THE IMPACT OF THE DIAL ACCESS AND SASKATCHEWAN CONSUMER DRUG INFORMATION SERVICES ON PATIENTS' CLINICAL OUTCOME

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ABSTRACT

Although drug information centres are thought to play a prominent role in meeting the drug information needs of both consumers and health care professionals, there is little information in the literature evaluating the effect of these services on patient outcomes. We conducted a study to determine if the Dial Access Drug Information Service and the Saskatchewan Consumer Drug Information Service impacted positively on a patient's clinical outcome. Drug information requests were eligible for the study if the following criteria were met: the request was patient specific, the service made a recommendation involving the patient's therapy, and the requester of the information was willing to participate in the study. For each request, a desired therapeutic outcome was documented. Each inquirer was asked to rate the impact of the service with respect to patient outcome as well as their opinion of objectivity and timeliness of the response. A panel of specialists determined whether the responses and recommendations given by the service were appropriate; what impact the service had on the patient; and assessed the "seriousness" of the inquiry. A total of 98 and 68 patient specific requests were received in the health care section and consumer section, respectively. The expert panel concluded that 94.9% of the health care requests and 98.5% of the consumer requests were answered appropriately and the majority of the requests involved potentially serious drug-related problems. The panel also determined that 46.8% of the recommendations in the health care section and 41.0% of the recommendations in the consumer section resulted in positive patient outcomes. For a significant number of queries, tangible outcomes could not be measured but the patient benefited from the information supplied by the drug information pharmacist in

24.7% of the health care professional queries and 42.6% of the consumer queries. Based on these results and the inquirers' opinion, the Dial Access Drug Information Service and the Consumer Drug Information Service provides drug information in an accurate, unbiased, timely manner and the services benefit the patient. However, it is difficult to determine if the service impacts positively on patient outcome because it is not the primary care giver; it is a support service which assists health care professionals in achieving specific patient outcomes. Further studies are necessary to develop criteria for acceptable standards of practice for drug information centres in order to ensure these services are impacting positively on patient care.

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1.0 Introduction

The Saskatchewan Dial Access Drug Information Service was established over 23 years ago by the Colleges of Pharmacy and Medicine to fulfil the drug information needs of health care professionals of the province. Presently, the Drug Information Service (DIS) consists of three components: the Dial Access Drug Information Service (DADIS) for health care professionals, the Saskatchewan Consumer Drug Information Service (SCDIS), and a regional adverse drug reaction reporting program (SaskADR). The service operates from the College of Pharmacy and Nutrition at the University of Saskatchewan in Saskatoon and employs two and one-half full time licensed pharmacists as drug information consultants. The entire service is available to all health care professionals and consumers throughout Saskatchewan from 0900 to 1700 hours, weekdays, with no direct charge to the user. Requests from inquirers are mainly communicated by way of telephone but users may also access the service via mail, facsimile or electronic-mail. After-hours telephone requests may be left on an answering machine. The DIS is not a substance abuse, toxicology or poison control centre; these categories of calls are referred to the appropriate centres.

DADIS services all health care professionals of the province including community and hospital pharmacists, physicians, nurses, dietitians, and dentists. The goals and objectives of DADIS are to provide health care professionals with immediate access to objective, concise and timely information on drug therapy; to develop a data bank on comprehensive drug information through the collection, review and evaluation of information on new and existing drugs; to

supplement the continuing education of all health care professionals via the distribution of articles and newsletters and to provide an educational and practical experience for undergraduate pharmacy students, hospital pharmacy residents and M.Sc. clinical graduate students in handling requests for information on drug therapy.

DADIS received 3,269 requests for drug information in the 1995-1996 fiscal year, a 12.1% increase over the number of calls received the previous year and a 58% increase over the last five years. Community pharmacists continued to be the greatest users of the service representing 67.3% of the total call volume. Hospital pharmacists represented 9.8%, physicians 8.3% and nurses 7.7% of the total number of calls in the 1995-1996 fiscal year. The nature of the requests have remained consistent over the past few years with identification/availability (21.1%), therapeutic use (17.3%), requests for general information (15%), drug interactions (9.2%), drug use in pregnancy and lactation (5.9%) and dosing information (5.3%) being the most commonly asked questions. The requests most frequently originated from Saskatoon (39.9%), Regina (14.3 %), and Prince Albert (5.8%). Approximately 85% of the requests can be answered within 30 minutes with provision of the answer on the same day of the query for 82.4% of the requests and within the next working day for 93.5% of the requests. A standardized drug information request form is utilized to document information on inquirer demographics, date of the call, nature of request, patient specifics (if necessary), and sources reviewed (Appendix A). The drug information pharmacist's (DIP) response and the time to answer the request is also recorded. All requests and responses are documented in a computerized database, and followed up by telephone and/or through the mail or facsimile. DADIS also publishes and

distributes a bimonthly newsletter to all practising pharmacists of the province. The newsletter serves to increase awareness of the latest developments in drug therapy, provides information on new drugs, and shares pertinent requests received by the service.

The SCDIS was established in 1990 as part of the DIS to provide consumers of the province with access to concise and unbiased information on drug therapy and to supplement the information and advice provided by their pharmacists and physicians. The service received a total of 1,580 requests in the 1995 calendar year, a 7.3% increase over the 1994 calendar year. The most commonly asked questions included requests for general information (23.4%), side effects (17.7%), therapeutic use (8.8%), drug interactions (7.1%), and dosing/administration (4%). Requests most frequently originated from Saskatoon (38.5%) and Regina (14.4%). Of the inquirers, 47.5% were repeat callers while 16.1% were referred to the service by health care professionals. A standardized drug information request form is utilized to document information on caller demographics, date of the call, nature of the request, patient specifics (if applicable), references reviewed, response, and time to formulate response (Appendix B). Similarly, all requests and answers are documented in a computerized database, and followed up by telephone and/or through the mail.

To date, two user satisfaction surveys have been completed for the DADIS. An initial evaluation of the DADIS was conducted after the service first opened in 1974. Users were asked to evaluate the service by completing a mailed questionnaire (Blackburn et al. 1976). A total of 93 questionnaires were mailed, 39 to physicians and 54 to pharmacists. Seventy-one completed

questionnaires were returned for a 76% return rate. The survey indicated that the service responded accurately in 94% of the requests and the information resulted in alteration of a patient's therapy in 34% of the calls. About 99% of the respondents indicated they were at least partially satisfied with the service and 97% stated they would recommend the service to their colleagues. The evaluation definitely indicated the service was of value and had the full support of medical and pharmacy practitioners who utilized the service.

