study by Armstrong and Markson (1997) found that pharmacists valued DUR alerts which identified medication overuse and drug interactions.

This study found that over 80% of community pharmacists felt DURs, based on all prescriptions prescribed, would significantly reduce hospital admissions. Hospitalization due to adverse drug reactions is a common occurrence in today's society. A study by Moore, et al., (1998) found that 6.6% of hospitalized patients had significant ADRs, and that between 5% and 9% of hospital costs were related to ADRs. Green, et al., (2000) found that ADRs were responsible for 7.5% of all hospital admissions, and that the actual number of ADR admissions may have increased in recent years.

As expected, there was no significant difference across age groups in the level of agreement of community pharmacists in the value of DURs that access a complete patient profile, reduce prescribing problems, or reduce hospital admissions. An incomplete medication profile would result in an incomplete DUR, and pharmacists, regardless of age, recognized that not having all prescription information for a patient when carrying out DURs would limit its value. A significant difference was found between younger and older age groups when pharmacists were asked if they felt that their clients would value DURs (64.1% versus 76.9%). These percentages are still higher than what was found in the post-implementation study by Kozyrskyi, et al., (1998), where only 58.6% of pharmacists felt clients value the drug monitoring services they provide through the use of

the DPIN. It is most notable that here too, the majority of pharmacists felt that their clients would value DUR.

Although not statistically significant, younger pharmacists in this study tended to agree more than their older colleagues that DURs would reduce prescribing problems and hospital admissions, and that overall the DUR function would be an important function of the Pharmacy Network. Younger pharmacists in this study were introduced to technology much earlier in their careers and may more readily except the benefits of technology in their profession. Older pharmacists, who have carried out DURs manually for the better part of their careers, may not have the same level of confidence in current technology. While these results are not conclusive, they are similar to an earlier study by Simpson & and Kenrick (1997) which found that younger nurses had more positive computer-related attitudes than their older colleagues.

In comparing the perceived value of DURs across age groups an interesting paradox has emerged; younger pharmacists appear to support the value of a DUR function more so than their older colleagues, however it is the older pharmacists who feel more strongly that their patients will value the services provided through the DUR function. Older pharmacists, while not fully accepting electronic DURs, may still feel that their clients have a higher comfort level with technology in the pharmacy.

In comparing the perceived value of a DUR function across gender it was found that the females' level of agreement was higher than that of males for all DUR measures, although only two were statistically significant: that their clients would value DUR services, and that the DUR function would be an important function of the Pharmacy

Network. Females in this study were found to be generally younger than male pharmacists (34.7 years versus 41.6 years), work in a chain store (71.9% versus 61.7%), and work at a pharmacy in an urban community (59.0% versus 47.5%). Given these demographic characteristics, it is reasonable to assume that a larger proportion female pharmacists in this study worked in pharmacies where large volumes of prescriptions are filled, and would rely more on technology in their day-to-day work activities. These findings should not lead one to conclude that female pharmacists in this study are more supportive of technology in general, or for DUR functions in particular. Although research from the 1980s tended to support the hypothesis that males had more positive attitudes than females with respect to computer technology (Ray, Sormunen & Harris, 1999), more recent studies have found gender not to be correlated with computer attitudes (Brown & Coney, 1994; Shaw & Gant, 2002).

In comparing the differences in perceived value of DUR measures across education, more pharmacists with a diploma felt their clients would value DUR services. A possible reason for this difference in agreement between education levels is that pharmacists with a diploma had more years experience (25.0 versus 7.1), than those pharmacists with a B.Sc.. It may be that as a pharmacist gains experience, they build up a relationship with many of their clients, and as a result of this relationship they are comfortable in providing regular DUR services, which are in turn appreciated by the client.

In summary, the perceived value of a DUR function was high among pharmacists in this study. Differences in the perceived value of a DUR function were primarily found

between age groups, suggesting that a larger proportion of younger pharmacists agree the DUR function would be valuable to pharmacists, whereas a larger proportion of older pharmacists feel their clients will value the DUR function.

2) Perceived Value of Computerized Physician Order Entry

Of the eight Computerized Physician Order Entry (CPOE) measures in this study, six were strongly supported (> 80% agreement) by community pharmacists. These included: removing problems with illegible handwriting, checking dose-ceilings, checking allergy information, screening for drug interactions, providing complete patient profiles, and providing real time information on dose algorithms. Providing information on medication appropriateness (71.5%) and default doses for normal conditions (69.6%) received somewhat less support. The CPOE function that received the strongest support was removing problems with illegible handwriting (97.2%), which is not surprising. The ability of CPOE to remove problems with illegible handwriting and ensure that the medication order is complete and unambiguous is widely accepted (Bates, et al., 1999; Ferren, 2002; Foster & Antonelli, 2002).

CPOE has also been shown to enhance patient safety by providing clinical guidelines and alerts for default dosages for normal conditions. For example, if a patient is prescribed too much, or too strong a dose of a medication than would be normally provided to a similar patient, the CPOE would send an alert to the pharmacist. This is of particular benefit to pediatric patients, where medication errors occur at similar rates to

that of adults but are three times more likely to cause harm (Fortescue, et al., 2003). Kaushal, Barker & Bates (2001) concluded that the benefits of CPOE may be even greater in the pediatric population given the need for dosages to be weight-based.

The perceived value of CPOE by community pharmacists in enhancing patient safety through the provision of default doses (69.7%) and dose ceilings (73.1%) was evident in this study. A majority of community pharmacists in this study also agreed that CPOE would enhance patient safety by checking for allergy information (85.1%) and screening for drug interactions (83.7%). Kozyrskyj, et al., (1998) found that 58.6% of community pharmacists surveyed agreed the DPIN enhanced their ability to identify drug-related problems for clients.

There was no significant difference across age groups or education in community pharmacists' level of agreement for any of the eight CPOE measures. With respect to gender the only significant difference found was the ability of CPOE to remove problems with illegible handwriting. While female pharmacists may be more comfortable in utilizing technology to replace paper prescriptions, it should be noted that the value of CPOE to remove problems with illegible hand writing was high for both males and females (94.4% versus 100.0%). When measures of CPOE were compared across the number of years practicing, a statistically significant difference was found between community pharmacists with < 12 and 12+ years experience regarding the ability of CPOE to check for dosage ceilings (78.1% versus 88.9%). That a larger proportion of pharmacists with 12+ years experience valued the function of checking for dose ceilings

may be because these pharmacists have more experience with adverse drug reactions caused by improper medication dosage.

Place of business was found to be significant for two measures of CPOE; providing a complete patient profile (urban 90.7% versus rural 79.4%) and providing information on medication appropriateness (urban 78.0% versus rural 66.7%). Differences in the value of CPOE in providing a complete patient profile may be the result of pharmacists in urban areas relying more on technology, as they generally fill higher volumes of prescriptions than pharmacists working in rural communities. Urban areas also provide many options for clients when they wish to have a prescription filled, which would result in a dispersed/fragmented medication profile. Clients in rural areas would tend to have limited options as there may be only one pharmacy serving the community.

Although there is considerable research identifying the benefits of CPOE, the costs for such systems are substantial both in terms of technology and organizational restructuring (Kuperman & Gibson, 2003). It will be critical that physicians and pharmacists in Newfoundland and Labrador are provided with appropriate training in CPOE prior to its implementation if the full benefits of CPOE are to be realized.

3) Perceived Value of Post-Market Surveillance (Adverse Drug Reaction Reporting)

Community pharmacists in this study reported an average of 2.5 ADRs a year, with male pharmacists reporting more than 3 times as many ADRs as female pharmacists.