More recently, DADIS conducted a user satisfaction survey of all practicing pharmacists of Saskatchewan (McLeod et al. 1996). The two primary objectives of the survey were: to establish whether the users are generally satisfied with the service provided and, to identify suggestions and ideas with respect to funding. A total of 514 surveys were returned, (51% response rate) and over 82% of the respondents were from community practice, which represents the largest proportion of practicing pharmacists. Approximately 83% of the pharmacists surveyed stated the service provided by DADIS was excellent and 97% of the respondents claimed that the information provided by DADIS had been useful, objective, and received within a reasonable time frame. Eighty-three percent of respondents stated they were willing to pay for the service with 50% agreeing to an annual pharmacy fee and 33% agreeing to a fee per request. To date, a user satisfaction survey has not been conducted for the SCDIS. Currently, neither service is involved in a consistent quality assurance program which analyzes standards for accuracy, objectiveness, timeliness and completeness of specific responses.

1.1 Background

Pharmaceutical care has been defined as "the responsible provision of drug therapy for the purpose of achieving definite outcomes that improve a patient's quality of life". The desired outcomes are cure of a disease, elimination or reduction of a patient's symptomatology, arresting or slowing of a disease process or preventing a disease or symptomatology (Hepler 1990). With the advent of pharmaceutical care, the pharmacist's responsibilities advance beyond the dispensing of medications into the identification, prevention and correction of drug-related problems. Becoming increasingly important is the need to determine the quality of the patient's care where the primary focus is outcomes of patient care rather than the distribution of drug products, drug information and patient counselling (Enright 1988). Recent studies in ambulatory and hospital settings have assessed the impact of pharmaceutical care on patient outcomes (Lobas et al. 1992; Brown 1991; Hatoum et al. 1992). Although drug information centres are thought to play a prominent role in meeting the drug information needs of both consumers and health care professionals, there is a paucity of information in the literature evaluating the effect of these centres on patient outcomes.

Grace (1975) evaluated the questions received by a drug information centre as being either judgemental or nonjudgemental. The study reported that 4.6% of the requests received were of the judgemental variety (defined as integration of data or knowledge and experience in the process of making a decision regarding a specific therapeutic problem). This study did not evaluate the usefulness or effect of the service on patient outcomes. The same parameters were

evaluated in another study conducted by Cardoni (1978) where 10.9% of the requests were considered to be judgemental. The authors suggested that Grace's methodology was not a proper measure of a DIS' effectiveness and that their performance should be evaluated by the effect the information had on an individual patient. The actual category of the request is immaterial and it is invalid to measure the usefulness of a DIS by arbitrarily categorizing requests by determining if the DIP integrated judgement into the answering of the request (Cardoni 1978).

An abundance of the literature on drug information services describe quality assurance programs within specific centres (Repchinsky 1987; Smith 1990; Pearson et al. 1972; Pearson et al. 1975; Moody 1990; Golightly et al. 1988; Woodward et al. 1990; Wheeler-Usher et al. 1990; Thompson 1985; Park 1985; Keys et al. 1975). Retrospective surveys, daily audits, reviews of telephone inquiries, physician advisory boards, and peer review committees have been utilized to determine the quality of responses to drug information requests (Wheeler-Usher et al. 1990). Problems encountered with these evaluation programs are that they are informal, subjective, biased and time consuming, and the quality of these programs may be associated with the competence of the evaluator (Thompson 1985). Also, since comments from retrospective surveys may not be solicited in reference to a specific request, results of these evaluations reflect the general attitude towards the service rather than a specific drug information request (Repchinsky 1987). While these programs are useful in determining user satisfaction, how the services are utilized and accuracy of the service, they do not gauge the impact of the service on the quality of patient care. Also, while quality assurance programs have evaluated the difficulty or complexity of consumer drug information requests (Smith 1990; Woodward 1990), no

published study has classified the seriousness of patient specific requests from a health care professional.

There is a need for drug information services to assess their impact on the quality of patient care since these services are justified only if health care professionals use them to improve patient care (Repchinsky 1987). Cardoni (1978) concluded that the Drug Information Service of the University of Connecticut's Health Centre provided useful information to health care professionals, the information was applied to patient specific problems, and the use of the information had a positive impact on patient care. These conclusions were based on the inquirer's opinion of immediate patient outcomes, since no follow - up of patients was carried out. Keys (1975) examined the impact of drug information on the quality of care provided by clinical pharmacists in hospital patient care areas. A panel of physicians and the coordinator of the clinical pharmacy program evaluated patient records to determine the impact of drug information on the individual patient. The panel concluded that approximately 75% of the drug information reviewed had at least a "significant" potential for benefiting the patient. However, only 14.5% of the communications were judged as actually benefiting the patient while 25% were judged as probably benefiting the patient. Finally, Drolet (1996) successfully developed a methodology for determining the impact of a drug information service on patient outcome originating from community pharmacists. The study utilized a panel composed of pharmacists for the analysis of queries to determine if the recommendations from the drug information pharmacists were appropriate and a separate physician panel to assess the actual outcomes. Drolet concluded that their methodology can be used to assess the impact of drug information

services on patient outcomes and that these services play an important role in patient care.

To the best of the author's knowledge, no study has assessed the impact of a consumer based drug information service on patient outcome. An analysis of queries and quality assurance programs for The Rocky Mountain Drug Consultation Centre has been well described (Golightly et al. 1988; Connor et al. 1980, 1982). Connor (1982) described how the Centre detected medication related problems from consumer queries which may have had a positive influence on a patient's therapy by preventing and correcting these problems. The author noted that whether these problems would have resulted in actual patient morbidity was not determined and that further investigation is necessary to develop mechanisms for determining the impact of such services on patient care. Golightly (1988) analyzed queries from health care professionals and consumers at the Rocky Mountain Drug Consultation Centre. The analysis revealed that medication related problems, particularly among the elderly, were common (involving 34.2% of consumer inquiries) and 16.3% of the cases involved serious or potentially serious medication related problems. Golightly did not specifically evaluate patient outcomes but the authors documented an apparent beneficial effect on patient therapy by preventing or correcting difficulties in 76.0% of cases of medication problems. This study also identified reasons why consumers contacted the Rocky Mountain Drug Consultation Centre, an important consideration in defending the existence of consumer drug information centres.