Pharmacists 37 years of age and older, had obtained a diploma, and/or were practicing 12 or more years reported almost 3 times as many ADRs as those under 37 years of age, graduated with a B.Sc., and/or were practicing less than 12 years. As previously discussed males in this study were generally older than female pharmacists, work as an independent, and work in a pharmacy located in a rural community. Given this, a larger proportion male pharmacists in this study may work in pharmacies where smaller volumes of prescriptions are filled, and subsequently would have more time to complete reports on ADRs, which is currently a manual (and time consuming) process. Another possible explanation for the higher reporting of ADRs by males in this study is that by working in rural communities these pharmacists may have more interaction with their clients and from this interaction, become more aware of adverse drug reactions than pharmacists working in high volume urban pharmacies. Although pharmacists in rural communities were found to report more ADRs than pharmacists in urban communities (3.1 versus 1.9), this difference was not statistically significant.

In Canada, suspected ADRs are reported to Health Canada, while in the US, reports are forwarded to the Food and Drug Administration (FDA). Health Canada received a total of 8,566 reports of suspected ADRs from all provinces in 2002. These reports were provided mainly by pharmacists, physicians, nurses, dentists and coroners (Health Canada, Canadian Adverse Reaction Newsletter, Vol 13, No. 2: April 2003). In a post-marketing surveillance study by Roeser & Rohan (1990) it was estimated that 50% of all ADR reports are submitted by hospitals and the remaining by physicians, dentists and pharmacists. A total 513 ADRs were reported by the 210 community pharmacists

responding to this question (7 did not answer this question). However, it is not known if pharmacists in this study reported all these 513 ADRs to Health Canada. The question asked only the average number of ADRs reported in one year and it is possible that community pharmacists in this study also included the reporting of suspected ADRs to the prescribing physician or other health professionals in the 513 ADRs reported.

Although the value of reporting adverse drug reactions in a population is widely accepted, the usefulness of available information is limited due to substantial underreporting (Heeley, et al., 2001; Hasford, Goettler, Munter & Muller-Oerlinghausen, 2002; Eland, et al., 1999). It has been estimated that only 10% of ADRs are self-reported. The main reasons given by health professionals for not reporting ADRs include: uncertainty of causation, the ADR being trivial or too well known, not aware of need to report, did not know how to report, or were too busy (Eland, et al., 1999; Hansford, et al., 2002). Community pharmacists responding to this survey reported, on average, less than 3 adverse drug events a year, although the majority indicated that they would report more ADRs if it could be done electronically through the Pharmacy Network. It is assumed that the potential for increased reporting through the Pharmacy Network is due in large part to the reporting being carried out electronically, rather than the current process which is manual, and labour intensive. While pharmacists in this study have indicated they would increase reporting through the Pharmacy Network, there are still a considerable number (31.3%) who feel their dispensary will be too busy to respond to information provided through the Pharmacy Network.

The need for the Pharmacy Network to be user friendly was a major requirement expressed by pharmacists. If the network is difficult to use, it will not free up time, and pharmacists will not use it. This concern is evident by 89.3% of community pharmacists in this study indicating that a comprehensive orientation to the Pharmacy Network is required prior to its implementation. Extensive pre-implementation training was also found to be critical in the study by Kozyrskyj, et al., (1998), where only 42.3% of pharmacists felt the implementation phase allowed for sufficient orientation on to how to use the DPIN in Manitoba.

4) Perceived Value of Prescription Profiling

In the absence of a Pharmacy Network, the majority of community pharmacists (59.9%) ask the patient what medications they are currently receiving. Other methods to obtain medication profiles included asking other health professionals (15.5%), asking members of the patient's family (12.5%), using the computer profile in that specific store (11.5%), and asking the client to bring all current medications into the pharmacy (9.5%).

It is interesting to note that 11.5% of pharmacists would use still their computer profile even if it would only provide those medications dispensed in their own pharmacy. Given the hypothesis that rural pharmacists would be more confident than urban pharmacists that their clients did not 'pharmacy shop', it would be expected that rural pharmacists would rely more on their computer profiles than urban pharmacists. This was

in fact the case, with rural pharmacists checking their computer profile almost twice as frequently as urban pharmacists (15.7% versus 8.0%).

In the absence of a Pharmacy Network, 34.6% of community pharmacists in this study were still confident that they knew the total number of medications their clients were prescribed. The hypothesis that pharmacists operating in smaller communities would be more confident in having a complete patient profile, given their patients limited choices for filling prescriptions, was not supported by the results. There was no measurable difference in pharmacist's level of confidence that they had a complete profile of their patient's medications for pharmacists working in either urban (34.8%) or rural (35.3%) Newfoundland and Labrador.

5) Pharmaceutical Care

Pharmaceutical care can be broadly defined as the responsible provision of drug therapy for the purpose of achieving definite outcomes that improves a patient's quality of life (Crealey, Sturgess, McElnay & Hughes, 2003). This study, while not specifically addressing the role of pharmacists in the delivery of pharmaceutical care, did find strong support from community pharmacists for functions proposed for the Newfoundland and Labrador Pharmacy Network that would support the delivery of these enhanced services.

The functions of drug utilization review (90.3%), computerized physician order entry (82.2%) and electronic reporting of adverse drug events (87.6%) were strongly supported by community pharmacists in this study. While the ability for community

pharmacists to access more comprehensive medication information is essential, patient care would be greatly enhanced when the pharmacist is made part of the patient's care management team. In working with physicians and other health care professionals the continuum of patient care is maximized (Hassell, Noyce, Rogers, Harris & Wilkinson, 1997).

There is some resistance from the physician community in expanding the role of pharmacists in the delivery of patient care. A study by Bailie & Romeo, (1996) found that physicians agreed that pharmacists should report adverse drug reactions and advise them about cost-effective prescribing, but there was little support for pharmacists providing screening services or dispensing antibiotics for minor aliments (such as a sore throat) without a prescription. The provision of enhanced pharmaceutical care by community pharmacists in Newfoundland and Labrador will be possible when the Pharmacy Network is implemented. However communication links between pharmacists and physicians will need to be better established if this continuum of patient care is to be realized. This study found that only 65.0% of community pharmacists agreed the Pharmacy Network would improve their relationship with physicians, suggesting there is some hesitation on the part of pharmacists that physicians will accept their expanded role in delivering enhanced patient care. In comparison, Kozyrskyi, et al., (1998) found that 44.1% of pharmacists agreed that the DPIN had improved their relationship with physicians, while 28.8% felt physicians were not receptive to pharmacist interventions.

While the role that community pharmacists in Newfoundland and Labrador will play in the patient's care management team has yet to be defined, the majority (94.9%) of

community pharmacists in this study agreed the Pharmacy Network would benefit their practice. This level of agreement is somewhat higher than found in the Kozyrskyj, et al., (1998) study, where 79.3% of pharmacists indicated that their initial expectations were that the DPIN would benefit their practice. After working with the DPIN for a period of time this agreement increased slightly to 80.2%.

As discussed previously, the benefits of the Pharmacy Network to both pharmacists and clients will be maximized only if it is easy to use, and frees up time for the pharmacists to deliver services other than dispensing medications. In this respect, the expectation of pharmacists for the Pharmacy Network is high, with only 8.3% indicating that they felt it would interfere with customer service. With such high expectations, it will be critical that the Pharmacy Network in Newfoundland and Labrador achieves this goal, given in Manitoba, Kozyrskyj, et al., (1998) found 28.8% of pharmacists felt the DPIN has interfered with customer service.

6) Payment for Pharmaceutical Care

Community pharmacists were asked whether they should be reimbursed for specific pharmaceutical services. Providing counseling services (82.9%), monitoring patient outcomes (88.9%), identifying medication appropriateness based on a patient's medical history (86.6%) and working with physicians to ensure the best possible medications are prescribed (89.4%), were all services for which the majority of pharmacists agreed they should be compensated.

When broken out by gender, it was found that female pharmacists were more supportive of payments for pharmaceutical care than their male colleagues. Female pharmacists in this study were generally younger and perhaps more comfortable in using technology to provide enhanced patient care. However, they expect to be appropriately reimbursed for these services. Conversely, male pharmacists were generally older, and may feel that these services have always been provided to patients at no cost, and that the implementation of a Pharmacy Network would not change the way they have always provided client services.

As a supplement to survey data collected for this study, provincial pharmacy associations across Canada were contacted by the researcher and asked if and how community pharmacists were compensated for pharmaceutical care services. Of those jurisdictions responding, PEI, Ontario, New Brunswick and Newfoundland and Labrador appear not to provide payments for any pharmaceutical care services, Nova Scotia, Manitoba and Saskatchewan will pay for some services, while British Columbia and Quebec have comprehensive payment programs in place for community pharmacists. In July 2003, the Ontario government announced a $3-million pilot project to reimburse pharmacists for giving patient advice and working closer with doctors. Remuneration for community pharmacists has always been tied to the dispensing of medications and it is felt this pilot will move pharmacists into the area of pharmaceutical care (Canada.com News, July 4, 2003)

A study by Miller & Ortmeier (1995) of 590 community pharmacies in the US found that financial incentives were the most important motivators in providing

pharmacy services. If the Newfoundland and Labrador government does not provide financial incentives to community pharmacists, it is unlikely that pharmaceutical care services will increase to any degree as a result of the Pharmacy Network. In Manitoba, Kozyrskyj, et al., (1998) found 74.6% of pharmacists surveyed agreed a potential problem was that they were not reimbursed for the services they provide as a result of DPIN

An earlier study by Zelnio, Nelson Jr & Beno (1984) found that community pharmacists were more likely to provide pharmaceutical services if they held advanced degrees, or were involved in continuing education. The study also found that confidence in providing pharmaceutical services increased with increased education and/or training. This may have implications in this province as it is only since 1990 that a B.Sc. was offered in pharmacy at Memorial University, and up to December 2002, only 194 of community pharmacists in the province (41%) had graduated from this program.

Consideration must also be given to how busy a pharmacist is when determining the level of pharmaceutical care that may be provided. A study by Christensen & Hansen (1999) found that the performance of pharmaceutical care was strongly affected by practice setting and volume of prescriptions dispensed. In this study only 8.3% of community pharmacists felt the additional information provided through the Pharmacy Network would interfere with customer service, whereas 31.3% felt their dispensary would be too busy to respond to information provided by the Pharmacy Network. Community pharmacists, while valuing the information provided through a pharmacy network, may not have time to take advantage of the additional information that will be available. However, given the appropriate financial incentives, the delivery of

pharmaceutical care services may become readily accepted in Newfoundland and Labrador's community pharmacies.

Limitations of the Study

The limitations of the study included:

1) A relatively low response rate to the survey (49.9%) which resulted in a potentially non-random sample. Due to a lack of demographic information available on the population of community pharmacists in the province, the investigator was unable to confirm that the sample is representative of all community pharmacists in the province;
2) A Type II error may have been introduced as a result of making multiple comparisons. The decision to analyze the survey data using univariate techniques limits the conclusions one can draw from the results. A multivariate approach would have identified predictors of whether a community pharmacist supports various functions of the Pharmacy Network;
3) While the focus of this study was on community pharmacists perceived value of a Pharmacy Network pre-implementation, it is recognized that a fully function Pharmacy Network would also include linkages to physician offices and hospital pharmacies and emergency rooms. A more comprehensive measure of perceived value would need to include these other stakeholder groups;

4) As this was a study of the perceived value of a pharmacy network before it is implemented, it is possible that the results are biased by socially desirable responses; and

5) The questionnaire was designed by the investigator and was not extensively tested for reliability and validity.

CHAPTER V

Summary, Recommendations and Conclusions

Summary

Recent advances in technology now provide community pharmacists an opportunity to deliver enhanced patient care. With the implementation of the Pharmacy Network in Newfoundland and Labrador community pharmacists will be able to carry out comprehensive drug utilization reviews (DURs), access a patient's complete medication profile, report adverse drug reactions (ADRs) more efficiently, and improve patient safety through access to computerized physician order entry (CPOE).

This study was carried out to: (1) measure the perceived value to community pharmacists of specific role enhancements as a result of implementing the Pharmacy Network; (2) measure the perceived impact that changes in business practices will have on community pharmacists as a result of the Pharmacy Network; and (3) identify key functions of the Pharmacy Network, and determine the perceived benefit to community pharmacists of these functions.

The setting for the study was all 171 chain and independent community pharmacies operating in the province at the time of the study. All 435 community pharmacists working in these pharmacies were mailed a survey package, with 219 responding, 217 of which were included in the quantitative analysis of the findings.

Data was collected through a questionnaire developed by the investigator with results presented as descriptive statistics. Demographic information was presented which

described the sample with respect to age, gender, education and work environment. Using a five-point Likert scale, the perceived value of drug utilization reviews, prescription profiling, physician order entry and adverse drug reaction reporting were measured. The expectations of community pharmacists to deliver and be remunerated for providing pharmaceutical services was also measured.

The findings of this study indicate that community pharmacists strongly support the functions proposed for the Newfoundland and Labrador Pharmacy Network. Community pharmacists felt DURs would prove valuable in delivering enhanced patient care. Access to complete medication profiles in support of DURs would reduce prescribing problems and subsequent hospital admissions. To a lesser extent, community pharmacists believed DUR functions would be valued by their clients.

The Pharmacy Network is expected to address the current process of reporting ADRs, which at present is very time consuming. There was strong support for the CPOE function mainly because it would remove problems with illegible handwriting. Providing information on medication appropriateness and default doses for normal conditions received somewhat less support.

Through having access to comprehensive patient drug information, and working in partnership with other health care professionals, community pharmacists would contribute to improved patient outcomes, while at the same time advancing their role from one of only dispensing medications to one where a complete set of pharmaceutical services are provided.

Realizing this enhanced role of community pharmacists will not be without its challenges. Moving from a business model where dispensing medications is the primary means for generating revenue, to one where payment (and therefore income) is provided for the delivery of pharmaceutical care, will require support from government, other health professionals and the general public.

Implications for Future Research

This study provided important baseline information about community pharmacists' expectations of a pharmacy network pre-implementation, and is the only known study of its kind. The sample frame was limited to community pharmacists and had only a modest response rate. Consideration should be given to duplicating the study in another jurisdiction with a) more intense efforts to achieve a higher response rate; b) inclusion of hospital pharmacists and physicians and c) development of a more specific measure for ADR reporting.

In addition, a follow-up post-implementation study should be conducted to determine the change in expectations of a pharmacy network once community pharmacists have had experience with it.

Conclusion

The results of this original study indicate strong support for and high perceived value by community pharmacists for the enhanced care that they would be able to provide once the Pharmacy Network is implemented. It is important to duplicate this study in other settings to determine if these findings are robust across jurisdictions, and to compare these findings with studies conducted post-implementation of a pharmacy network.

Reference List

Abookire S.A., Teich J.M., Sandige H., Paterno M.D., Martin M.T., Kuperman G.J. & Bates D.W. (2000). Improving allergy alerting in a computerized physician order entry system. American Medical Informatics Association, 2-6.

Akl A.I., Sobh M.A., Enab Y.M. & Tattersall J. (2001). Artificial intelligence: a new approach for prescription monitoring of hemodialysis therapy. American Journal of Kidney Disease, 38(6), 1277-83

Ajayi F.O., Sun H. & Perry J. (2000). Adverse drug reactions: a review of relevant factors. Journal of Clinical Pharmacology, 40(10), 1093-101.

Al-Shaqha W.M. & Zairi M. (2001). Pharmaceutical care management: a modern approach to providing seamless and integrated health care. International Journal of Health Care Quality Assurance, 14(6-7), 282-301.

Amsler M.R., Murray M.D., Tierney W.M., Brewer N., Harris L.E., Marrero D.G. & Weinberger M. (2001). Pharmaceutical care in chain pharmacies: beliefs and attitudes of pharmacists and patients. Journal of American Pharmacy Association (Wash), 41(6), 850-5.