1.2 Summary

DADIS and SCDIS have been in operation for 23 years and 6 years, respectively. Since the number of queries continues to rise every year, it is assumed that a useful service is being provided to health care professionals and patients. However, neither service has been involved in a consistent quality assurance program to determine if they are fulfilling their objectives of disseminating accurate, timely, and unbiased drug information. Determining the quality of responses and the impact of this DIS on a patient's care is particularly important during a period when pharmacists are assuming a greater responsibility in the provision of pharmaceutical care. Also, it is estimated that 48-85% of inquiries received at drug information centres are related to patient specific issues (Beaird et al. 1994). While the literature supports the notion that drug information has a positive impact on the quality of a patient's care (Cardoni 1978; Golightly et al. 1988; Keys et al. 1975; Drolet 1996; Connor et al. 1980, 1982), there is little objective information on the effect of these centres on patient outcome. More specifically, no study has assessed the impact of a consumer drug information service on the clinical outcome of a patient or examined the patient's opinions of these services, an important consideration in the concept of pharmaceutical care. Thus, we conducted a study to determine if the DIS is disseminating accurate, timely and unbiased information to inquirers and if these services are impacting positively on a patient's clinical outcome. The seriousness of the drug information requests was also assessed.

2.0 Hypothesis

The DIS disseminates drug information in an accurate, objective and timely fashion and impacts positively on a patient's clinical outcome. This hypothesis will be tested by addressing each of the following objectives:

1. Determine the percentage of recommendations from the DIS which are accepted by health care professionals and consumers.

2. Record the average time (in minutes) required to answer a patient specific response.

3. Adapt a quality assurance program (Repchinsky 1987) to address the following issues:

   a. To establish if patient specific drug information requests are answered in a timely fashion (ie. information was received in time to be used in the patient) as determined by the opinion of the requester utilizing a five point scale (very timely, timely, no opinion, untimely, very untimely).

   b. To determine if health care professionals believed the information they received was objective (ie. unbiased) utilizing a five point scale (very objective, objective, no opinion, unobjective, or very unobjective).

c. To ascertain completeness of responses by determining if it was necessary for the inquirers to look further for information after contacting the DIS with a drug information request.

d. To determine health care professionals' and consumers' opinions of the impact the DIS had on patient outcome utilizing a grading scale (very beneficial, beneficial, no impact, detrimental, very detrimental or unable to assess).

4. Ascertain, by way of an expert panel's assessment, if the recommendations made by the DIS are appropriate, inappropriate or unable to assess.

5. Classify, by way of an expert panel's assessment, the impact of the DIS' recommendation as: the recommendation resulted in a positive outcome; the recommendation resulted in a negative outcome; the patient did not respond to the intervention and the problem remains unresolved; a tangible subjective and / or objective outcome cannot be measured but the patient's pharmacotherapy improved; a tangible subjective and / or objective outcome could not be measured but the patient benefited from education on his/her therapeutic regimen; and the panel was unable to document the impact of the recommendation on the patient's outcome.

6. Classify, by way of an expert panel's assessment, the seriousness of each patient specific drug information request as either not serious, potentially serious or serious.

3.0 Methodology

The methodology was modified from Drolet (1996) who documented the effect of patient outcomes following the use of the Ottawa Valley Regional Drug Information Service (OVRDIS) by community pharmacists.

3.1 Inclusion Criteria

The study received approval from the Advisory Committee on Ethics in Human Experimentation (Behavioral Sciences, University of Saskatchewan) and was conducted at the DIS at the College of Pharmacy and Nutrition, University of Saskatchewan between January 4 - April 11, 1996. Questions handled by the DIS were eligible for the study if they were patient specific (ie. if the question involved a patient and was drug-related), a desired outcome could be identified, if the DIS made a recommendation involving a patient's therapy (appendix E, #6) and if the requester of the information was willing to participate in the study (the reason for non-participation could not be determined unless the inquirer offered the information without questioning by the investigator). Requests were also eligible for study if they were answered by full time DIPs to ensure consistency of results. Requests answered by hospital pharmacy residents were not included in the study.

3.2 Pilot Project

A one week pilot study was conducted from December 6 - 12, 1995 to determine the feasibility of the study. A number of concerns arose from the pilot including inappropriate documentation and poor probing by the DIP. Proper documentation of the question, answer, recommendations and references are important in order for the panel to accurately assess the appropriateness of the responses and classification of outcomes. The investigator reminded the DIPs of the importance of determining the true nature of the request by determining if the caller is inquiring about a specific patient or for general information. The pilot study also gave the investigator a sense of the time involved in the assessment of each request. As a result of the pilot, it was decided the actual period for collection of drug information requests be 6 weeks in length to obtain approximately 150 - 200 requests. It was estimated that the panel members would require approximately 25 - 30 hours to assess this number of requests. Greater than 200 requests would have required a greater commitment of time from each panel member. Finally, the pilot identified problems in classifying patient outcomes. As a result, an additional option was added to the outcome classification in appendix G (a tangible outcome could not be measured based on the recommendation, but the patient benefited from education on their therapeutic regimen).

The actual study period took place between January 4 - April 11, 1996; 8 weeks for the collection of drug information requests and up to 6 weeks for follow-up of patient outcomes. Originally, it was believed that a 6 week time period would suffice for the collection of 150-200

requests. However, an additional 2 weeks was added in order to collect this number of eligible requests.

3.3 Documentation

The study was divided into two sections: one consisted of health care professional queries and the other included queries from consumers of the province. The handling and documentation of drug information requests that met the inclusion criteria, were completed by a licensed pharmacist following the DIS' policies and procedures and a systematic approach to handling drug information requests which is described elsewhere (Watanabe 1978). The DIPs were assured of anonymity and the results would be presented in an aggregate form. Although not directly involved in handling drug information requests, the investigator ensured appropriate documentation of the response in order to facilitate evaluation by the panel. Documentation of the request included identification of the telephone caller (ie. consumer versus specific health care professional), caller location, actual requests, nature of the call and necessary background information, time to complete the question, recommendations and pertinent references (see Drug Information Request Forms for the health care professional and consumer - appendix A and B respectively). All the information was recorded in a computerized database. Following completion of the drug information request, the DIP asked if the inquirer was willing to participate in the study.

3.3.1 Health Care Professional Queries (DADIS)

Following completion of the drug information request, the DIP read a statement to the health care professional (appendix C) explaining the details of the study and request for consent. Consent was recorded in appendix E (statement #2) by the DIP.

After consent was obtained the DIP identified, in consultation with the inquirer, the possible desired outcomes and the time frame feasible for follow-up (appendix E, statement 5). The desired outcomes included: the resolution of the therapeutic problem; the reduction or elimination of symptomatology; the arresting or slowing of the disease process; the prevention of disease or symptomatology; the medication administration being optimized; and other. It was possible for the patient to have more than one desired outcome per request.

Approximately one to two days after completion of the drug information request, the investigator telephoned the health care professional to confirm the actual recommendation which was made to the patient by a health care professional (appendix F, questions 1-3 - to be completed by the investigator). For queries which were initiated by a physician and the pharmacist was acting as an intermediary to the DIS, the pharmacist was required to contact the physician to determine the exact recommendation made to the patient within one to two days of the request.