Armstrong E.P. & Denemark C.R. (1998). How Pharmacists respond to online, real-time DUR alerts. Journal of American Pharmaceutical Association, 38, 149-54.

Armstrong E.P. & Markson T.J. (1997). On-line DUR Messages: Pharmacists attitudes and actions in Response. Journal of American Pharmaceutical Association, Vol. NS37, No. 3.

Babb V.J. & Babb J. (2003) Pharmacists involvement in Healthy People 2010. Journal of American Pharmacy Association (Wash), 43(1), 56-60.

Bailie G.R. & Romeo B. (1996). New York State primary care physicians' attitudes to community pharmacists' clinical services. Archives of Internal Medicine, 156(13), 1437-41.

Bates D.W., Cullen D.J., Laird N., Pertersen L.A., Small S.D., Servi D., Laffel G., Sweitzer B.J. Shea B.F., Hallisey R., et al. (1995). Incidence of adverse drug events and potential adverse drug events. Implications for prevention. ADE prevention study group. The Journal of the American Medical Association, 274(1), 29-34.

Bates D.W., Leape L.L., Cullen D.J., Laird N., Petersen L.A., Teich J.M., Burdick E., Hickey M., Kleefield S., Shea B., Vliet MV & Seger D.L. (1998). Effect of Computerized Physician Order Entry and a team intervention on prevention of serious medication errors. Journal of American Medical Association, Vol 280, No 15.

Bates D.W., Teich J.M., Lee J., Seger D., Kuperman G.J., Ma'Luf N., Boyle D. & Leape L. (1999). The impact of computerized physician order entry on medication error prevention. The Journal of American Medical Informatics Association, 6(4), 313-321.

Bennett M.S., Blank D., Bopp J., James J.A. & Osterhaus M.C. (2000) Strategies to improve compensation for pharmaceutical services. Journal of American Pharmacy Association (Wash), 40(6), 747-55.

Bizvoi K.E., Beckley B.E., McDade M.C., Adams A.L., Lowe R.A., Zechnich A.D. & Hedges JR. (2002). The effect of computer-assisted prescription writing on emergency department prescription errors. Academic Emergency Medicine, 9(11), 1168-75.

Birkmeyer C.M., Lee J., Bates D.W. & Bickmeyer J.D. (2002). Will electronic order entry reduce health care costs? American College of Physicians, March/April.

Boyd I.W. (2002). The role of Australian Adverse Drug Reactions Advisory Committee (ADRAC) in monitoring drug safety. Toxicology, Dec 27, 181-82: 99-102.

Briceland L.L. (2001). Reducing medication errors through advances in automation. American Society of Health-System Pharmacists 35th midyear Clinical meeting. www.medscape.com/medscape/CNO/2001/ASHP

Britton M.L. & Lurvey P.L. (1991). Impact of medication profile review on prescribing in a general medicine clinic. American Journal of Hospital Pharmacy, 48(2), 265-70.

Brown S.H., & Coney R.D. (1994). Changes in physicians' computer anxiety and attitudes related to clinical information system use. Journal of the American Medical Informatics Association,1(5), 381-94.

Christensen D.B.& Hansen R.W. (1999). Characteristics of pharmacies and pharmacists associated with the provision of cognitive services in the community setting. Journal of American Pharmacy Association (Wash), 39(5), 640-9.

Christensen D.B., Neil N., Fassett W.E., Smith D.H., Holmes G. & Stergachis A. (2000). Frequency and characteristics of cognitive services provided in response to financial incentive. Journal of American Pharmacy Association (Wash), 40(5), 609-17.

Church R.M.(1989). The expanded role of pharmacists in the Public Health Service: an overview of a pharmacy practice model. Hospital Formulary, 24(9), 526-7, 530, 532.

Conard L.A., Fortenberry J.D., Blythe M.J. & Orr D.P. (2003). Pharmacists' attitudes toward and practices with adolescents. Archives of Pediatric Adolescent Medicine, 157(4), 361-5.

Cook E.D. Jr & Schuyler C.L. (1985). Physician utilization of pharmacy computer drug profiles. Hospital Pharmacy, 20(12), 908, 910, 914.

Crealey G., Sturgess I., McElnay J.& Hughes C. (2003). Pharmaceutical care programs for the elderly: economic issues. Pharmacoeconomics, 21(7), 455-65.

Dunlop J.A. & Shaw J.P. (2002). Community pharmacists' perspectives on pharmaceutical care implementation in New Zealand. Pharmacy World and Science, 24(6, 224-30.

Dupclay L., Rupp M.T., Bennett R.W. & Jarnagin T.M. (1999). Analysis of Grocery Chain Pharmacists' Work-Related Behaviors. Journal of American Pharmacy Association, 39, 74-81.

Evans R.S., Pestotnik S.L., Classen D.C., Base S.B. & Burke J.P. (1992). Prevention of adverse drug events through computerized surveillance. Annual Symposium of Computer Applications in Medical Care, 437-41

Eland I.A., Belton K.J., van Grootheest A.C., Meiners A.P., Rawlins M.D. & Stricker B.H. (1999). Additional survey of voluntary reporting of adverse drug reactions. British Journal of Clinical Pharmacology, 48(4), 623-7.

Felkey B.G. & Barker K.N. (1996). Technology and automation in pharmaceutical care. Journal of American Pharmacy Association (Wash), NS36(5), 309-14.

Felkey B.G. (1997). Health system informatics. American Journal of Health System Pharmacy, 54(3), 274-80.

Ferren A.L. (2002). Gaining MD Buy-in: physician order entry. Journal of Healthcare Information Management, 16(2), 66-70

Fortescue E.B., Kaushal R., Landrigan C.P., McKenna K.J., Clapp M.D., Federico F., Goldman D.A. & Bates DW. (2003). Prioritizing strategies for preventing medication errors and adverse drug events in pediatric inpatients. Pediatrics, 111(4 Pt 1), 722-9.

Foster R.A. & Antonelli P.J. (2002). Computerized physician-order entry: are we there yet? Otolaryngolic Clinics of North America, 35(6), 1237-43, vii.

Green C.F., Mottram D.R.,Rowe P.H. & Pirmohamed M. (2000) Adverse drug reactions as a cause of admission to an acute medical assessment unit: a pilot study. Journal of Clinical Pharmacy & Therapeutics, 25(5), 355-61.

Green C.F., Mottram D.R., Rowe P.H. & Pirmohamed M. (2001). Attitudes and knowledge of hospital pharmacists to adverse drug reaction reporting. British Journal of Clinical Pharmacology, 51(1), 81-6.

Grootheest K.V., Graaf L.& Berg T.W. (2003). Consumer adverse drug reaction reporting: A new step in pharmacovigilance. Drug Safety, 26(4), 211-217.

Halkin H., Katzir I., Kurman I., Jan J. & Mlakin B.B. (2001). Preventing drug interactions by online prescription screening in community pharmacies and medical practices. Clinical Pharmacology & Therapeutics, Volume 69, Number 4.

Hasford J., Goettler M., Munter K.H. & Muller-Oerlinghausen B. (2002). Physicians' knowledge and attitudes regarding the spontaneous reporting system for adverse drug reactions. Journal of Clinical Epidemiology, 55(9), 945-50.

Hassell K., Noyce P.R., Rogers A., Harris J. & Wilkinson J. (1997). A pathway to the GP: the pharmaceutical 'consultation' as a first port of call in primary health care. Family Practice, 14(6), 498-502.

Heeley E., Riley J., Layton D., Wilton L.V. & Shakir A.W. (2001). Prescription-event monitoring and reporting adverse drug events. The Lancet, Vol. 358 Issue 9296, 1872-73.

Hepler C.D. (1985). Pharmacy as a clinical profession. American Journal of Hospital Pharmacy, 42, 1298-306.

Hepler C.D. (1988). Unresolved issues in the future of pharmacy. American Journal of Hospital Pharmacy, 45(5), 1071-81.