From discussion between the inquirer and investigator, the desired outcome and time frame for follow-up was finalized (appendix F, statement 4). The health care professional was asked to obtain subjective and/or objective information from the patient and/or patient's physician surrounding the actual patient outcome. The health care professional was contacted as frequently as necessary by the investigator within the 6 week follow-up period to determine the actual patient outcome which was then recorded in appendix G (statement 1) by the investigator. When follow-up was complete, the investigator documented the inquirer's opinion (telephone questionnaire) on the timeliness of the response, objectivity of the response and any benefit the service had on the patient (appendix F, questions 6 - 9).

3.3.2 Consumer Queries

Following completion of the drug information request, the DIP read a statement to the patient (appendix D) explaining the details of the study and request for consent. Consent was recorded in appendix E (statement 2) by the DIP. The DIP responsible for completing the request also determined the possible desired outcome, in consultation with the patient, and time frame necessary for follow-up (appendix E, statement 5). Thus, appendix E was utilized to document both consumer and health care professional queries. The desired outcome and time frame necessary for follow-up was finalized from discussion between the investigator and DIP (appendix F) immediately following completion of the request. The pharmacist that handled the drug information request was responsible for the follow-up within a period of 1-2 days (or as soon as was possible) to determine if the actual recommendation was accepted by the patient (appendix E, statement 7). The actual patient outcome was determined by the DIP during the 6 week follow-up period and recorded in appendix G by the investigator. Once follow-up had been completed, the investigator documented where the inquirer normally receives information on drug therapy and their opinion of the service via a telephone questionnaire (appendix F, questions 11 - 16).

3.3.3 Panel Assessment of Recommendations and Clinical Patient Outcomes

A panel consisting of two clinical pharmacists and two physicians experienced in general medicine was responsible for assessing the appropriateness of the answers and recommendations made by the drug information pharmacists. Each panel member was supplied with copies of the computer generated questions and answers, desired outcomes and clinical patient outcomes (appendix G) to determine, by a majority*, if the recommendations made by the DIP were appropriate, inappropriate, or unable to assess. In all queries, the patient's confidentiality was maintained. The panel members were also requested to classify, by a majority*, the impact of each recommendation on patient outcome** as one of the following: the recommendation resulted in a positive patient outcome, the patient did not respond to the recommendation and the problem remains unresolved, the patient experienced a negative response, a tangible outcome could not be measured but the patient's pharmacotherapy improved, a tangible outcome could not be measured but the patient benefited from education of his/her therapeutic regimen, and unable to document the impact of the recommendation on the patient's outcome (appendix G). A positive outcome was classified by the panel if the desired outcome was achieved and a beneficial effect on the patient was attributed (in part or in whole) to the DIS. A negative outcome would be classified by the panel if the desired outcome was not achieved and a detrimental effect on the patient was attributed (in part or in whole) to the DIS. Panel members were encouraged to modify desired outcomes when classifying the impact of the recommendation on patient care if they disagreed with the investigator. Finally, the panel was asked to classify, by a majority*, the importance of each query as either *not serious, potentially*

serious, or *serious* (Appendix H). This model of assessment was modified from Hatoum (1992) and employed in the study by Drolet (1996).

After an orientation to discuss the first ten health care professional requests, the panel members assessed the appropriateness of the response, classification of outcome and seriousness of the query on an individual basis. For those queries in which the panel did not reach an agreement, two further meetings were held in order to reach a majority. Generally, the investigator facilitated discussion of those queries which did not reach a majority. After discussion, the panel members voted on each issue in an attempt to reach a majority.

* Note - At least three of four panel members needed to be in agreement for a recommendation or outcome to be classified. If less than three panel members agreed, the recommendation or outcome was considered to be "unable to assess due to the lack of majority".

** Note - Outcome can be defined as the consequence of an intervention / recommendation or a change in a patient's health status that can be credited to preceding health care (Oakley 1983).

4.0 Results

4.1 Health Care Professional Section

A total of 577 drug information requests were received during the study period. Of these requests, 245 (42.5%) were patient specific and 98 requests met the inclusion criteria. One hundred and twenty patient specific requests were not included in the study because they were answered by hospital pharmacy residents while seventeen requests were not included because the inquirers refused to participate (12 pharmacists, 3 nurses, and 2 physicians). Ten requests were not included in the study because a desired outcome could not be identified for the patient. Most of the inquirers were pharmacists (90% retail pharmacists and 10% hospital pharmacists - Figure 1) while 34 (34.7%) of the callers were based in Saskatoon and 18 (18.4 %) were from Regina. The individual calling the DIS (inquirer) acted as the intermediary 65.3% of the time. Questions to the inquirer originated most frequently from the patient (41.8%), physician (24.5%), pharmacist (23.5%), nurse (8.2%) and patient's representative (2.0%). The nature of most of the patient specific requests involved drug interactions and adverse drug reactions (Figure 2). The mean time to answer a question was 22.37 minutes (range of 4 to 120 minutes) with 92.9% of the requests answered and returned within the next working day. The mean time to conduct follow - up was 10.41 minutes (range of 5 - 30 minutes).