Hepler C.D. & Strand L.M. (1990). Opportunities and responsibilities in pharmaceutical care. American Journal of Hospital Pharmacy, 47, 533-43.

Holland R.W. & Nimmo C.M. (1999).Transitions, part 1: beyond pharmaceutical care. American Journal of Health System Pharmacy, 56(17), 1758-64.

Hunt D.L., Haynes B., Hanna S.E., Smith K. (1998). Effects of computer-based clinical decision support systems on physician performance and patient outcomes. A systematic review. The Journal of the American Medical Association 280:1339-46.

Institutes of Medicine. To Err is Human: Building a Safer Health System. (1999). Washington DC: NA Academy Press

Kaushal R., Barker K.N. & Bates D.W. (2001). How can information technology improve patient safety and reduce medication errors in children's health care? Archives of Pediatrics and Adolescent Medicine,155(9), 1002-7.

Kaushal R. & Bates D.W. (2002). Information technology and medication safety: what is the benefit? Quality and Safety in Health Care, 11(3), 261-5.

Kaushal R., Bates D.W., Landrigan C., McKenna K.J., Clapp M.D., Federico F. & Goldmann D.A. (2001). Medication errors and adverse drug events in pediatric inpatients. Journal of the American Medical Association, 285(16), 2114-20.

Kaushal R., Shojania K.G, & Bates D.W. (2003). Effects of Computerized Physician Order Entry and Clinical Decision Support Systems on Medication Safety. Archives of Internal Medicine, Vol. 163 No. 12.

Khorasani R. (2001). Computerized Physician Order Entry and Decision Support: Improving Quality of Care. RadioGraphics, 21, 1015-1018.

Koepsell T.D., Helfand K.H., Diehr P.H., Gurtel A.L., Gleser M.A. & Tompkins R.K. (1983). The Seattle evaluation of computerized drug profiles: effect on provider activities. Medical Care, 21(5), 497-507.

Kozyrskyj A., Brown T.E. & Mustard C.A. (1998). Community pharmacists perceptions of a provincial drug utilization database. Canadian Pharmaceutical Journal, October.

Kuperman G.J.& Gibson R.F. (2003). Computer Physician Order Entry: Benefits, Costs and Issues. Annals of Internal Medicine, 139, 31-39.

Lapointe N.A. & Jollis J.G. (2003). Medication errors in hospitalized cardiovascular patients. Archives of Internal Medicine, vol. 163 No. 12.

Larson R.A. (2000). Patients willingness to pay for pharmaceutical care. Journal of American Pharmacy Association, 40, 618-24.

Laucka P.V. & Hoffman N.B. (1992). Decreasing medication use in a nursing-home patient-care unit. American Journal of Hospital Pharmacy, 49(1), 96-9.

Lazarou J., Pomeranz B.H. & Corey P.N. (1998). Incidence of adverse drug reactions in hospitalized patients: a meta-analysis of prospective studies. Journal of the American Medical Association, 279(15), 1200-5.

Leape, L.L., Bates, D.W., Cullen, J. D., Cooper J., Demonaco, H.J., Gallivan T., Hallisey, R., Ives, J., Laird N., Laffel, G. & et.al. (1995). System analysis of adverse drug events. ADE Prevention Study Group. The Journal of the American Medical Association, 274(1), 35

Lee F., Teich J.M., Spurr C.D. & Bates D.W. (1996). Implementation of physician order entry: user satisfaction and self-reported usage patterns. Journal of the American Medical Informatics Association Online, 3(1), 42-55.

Lustig A. (2000). Medication error prevention by pharmacists – An Israeli solution. Pharmacy World and Science. 22(1), 21-25.

Mann R.D. (1998). Prescription-event monitoring–recent progress and future horizons. British Journal of Clinical Pharmacology, 46(3), 195-201.

Miller M.J.& Ortmeier B.G. (1995) Factors influencing the delivery of pharmacy services. American Pharmacy, NS35(1), 39-45.

Moore N., Lecointre D., Noblet C. & Mabille M. (1998). Frequency and cost of serious drug reactions in a department of general medicine. British Journal of Clinical Pharmacology, Vol. 45 Issue 3, 301-8

Newfoundland and Labrador Centre for Health Information (1998). Benefits Driven Business Case.

Newfoundland and Labrador Centre for Health Information (2002). Pharmacy Briefing Note.

Newfoundland and Labrador Centre for Health Information (2002). Pharmacy Scoping Project Briefing Note.

Newfoundland and Labrador Centre for Health Information (2002). Stakeholder Consultation Presentation.

Norwood G.J., Sleath B.L., Caiola S.M. & Lien T. (1998). Costs of implementing pharmaceutical care in community pharmacies. Journal of American Pharmacy Association (Wash), 38(6), 755-61.

Oppenheim M.I., Vidal C., Velasco F.T., Boyer A.G., Cooper M.R., Hayes J.G. & Frayer W.W. (2002). Impact of a computerized alert during physician order entry on medical dosing in patients with renal impairment. American Medical Informatics Association, 577-81

Parker P.J. (2003). Computerized order entry goes beyond safety net. Nursing Management (Springhouse), Vol. 34(2), 45-56

Penna, R.P. (1987). Pharmacy: a profession in transition or a transitory profession? American Journal of Hospital Pharmacy, 44(9), 2053-9

Peterson G.M., Wu M.S. & Bergin J.K. (1999). Pharmacist's attitudes toward dispensing errors: their causes and prevention. Journal of Clinical Pharmacy and Therapeutics, 24(1), 57-71.

Puijenbroek E.P., Diemont W.L. & Grootheest K.V. (2003). Application of qualitative signal detection in Dutch spontaneous reporting system for adverse drug reactions. Drug Safety, 26(5), 293-301.

Raschke R.A., Gollihar B., Wunderlich T.A., Guidry J.R., Leibowitz A.I., Peirce J.C., Lemelson L., Heisler M.A. & Susong C. (1998). A computer alert system to prevent injury from adverse drug events. The Journal of the American Medical Association, 280:1317-1320.

Ray C.M., Sormunen C. & Harris T.M. (1999). Men's and women's attitudes toward computer technology: a comparison. Office Systems Research Journal, Vol. 17, No 1, Spring.

Ring J. & Brockow K. (2002). Adverse drug reactions: mechanisms and assessment. European Surgical Research, 34(1-2), 170-5.

Roeser H.P. & Rohan A.P. (1990). Post-marketing surveillance of drugs. The spontaneous reporting scheme: role of the Adverse Drug Reactions Advisory Committee. Medical Journal of Australia, 153(11-12), 720-6.

Schommer J.C., Petersen C.A., Doucette W.R., Gaither C.A.& Mott D.A. (2002). Community pharmacists' work activities in the United States during 2000. Journal of American Pharmacy Association (Wash), 42(3), 379-380.

Shaw L.H. & Gant L.M. (2002). Users divided? Exploring the gender gap in Internet use. Cyberpsychology and Behavior, 5(6), 517-27.

Simpson G. & Kenrick M. (1997). Nurses attitudes toward computerization in clinical practice in a British general hospital. Computers in Nursing,15(1), 37-42

Suh D.C. (2000). Consumers willingness to pay for pharmacy services that reduce risk of medication-related problems. Journal of American Pharmacy Association, 40, 818-27.

Sweis D., Wong C.K. (2000). A survey on factors that could affect adverse drug reaction reporting according to hospital pharmacists in Great Britain. Drug Safety, Aug 23(2).

Tamblyn R., Huang A., Perreault R., Jacques A., Roy D., Hanley J., McLeod P., LapriseR (2003). The medical office of the 21st century (MOXXI): effectiveness of computerized decision-making support in reducing inappropriate prescribing in primary care. Canadian Medical Association Journal 169 (6): 549–556

Texas State Auditor's Office Methodology Manual. Robert E. Johnson, Sr. Building - 1501 N. Congress Avenue - Austin, TX 78701 www.sao.state.tx.us/Resources/Manuals/Method/metintro.html

Tully M.P. & Seston E.M (2000). Impact of pharmacists providing a prescription review and monitoring service in ambulatory care and community practice. The Annals of Pharmacotherapy, 34, 1320-31

Venot A. (1999). Electronic prescribing for the elderly: will it improve medication usage? Drugs and Aging. 15(2), 77-80.