Figure 1

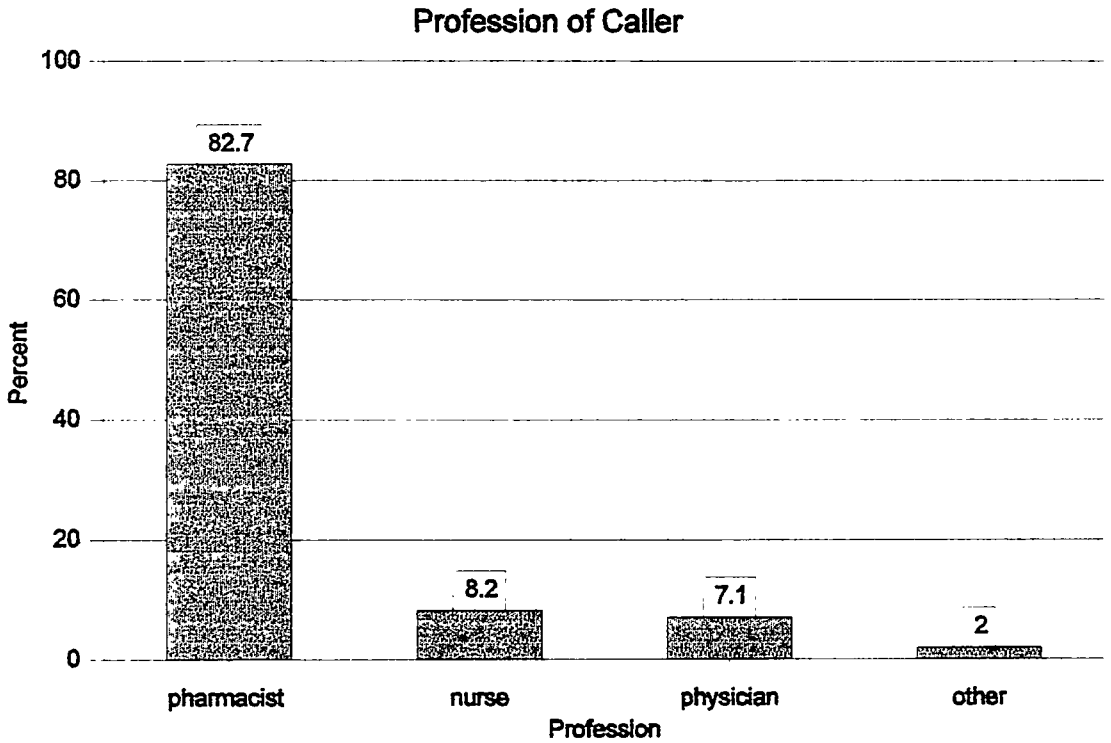
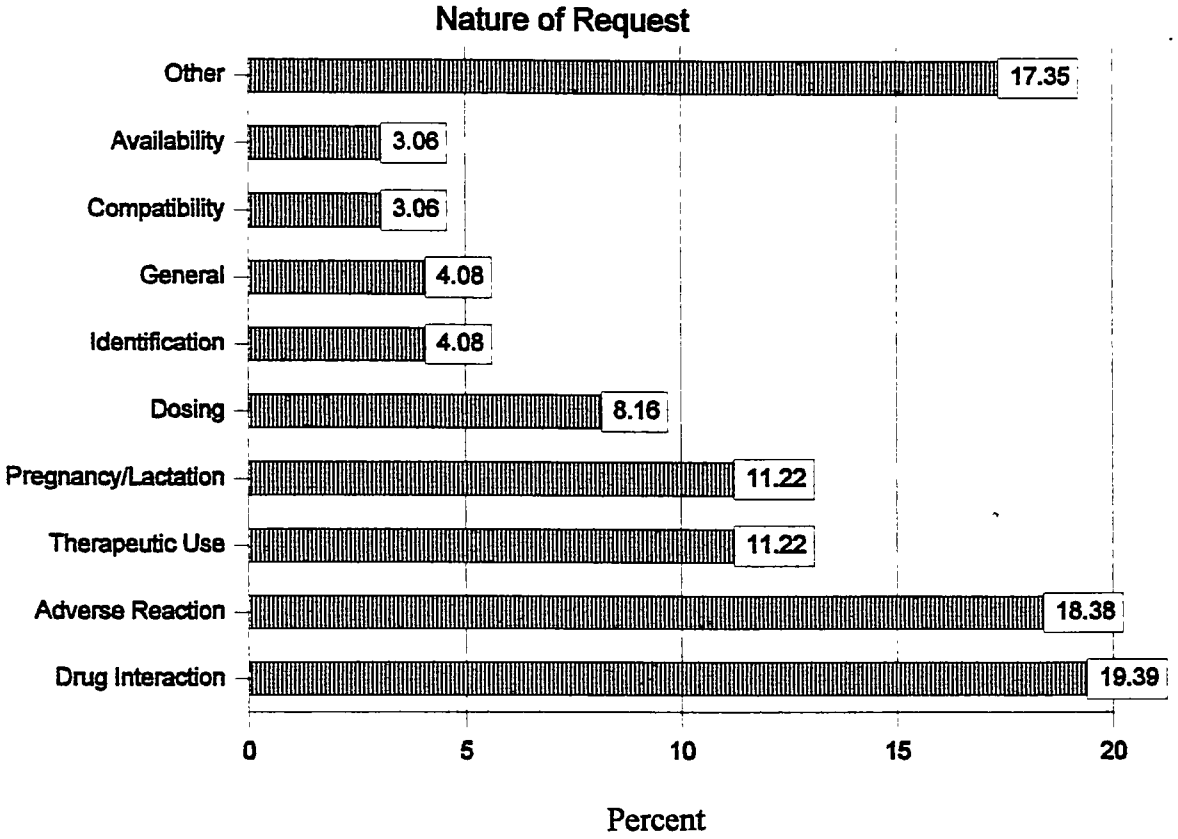

Profession of Caller
100
80
60
40
20
0
Percent
82.7
8.2
7.1
2
pharmacist
nurse
physician
other
Profession

Figure 2


Nature of Request
Other
17.35
Availability
3.06
Compatibility
3.06
General
4.08
Identification
4.08
Dosing
8.16
Pregnancy/Lactation
11.22
Therapeutic Use
11.22
Adverse Reaction
18.38
Drug Interaction
19.39
0
5
10
15
20
Percent

A total of 101 desired outcomes were identified for the 98 patient specific queries (Table 1) and 230 recommendations were made by the DIPs (Table 2). Eighty-three and one-half percent of the interventions / recommendations made by the DIPs were utilized by the health care professionals (Table 2). Twenty - six (11.3%) of the recommendations were not utilized and the outcomes of twelve (5.2%) of the interventions / recommendations were not known.

Table 1 (Desired Patient Outcomes)

Desired Patient Outcome	Frequency	Percent of Total
Prevention of disease / symptom	56	55.4
Medication administration optimized	24	23.8
Reduction / elimination of symptoms	18	17.8
Resolution of therapeutic problem	2	2.0
Arresting or slowing of disease process	1	0.9
Total	**101**	**100**

Table 2 (Interventions/Recommendations)

Intervention	Frequency / % of Total	A* / N* / U* / Percent Accepted
Give information / education	83 / 36.1	78 / 0 / 5 / 94.0
Recommend / add drug	38 / 16.5	25 / 11 / 2 / 65.8
Refer patient to pharmacist / physician	26 / 11.3	22 / 2 / 2 / 84.6
No change in drug regimen	25 / 10.9	20 / 3 / 2 / 80.0
Monitor parameters	19 / 8.3	19 / 0 / 0/ 100.0
Discontinue drug	15 / 6.5	11 / 3 / 1 / 73.3
Change drug administration	10 / 4.3	6 / 4 / 0 / 60.0
Recommend / change dose	7 / 3.0	7 / 0 / 0 /100.0
Other	7 / 3.0	4 / 3 / 0 / 57.1
Total	**230 / 100**	**192/ 26 / 12 / 83.5**