Warholak-Juarez T., Rupp M.T., Salazar T.A. & Foster S. (2000). Effect of patient information on the quality of pharmacists' drug use review decisions. Journal of American Pharmacy Association (Wash), 40(4), 500-8.

Wertheimer A.I. & Kralewski J. (1993). DUR Programs: Current trends and future directions. American Pharmacy, Vol NS33, No 2 Feb.

Williams D. & Feely J. (1999). Underreporting of adverse drug reactions: attitudes of Irish doctors. Irish Journal of Medical Science, 168(4), 257-61.

Zelnio R.N., Nelson A.A. Jr & Beno C.E. (1984). Clinical pharmaceutical services in retail practice. I. Pharmacists' willingness and abilities to provide services. Drug Intelligence and Clinical Pharmacy, 18(11), 917-22.

APPENDIX A

Summary of the Newfoundland and Labrador Pharmacy Network Scoping Process

Functions to be included in the development of the proposed Pharmacy Network were identified through the Pharmacy Network Project Scope. The Newfoundland and Labrador Centre for Health Information (NLCHI) Pharmacy Network Project Team (Project Team) began work in September 2002 and completed its work in February 2003. The Project Team developed a list of key deliverables, as well as a list of major stakeholders who would need to be engaged in an extensive consultation process. These stakeholder consultations were carried out over a 6 month period and involved over 800 stakeholders across the Province. The format of the consultations were either meetings, presentations or workshops and provided an avenue for health care professionals, health agencies, community groups and government officials to formulate expectations of the Pharmacy Network. Another key objective of the consultations was to identify issues that would need to be addressed to make the Pharmacy Network successful.

In addition to having access to the results of the Pharmacy Network consultation process, the researcher reviewed published documents on existing pharmacy networks in British Columbia, Alberta and Manitoba. These provinces were selected for review as they have established pharmacy networks, recognizing that other provinces are either planning, or currently implementing pharmacy networks. Additional information was provided to the researcher by the Pharmacy Network Project Team which, as part of the Project Scope, also carried out an extensive jurisdictional review. This jurisdictional review focused on identifying pharmacy network functions and associated infrastructure, identifying risks, and determining successes and failures experienced since implementation. As a result of the stakeholder consultations and a review of existing

pharmacy networks in other provinces, the Pharmacy Network Project Team have proposed that the Pharmacy Network will include several key functions.

The Pharmacy Network will provide on-line, comprehensive medication profiles (Prescription Profiling). Access to complete prescription information will allow community pharmacists to provide enhanced quality of care and reduce wastage resulting from over utilization and prescribing. The Pharmacy Network will permit physicians to submit prescriptions electronically (Computerized Physician Order Entry), which would significantly reduce errors resulting from illegible handwriting, provide information in real time on allergies and drug cost, as well as provide access to relevant clinical guidelines. Drug analysis will be carried out on all active medications in the patients profile (Drug Utilization Reviews). Real time prescription analysis will check for appropriate drug utilization by monitoring dosage amounts and possible drug interactions or duplication. Both the physician and the community pharmacists will be able to record an adverse drug reaction (ADR) directly in the patient's prescription profile (Prescription Monitoring). The ADR report would then either be sent electronically, or by Fax, to Health Canada. The Pharmacy Network will also allow for the identification of the source of the ADR (health care provider or patient).

It has also been proposed that the Pharmacy Network would support on-line real time adjudication for claims submitted for clients of the Newfoundland and Labrador Prescription Drug Program (NLPDP). The NLPDP is the provincial government drug program and provides prescription drug coverage to low-income residents of the Province. This function was identified by community pharmacists as critical to the success of the Pharmacy Network, however this function was beyond the scope of this study.

Change Management Issues

When new systems or processes are introduced into a work environment changes in business practices result, and with this change will be the potential for opposition and work slowdowns. In the past many information systems introduced in the work place did not achieve the expected benefits. This failure to maximize benefits was largely the result of resistance to change in business practices, rather than the system itself. Change management is a set of processes or strategies that prepare users for the transition to a new way doing business, and as a result increase the chances of success. In developing a change management strategy the level of acceptance must be determined by each stakeholder group that will be impacted by the new system. Strategies are then customized for each group to maximize acceptance and understanding of the new system.

Change management strategies developed for the proposed Pharmacy Network in Newfoundland and Labrador, and those currently implemented in British Columbia, Alberta and Manitoba were studied. It should be noted that the majority of information developed by provinces when developing/implementing large-scale information systems is considered proprietary and was not accessible by the researcher. A considerable amount of resources are required in developing business plans for provincial pharmacy networks, which are then used to secure federal funding in support of system implementation. Provinces are therefore reluctant to share this information. In other cases detailed business plans were not required and therefor information on change management issues were not addressed to any great degree. The researcher was able to obtain high level information on change management in other provinces through documents found within the public domain. For the proposed Pharmacy Network, information was obtained through interviews with both the Project Director and Pharmacy Consultant with NLCHI's Pharmacy Project Team.

Change Management Strategies

Information on change management strategies for implementing pharmacy networks was obtained from British Columbia, Alberta, Manitoba and Newfoundland and Labrador.

British Columbia

Several working committees were put in place to provide input and advice to the project team developing the pharmacy network (PharmaNet). When PharmaNet became operational a change management committee and user group were established. The user group is made up of major stakeholder groups, including the Health Ministry, pharmacists and the BC College of Pharmacy. A user guide was also prepared and distributed which provide user-friendly instructions on how to use the various functions available through PharmaNet. Financial assistance in the amount of $3,000 was provided to each pharmacy to offset the costs associated with technology upgrades required to access the pharmacy network.

Alberta

The Pharmaceutical Information Network (PIN) was supported from several existing committees and working groups. These include the Senior Reference Committee, the Health Authorities' CEOs' WellNet Advisory Committee, the Medical Advisory Group to the Alberta Wellnet Initiative, the Pharmacy Advisory Group to the Alberta Wellnet Initiative, and the provincial Technical Coordinating Group. The Pharmaceutical Information Network Task Force/Steering Committee was established for the PIN and provides advice and guidance on issues related to piloting and implementation. Membership on the committee includes the College of Physicians and Surgeons of Alberta, Alberta Medical Association, Alberta College of Pharmacists, Alberta Health

and Wellness, and the council of CEOs of the Health Authorities. The Steering Committee is also responsible for approving access to information contained in the PIN. Reporting to the Steering Committee is the Pharmaceutical Information Network Working Group, which provides advice on how the PIN can be developed so that it is user-friendly and improves patient care.

In addition to the various committees and working groups a comprehensive implementation 'toolkit' was developed for health care providers. This toolkit provides user-friendly instructions on how to use the PIN. In future it is expected that PIN training will be offered as part of the curriculum at medical schools. Alberta also provides funding to physicians to assist in purchasing computers and relevant software. It is planned that this support will soon be made extended to community pharmacists.

Manitoba

There were also a number of working groups established in Manitoba during implementation of the Drug Program Information Network (DPIN) and had representation from a number of stakeholder groups and were involved in the actual design of the DPIN. These groups were instrumental in ensuring that the needs of stakeholders were incorporated into the design of the DPIN. The support of the Manitoba Pharmaceutical Association and the Manitoba Society of Pharmacists was believed to be critical in gaining acceptance of the DPIN. In addition to the development of a training toolkit, training was provided by practice management specialist, as well as through a "play" function available in the DPIN. This "play" function allowed pharmacists to become familiar with the functions available through the DPIN without affecting the actual data. Pharmacies were provided with a maximum of $1,500 to assist in upgrading their information systems.