*** A = Accepted N = Not Utilized U = Unknown**

4.1.1 Health Care Professionals' Opinion

Ninety - five (96.9%) of the inquirers felt the DADIS had answered their question in a timely manner (66.3% believed the service was *very* timely). Three (3%) of the inquirers thought the service was not timely (1% regarded the service as *very* untimely). Ninety - five (96.9%) of the health care professionals believed the DADIS answered their question in an objective manner (72 or 73.5% of the inquirers believed the DADIS was *very* objective). None of the inquirers felt the service was unobjective but three (3.1%) did not have an opinion. Seventy - two (73.5%) of the inquirers believed the DADIS had a beneficial impact on the patient (28 or 28.6% believed the information was *very* beneficial to the patient) while 10 (10.2%) did not think the service impacted on the patient and 16 (16.3%) of the inquirers were unable to assess the impact of the service on the patient's care. None of the health care professionals believed the service had a detrimental effect on the clinical outcome of the patient. Only 14 (14.3%) of the health care professionals looked elsewhere after contacting the DADIS while 82 (83.7%) of the inquirers did not look further. Two (2%) of the inquirers did not have an opinion regarding whether they looked for further information after contacting the DADIS.

4.1.2 Panel Assessment of Health Care Professional Queries

The panel concluded that 93 (94.9%) of the requests were handled appropriately by the DIP's. Two (2.0%) of the requests were considered to be handled inappropriately by the DIP's while two of the responses were unable to be assessed by the panel due to insufficient information and documentation provided by the DIP. One (1.0%) of the requests could not be classified because the panel was unable to reach a majority. Table 3 describes the impact of the interventions on patient outcome. The panel concluded that the DADIS impacted positively on patient outcome in 35.6% of the queries and impacted negatively in 3.0% of the queries. For 23.8% of the requests, the panel concluded that the recommendation was not utilized. When a health care professional acted as an intermediary for the drug information request, 25.0% (16/64) of the recommendations were not utilized. When there was no intermediary to the drug information request, 23.5% (8/34) of the recommendations were not utilized. Of the 36 positive patient outcomes, 55.6% (20/36) were based on subjective data, 27.8% (10/36) were based on objective data, and 16.7% (6/36) were based on both objective and subjective patient data. If *accepted* interventions are evaluated, the DADIS impacted positively in 46.8% and negatively in 3.9% of patients' outcomes (Table 3). Finally, the panel classified 66.3% of the requests as potentially serious and 33.7% of the requests as not serious. Of the interventions which resulted in a positive outcome, 27 (75.0%) were considered potentially serious and 9 (25.0%) were not considered serious. The three interventions which resulted in negative patient outcomes were considered to be potentially serious queries.

Table 3 (Impact of Accepted Interventions/Recommendations)

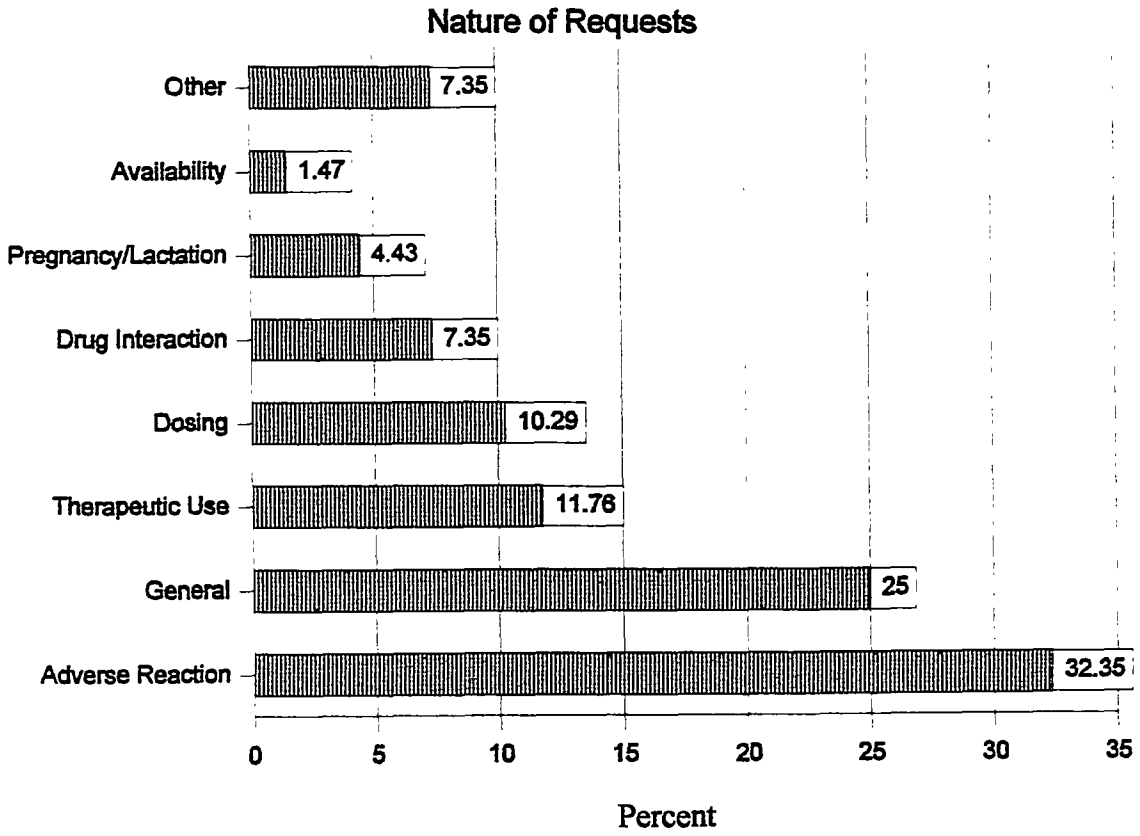
Impact	Frequency /% Total	Percent (Accepted)
positive patient outcome	36 / 35.6	46.8
recommendation not utilized	24 / 23.8	0
tangible outcome can't be measured / patient benefited	19 / 18.8	24.7
unable to obtain information / patient lost to follow-up	10 / 9.9	13.0
6 week period insufficient	5 / 5.0	6.5
patient did not respond / problem remains unresolved	3 / 3.0	3.9
negative patient outcome	3 / 3.0	3.9
inappropriate documentation	1 / 1.0	1.3
outcome can't be measured / pharmacotherapy improved	0 / 0	0
Total	101 / 100	100

4.2 Consumer Section

A total of 277 drug information requests were received during the study period. Of these requests, 96 (34.7%) were regarded as patient specific and 68 requests met the inclusion criteria. Twelve requests were not included in the study because a hospital pharmacy resident answered the requests while 10 queries were not included because a desired outcome could not be identified. Five requests were not included because the inquirers refused to participate in the study (one inquirer refused to participate because she believed the service took too long to answer her query and another inquirer could not understand the premise of the study). Another request was not included in the study because the investigator answered the query. The mean age of the callers was 56 years (range of 23 to 88 years) and sixty - one (89.7%) of the requests originated from females. The queries originated most frequently from Saskatoon (18 requests or 26.5%) and Regina (10 requests or 10.3%). Many inquirers (37 or 54.4%) were repeat callers while seven (10.3%) were referred to the service by health care professionals (six pharmacists, one nurse) and 24 (35.3%) heard about the service through various modes of advertising. Most (72.1%) of the inquirers contacting the SCDIS were actual patients while 27.9% of the inquirers were either a family member or friend of the patient. Of the inquirers who were either family members or friends of the patient, 12 (63.2%) acted as an intermediary for the patient recommendation while seven (36.8%) of the inquirers directly represented the patient (eg. mother of infant). The nature of most of the patient specific requests involved information on adverse drug reactions and requests for general drug information (Figure 3). The mean time to answer a request was 33.60 minutes (range of 5 to 120 minutes). The mean time for follow - up

of patient outcomes was 20.16 minutes (range of 4 - 40 minutes).

Figure 3


Nature of Requests
Other
7.35
Availability
1.47
Pregnancy/Lactation
4.43
Drug Interaction
7.35
Dosing
10.29
Therapeutic Use
11.76
General
25
Adverse Reaction
32.35
0
5
10
15
20
25
30
35
Percent

A total of 70 desired outcomes were identified for the 68 patient specific queries (Table 4) and 158 recommendations were made by the DIP's (Table 5). Approximately 87% of the recommendations were accepted and utilized by the consumers. Ten (6.3%) of the recommendations were not utilized and the outcomes of another 10 (6.3%) recommendations were not known.

Table 4 (Desired Patient Outcomes)

Desired Patient Outcome	Frequency	Percent of total
Medication administration optimized	37	52.9
Reduction / elimination of symptoms	18	25.7
Prevention of disease / symptom	15	21.4
Arresting or slowing of disease process	0	0
Resolution of therapeutic problem	0	0
Total	**70**	**100**

Table 5 (Interventions/Recommendations)

Interventions	Frequency / % of Total	A* / N* / U* / Percent Accepted
Give information / education	61 / 38.6	57 / 0 / 4 / 93.4
Refer patient to pharmacist / physician	41 / 25.9	33 / 5 / 3 / 80.5
No change in drug regimen	24 / 15.2	22 / 2 / 0 / 91.7
Recommend / add drug	8 / 5.1	5 / 1 / 2 / 62.5
Discontinue drug	7 / 4.4	5 / 1 / 1 / 71.4
Monitor parameters	7 / 4.4	7 / 0 / 0 / 100
Recommend / change drug administration	4 / 2.5	4 / 0 / 0 / 100
Recommend / change dose	4 / 2.5	3 / 1 / 0 / 75.0
Other	2 / 1.3	2 / 0 / 0 /100
Total	**158 / 100.0**	**138 /10/10 /87.3**

***A = Accepted N = Not Utilized U = Unknown**

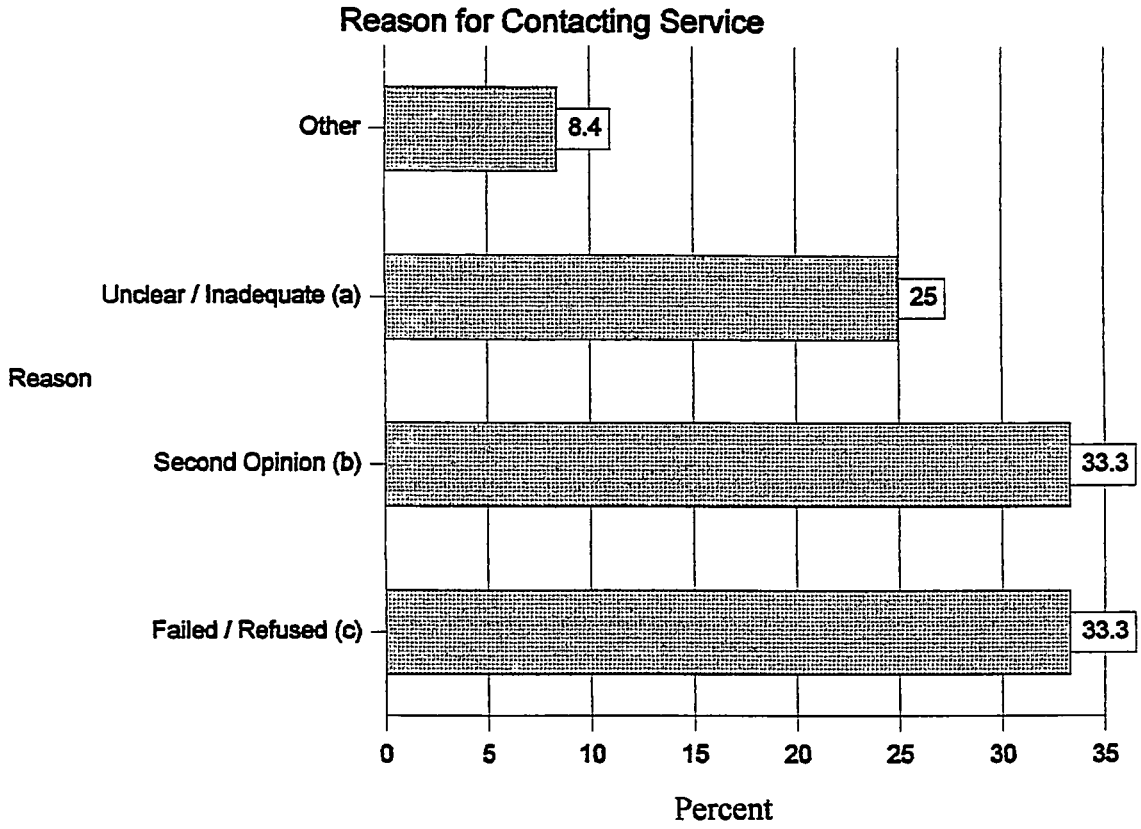
4.2.1 Consumers' Opinion

A consumer's opinion was obtained in 64 of 68 patients (four patients were lost to follow-up). Most of the consumers (40.6%) involved in the study survey stated they normally consult a retail pharmacist for information on drug therapy while 18.8% contact the SCDIS (Table 6). Twenty - four (35.3%) of the inquirers consulted a health care professional before contacting the DIS. The reasons for contacting the SCDIS after originally consulting a health care professional are shown in Figure 4. Most of these callers were pursuing a second opinion on their drug therapy or the health care professional failed or refused to provide the patient with sufficient information.