Newfoundland and Labrador (Consultation)

The proposed change management strategy was designed to maximize benefits by promoting both usage and acceptance of the Newfoundland and Labrador Pharmacy Network (Pharmacy Network). The goal of the change management strategy is to show stakeholders the benefits of having user-friendly, timely access to quality information, and through this gain overall acceptance of the Pharmacy Network. The strategies were developed to address problem areas while at that same time emphasizing areas of success. Through the consultation process the Pharmacy Network project team identified a number of issues that stakeholders feel will need to be addressed for the Pharmacy Network to be successful:

Computer Skills

To varying degrees, pharmacists will require training and support before they become comfortable using the Pharmacy Network.

Telecommunications

Less advanced telecommunication capabilities in remote areas may make access to the Pharmacy Network more difficult than in larger populated areas.

Workload

The Pharmacy Network must make the work carried out by pharmacists easier. It cannot increase the time required to treat a patient.

Compensation

The Pharmacy Network will provide new functions for community pharmacists. These functions will require additional effort and pharmacists feel they should be appropriately compensated.

Costs

Pharmacists believe they should not be burdened with the costs of implementing new software/hardware required to access the Pharmacy Network.

Privacy and Confidentiality

Patient privacy must be assured or they may not want their prescription data to be part of the Pharmacy Network. Community pharmacists indicated that the time to obtain consent from the patient must not interfere with current business practices.

Change Management Strategies Proposed in Newfoundland and Labrador

The proposed change management strategies developed by the NLCHI Project Team include:

Government Sponsor

The sponsor will have the authority to ensure that there is motivation for change.

Standards of Practice

The NLCHI Project Team will work closely with relevant regulatory bodies to ensure standards of practice are aligned with the Pharmacy Network.

Pharmacy Network Champions

Each site is to have an internal champion to promote the value of the Pharmacy Network.

Multi-Disciplinary Working Committees

These Committees will be involved in formulating work processes to support providers in using the Pharmacy Network.

Training

The training strategy will include:

- Train the trainer
- Combination of web-based, classroom and one-on-one training
- Providing training manuals
- Incorporating continuing education credits
- Training new health care workers coming to the Province

Development of Communication Tools

The communication strategy will include:

- Audience specific presentations
- Brochures
- Newsletters
- Public education
- TV and Radio announcements

Value-Add Information

The Pharmacy Network would provide an opportunity to provide access to vetted value-added resources.

Implementation Toolkit

The toolkit will provide step-by-step instructions explaining the new processes and workflows.

Pilot Sites

Piloting the Pharmacy Network has many advantages such as the opportunity to address technical and workflow issues prior to full implementation.

Help Desk

The help desk will provide support before and after implementation.

Evaluation

The evaluation strategy will include:

- Post-implementation evaluation (survey 6 months post-implementation)
- Clinical evidence of benefits shared
- Determining trends in access by sites

Public Education

Public acceptance is critical to the success of the Pharmacy Network. The public campaign will include media advertising, printed materials and stakeholder involvement.

Specific Role Enhancements

The proposed Newfoundland and Labrador Pharmacy Network will provide community pharmacists with an opportunity to increase their scope of practice. The researcher had the opportunity to attend two consultations sessions held with community pharmacists at the Radison Hotel in St. John's. These consultations took the forum of a Power Point Presentation with opportunities for pharmacists to provide feedback after each function or issue was identified by the Project Team. One question asked of pharmacists at the conclusion of the presentation was what did they feel would the benefits of the Pharmacy Network. Responses to this question provided insight into opportunities for role enhancements perceived by pharmacists as a result of the

Pharmacy Network. Additional feedback on consultations that took place outside St. John's were provided to the researcher by the Pharmacy Network Project Team.

Community Pharmacists feel the Pharmacy Network will free up time which is currently taken up with dispensing medications. This free time could them be better utilized by providing pharmaceutical care to patients. The availability of on-line patient information would allow the pharmacist to make safer and easier decisions about a patient diagnosis and treatment. Many pharmacists also felt that the Pharmacy Network would provide seamless care to the patient through improved coordination of services provided by many different health professionals. The provision of these enhanced services would not only improve patient care, but would increase public confidence in overall pharmacy profession. The ability to be paid for these enhanced services was felt to be critical to many community pharmacists.

A review of published documents from British Columbia, Alberta and Manitoba provided minimal information on perceived role enhancements prior to implementing a pharmacy network. These provinces were not required to carry out detailed business plans prior to implementing pharmacy networks, and because of this, little information was available post-implementation. It was found that in British Columbia warnings of prescription interactions and duplication resulted in a significant number of prescriptions not being filled. In Alberta, pharmacists involved in the pharmacy network pilot felt unnecessary phone calls to physicians were reduced, allowing for more efficient use of their time. However, pilot community pharmacist located in smaller communities felt they did not realize the full benefits of the pharmacy network as their patients generally do not have many options on where they can fill their prescriptions. In Manitoba, a post-implementation survey found 80% of pharmacists agreed the pharmacy network benefited their practice.

APPENDIX B-1

November 29, 2002

Dear Mr. Sir/Madam:

The Newfoundland and Labrador Centre for Health Information (NLCHI) is a provincial agency mandated to build a provincial Health Information Network (HIN). The HIN, when completed, will enable information sharing amongst all providers of health care and its services. The first phase, the Unique Personal Identifier/ Client Registry, is now operational. Completed at a cost of $3.6M, it provides a comprehensive registry of all people accessing health services in the province. The second phase of the HIN is the Newfoundland and Labrador Pharmacy Network (NPN). The NPN will provide prescription medication information sharing between community and institutional pharmacies, physician offices, emergency rooms, other health professionals, and the Newfoundland and Labrador Prescription Drug Program (NLPDP).

This study, by Mr. MacDonald, to determine the perceived value of the NPN prior to implementation, will assist NLCHI in determining the true value of introducing the integrated network. I support Mr. MacDonald's study and would ask that you assist him by completing the enclosed questionnaire.

Sincerely,

Steve O'Reilly
CEO

APPENDIX B-2

December 10, 2002

Dear Sir/Madam:

The Newfoundland and Labrador Centre for Health Information (NLCHI) is currently carrying out a scoping exercise, on behalf of the Government of Newfoundland and Labrador, to determine the feasibility of implementing a Provincial Pharmacy Network. This initiative presents a unique opportunity to determine the perceived value to community pharmacists of the Newfoundland and Labrador Pharmacy Network (NPN) prior to its implementation. As part of my Masters' Thesis this survey will investigate the perceptions among community pharmacists on issues such as the value of a complete patient profile, the usefulness of drug utilization reviews and electronic physician prescribing, and the issue of payment for professional (cognitive) services.

Enclosed in this package is a survey questionnaire, as well as a self-addressed return envelope for the return of the completed questionnaire. The study is anonymous, no personal identifiable information will be collected as a result of this survey.

I would like to thank you in advance for participating in this study.

Sincerely,

Don MacDonald

APPENDIX C

Thank you for agreeing to complete this questionnaire. As noted in the cover letter, the purpose of this study is to get a picture of what pharmacists expect of a Pharmacy Network in Newfoundland and Labrador, prior to its implementation. In this province it is proposed that the Pharmacy Network will link all hospitals, physician offices and community pharmacies and support: 1) computerized physician order entry, 2) prescription monitoring, 3) prescription profiling and (4) drug utilization reviews. Your response is anonymous, no personal identifiers will be attached to this questionnaire.

Section I: Demographic

Note: ***If you happen to work in more than one Pharmacy, please respond from the perspective of the site where most of your time is spent.***

1. Which of the following best describes your current position in the pharmacy where you received this questionnaire? *(Circle 1 response only)*

a) Manager/Owner/Franchisee	**45.6%**
b) Staff Pharmacist	**48.8%**
c) Relief Pharmacist	**5.5%**
d) Other (Please Specify _____)	**0.0%**

2. Is the Pharmacy in which you generally work:

Part of a Chain	**66.2%**
or	
An Independent	**33.8%**

3. Is this pharmacy located in:

38.8%	a city
13.6%	a community population >10,000, but not a city
47.7%	a community < 10,000

4. Do you normally work in more than one Pharmacy in any given week?

12.9%	Yes
87.1%	No

5. How many hours per week do you normally work in this pharmacy?

Mean 37.9 Hours

6. How many Pharmacists normally work at this Pharmacy?

1 (12.5%) 2 (32.9%) 3 (41.2%) 4 or more (13.4%)

7. Are you: a) Female **55.6%**
b) Male **44.4%**

8. In what year were you born?

19_____ **Mean = 38.5 years**

9. In what year were you first licensed to practice pharmacy in Canada?

19_____ or 20_____ **Mean = 14.8 years**

10. What is your level of training? (Circle all that apply)

a)	B.Sc.(Pharmacy)	**57.9%**
b)	Ph.C.	**40.7%**
c)	M.Sc	**0.5%**
d)	M.B.A.	**0.0%**
e)	Ph.D.	**0.5%**
f)	Pharm D	**0.5%**
g)	Other (please specify	**0.0%**

11. Please indicate the number of years of experience that you have had as a licensed pharmacist in the following pharmacy settings. (Include experience in Canada and elsewhere if applicable)

Number of years at this pharmacy	**Mean 7.1** years
Number of years elsewhere in community pharmacy	**Mean 7.1** years
Number of years in hospital pharmacy	**Mean 0.5** years
Number of years in other areas of practice	
(Please specify) **Teaching and Sales**	**Mean 0.3** years
(Please specify) _____	**Mean 0.0** years

Section II: Pharmacy Network Functions

Respond to statement 12 by circling one of the following responses:

1 Strongly Agree (A)
2 Somewhat Agree
3 Neither Agree Nor Disagree
4 Somewhat Disagree
5. Strongly Disagree (D)

Computerized Physician Order Entry

Several studies have indicated that there are major problems with the order entry stage of prescribing medications. Computerized physician order entry is one strategy that has gain wide acceptance towards improving this process.

12. Do you feel that Computerized Physician Order Entry will result in enhanced patient safety by:

	(A)				(D)
a) Providing default doses for normal conditions	**1**	**2**	**3**	**4**	**5**
	19.2%	50.5%	22.9%	5.1%	2.3%
b) Removing problems with illegible handwriting	**1**	**2**	**3**	**4**	**5**
	82.8%	14.4%	1.4%	1.4%	0.0%
c) Checking dose-ceilings	**1**	**2**	**3**	**4**	**5**
	28.0%	55.1%	13.6%	2.3%	0.9%
d) Checking allergy information	**1**	**2**	**3**	**4**	**5**
	33.0%	52.1%	9.8%	5.1%	0.0%
e) Screening for drug interactions	**1**	**2**	**3**	**4**	**5**
	39.3%	44.4%	10.7%	5.1%	0.5%
f) Providing complete patient profile	**1**	**2**	**3**	**4**	**5**
	53.1%	31.9%	10.8%	3.8%	0.5%
g) Providing real-time information on dose algorithms	**1**	**2**	**3**	**4**	**5**
	34.7%	47.9%	15.0%	1.9%	0.5%
h) Providing information on medication appropriateness	**1**	**2**	**3**	**4**	**5**
	26.2%	45.3%	22.9%	5.1%	0.5%

Prescription Profiles

Medication information on a prescription profile may include the type of medication, date of prescribing and dispensing, refill dates, quantity, strength and specific directions for administering the drug. As well as providing a pharmacist with a list of current medications, most prescription profiles provide a 6-12 month prescribing history.

13. On average, when you need to determine which medications a patient is receiving, what percent of time do you:

a) ask the patient	**59.9%**
b) ask the family of the patient	**12.5%**
c) have the patient bring in all medications to pharmacy	**9.5%**
d) ask other health care providers	**15.5%**
e) other (Please Specify - **Check Computer Profile**	**11.5%**

14. Are you confident that you know the total number of medications your patients are prescribed?

34.6%	Yes
65.4%	No

Prescription Monitoring

Adverse drug reactions (ADRs) result in a significant number of hospital admissions and deaths. Prescription monitoring is a system of responding to adverse events in a population due to prescription medications.

15. What is the average number of adverse drug reactions that you report in one year?
Mean 2.45

16. Would you be more likely to report an adverse drug reaction electronically?

88.8%	Yes
11.2%	No

Respond to statement 17 through 28 by circling one of the following responses:

1 Strongly Agree (A)
2 Somewhat Agree
3 Neither Agree Nor Disagree
4 Somewhat Disagree
5. Strongly Disagree (D)

Drug Utilization Reviews

Generally Drug Utilization Review alerts identify the possibility of therapeutic duplication, drug interactions, low/high dose, drug over-use/under-use and drug-pregnancy conflicts.

17. Drug Utilization Reviews have limited value unless carried out on the complete patient profile

(A) (D)
1 2 3 4 5
61.8% 27.6% 6.0% 3.7% 0.9%

18. Drug Utilization Reviews based on all prescriptions Prescribed will significantly reduce prescribing problems (eg. drug interactions, drug duplication)

1 2 3 4 5
54.4% 36.9% 6.5% 2.3% 0.0%

19. Drug Utilization Reviews will be an important function of the Pharmacy Network

1 2 3 4 5
52.5% 37.8% 7.4% 0.9% 1.4%

20 Drug Utilization Reviews based on all prescriptions prescribes will significantly reduce hospital admissions

1 2 3 4 5
37.8% 42.4% 17.1% 2.3% 0.5%

21. Clients will value the Drug Utilization Reviews services that I will provide through my use of Pharmacy Network

1 2 3 4 5
26.3% 43.3% 24..0% 6.0% 0.5%

Section III: Cognitive Services

22. Pharmacists should be reimbursed for the following professional (cognitive) services:

A) (D)
a) Providing Counseling **1 2 3 4 5**
60.6% 22.2% 10.6% 1.9% 4.6%

b) Monitoring Outcomes

1	2	3	4	5
67.6%	21.3%	7.9%	0.9%	2.3%

c) Identifying medication appropriateness Based on a patients medical history

1	2	3	4	5
57.4%	29.2%	8.3%	2.8%	2.3%

d) Working with Physicians to ensure the best possible medications are prescribed

1	2	3	4	5
62.0%	27.3%	7.4%	1.9%	1.4%

Section IV: General

23. A comprehensive orientation process will be required prior to the implementation phase of Pharmacy Network

(A) (D)

1	2	3	4	5
62.0%	27.3%	7.4%	1.9%	1.4%

24. I expect the Pharmacy Network would benefit my practice as a pharmacist.

1	2	3	4	5
65.9%	27.2%	5.5%	0.9%	0.5%

25. The dispensary is too busy for me to respond to information provided by the Pharmacy Network.

1	2	3	4	5
2.3%	29.0%	25.3%	29.0%	14.3%

26. The Pharmacy Network will not be relevant to my clients as most of them are regular customers

1	2	3	4	5
1.9%	15.3%	25.5%	34.9%	18.1%

27. The Pharmacy Network will improve my Relationship with physicians

1	2	3	4	5
19.4%	45.6%	27.6%	6.5%	0.9%

28. The Pharmacy Network will interfere with customer Service

1	2	3	4	5
1.4%	6.9%	31.0%	35.6%	25.0%

29. Do you currently use a computer in your Pharmacy

99.1% Yes

0.9% No

30. Are there any other comments that you would like to make about your expectations of a Pharmacy Network, and how the Pharmacy Network would impact upon you or your pharmacy? If so, please use this space and/or the back cover for that purpose.

Thank you again. Please use the pre-addressed return envelope to return the completed questionnaire. Copies of the final report will be available from the investigator, Mr. Don MacDonald (709-757-2408, DonM@NLCHI.nf.ca), or by accessing NLCHI's website at www.nlchi.nf.ca