Table 6 (Where Consumers Obtain Drug Information)

Source	Frequency	Percent of total
Pharmacist Only	26	40.6
Consumer Drug Information	12	18.8
Pharmacist and Physician	12	18.8
Physician Only	6	9.4
Pharmacist and Consumer Drug Information	5	7.8
Other	3	4.7
Total	64	100

Figure 4



(a) The information provided by the pharmacist/physician was unclear or inadequate.

(b) The patient desired a second opinion to verify accuracy of information.

(c) The pharmacist/physician failed or refused to provide information.

Sixty - three (98.5%) of the consumers surveyed stated the SCDIS answered their question in a timely manner (49 or 76.6% felt the service was *very* timely) and one inquirer believed the service was very untimely. Fifty - nine (92.2%) of the inquirers believed the SCDIS was beneficial to the patient's care (34 or 53.1% of patients believed the SCDIS had a *very* beneficial effect on their care). Thirty - one (91.2%) of the repeat callers and 28 of the new callers believed the service was beneficial to the patient. Four (6.3%) of the consumers felt the service had no impact on their care while one (1.5%) of the consumers was unable to assess the effect of the service on their care. None of the consumers believed the service had a detrimental effect on patient care. Eleven (17.2%) of the consumers looked for further information after contacting the service.

4.2.2 Panel Assessment Of Consumer Queries

The panel concluded that 67 (98.5%) of the requests were answered appropriately by the DIPs while one query (1.5%) was handled inappropriately. Table 7 describes the impact of each intervention on the patient's outcome. In 38.2% of the queries, the panel concluded that a tangible outcome could not be measured based on the SCDIS' recommendations but the patients benefited from education on their therapeutic regimen. Approximately 37% of the recommendations resulted in a positive outcome and none of the interventions resulted in a negative outcome. Of the 25 positive patient outcomes, 76% (19/25) were based on subjective data, 16% (4/25) were based on objective data and 8% (2/25) were based on both objective and subjective data. The panel also concluded that 10.3% of the recommendations were not utilized. When an intermediary was involved in the drug information request, all of the recommendations made by the DIP were utilized. If only *accepted* recommendations were reported, the SCDIS impacted positively in 41% of patients (Table 7). Finally, the panel classified 55.9% of the queries as potentially serious and 44.1% of the requests as not serious. Of the queries which resulted in a positive patient outcome, 15 (60%) were considered potentially serious.

Table 7 (Impact of Accepted Interventions/Recommendations)

Impact	Frequency / % Total	Percent (Accepted)
tangible outcome can't be measured / patient benefited	26 / 38.2	42.6
positive patient outcome	25 / 36.8	41.0
recommendation not utilized	7 / 10.3	0
unable to obtain information / patient lost to follow-up	5 / 7.4	8.2
6 week period insufficient for follow - up	3 / 4.4	4.9
patient did not respond / problem remains unresolved	2 / 2.9	3.3
patient experienced a negative response	0 / 0	0
tangible outcome can't be measured / pharmacotherapy improved	0 / 0	0
inappropriate documentation by DIS	0 / 0	0
Total	**68 / 100**	**100**

5.0 Discussion

Ideally, a drug information service should answer requests in an accurate, timely, and objective manner for 100% of the queries. However, this may not always be practical or possible, particularly when accuracy, timeliness, and objectivity is often assessed using an inquirer's opinion or panel's assessment of the service. A DIS *should* provide an appropriate response 100% of the time when the request involves the simple exchange of information. However, when judgment is required to answer a patient specific drug information query, the risk of answering a request "inappropriately" is enhanced. Thus, methods for maintaining accurate and timely dissemination of drug information such as quality assurance programs become important to ensure drug information centres are maintaining high standards of practice and impacting positively on a patient's care.

This study suggests that the DIS disseminates drug information in an accurate, timely and unbiased fashion for patients with potentially serious drug-related problems. An expert panel concluded that 94.9% of the requests in the health care professional section and 98.5% of the requests in the consumer section were answered appropriately by the DIPs. In the health care professional section, the panel believed the DIP inappropriately recommended re-challenging patients (under medical supervision) with medications to which they had adversely reacted. For these two cases, the recommendations were not utilized. In the consumer section, the panel believed the DIP inappropriately diagnosed a rash without referral to a physician for proper evaluation. For this case, the panel concluded that the patient did not respond to the intervention

and the patient's problem remained unresolved.

Only two requests from the health care professional section were classified by the panel as unable to assess because of insufficient information and documentation by the DIP. This issue is significant because poor probing and / or documentation by the DIP was identified during the pilot project and was a prominent concern of the investigator. The exchange of verbal information which occurs between the DIP and the inquirer is often underestimated by written documentation of the request. For only one request in the health care professional section, the panel could not reach a majority. The two pharmacists on the panel believed the DIP should have offered more information to the inquirer regarding converting a patient from one narcotic to another while the physician panel members believed the information offered by the DIP was sufficient. Interestingly, this was the only request where a distinct difference in opinion occurred between the pharmacist and physician panel members.

The DIS also distributes drug information in a timely and objective fashion according to the inquirers' opinion. The mean time to answer a request was 22.37 minutes in the health care professional section and 33.60 minutes in the consumer section. Also, approximately 93% of the requests were answered and returned to the health care professional within one working day. The response time, which includes the time needed to probe the inquirer for information, does not necessarily reflect the efficiency of the service or complexity of the request. Health care professionals, for example, appear to be less willing to spend time on the telephone with the DIPs than consumers because they may be too busy and not have time to converse. This point

may be reflected in the difference in mean times to answer a request. Generally, requests from the consumer section were considered to be less complicated than the health care professional queries and this may be demonstrated by the nature of the requests. The majority of consumer requests involved side/adverse effects of drugs, general requests for information, therapeutic use and dosing while the nature of health care professional requests involved drug interactions, adverse drug reactions, therapeutic use and pregnancy and lactation. Response times also do not reflect whether the inquirers received the information in time to be useful for the patient. Almost 97% of health care professionals and 98.5% of consumers believed the DIS answered their request in a timely fashion. As suggested by Repchinsky (1987), a standard of 100% would be desirable for timeliness. Thus, DIPs should attempt to identify which requests are a priority by asking the inquirer the urgency of the request or by determining if the request is patient specific since these requests are generally more urgent. One health care professional believed the service was *very* untimely in responding to their drug information request. On further review, the inquirer had misplaced an addendum to a literature report mailed by the DADIS. The inquirer discovered the addendum approximately one week after they had received the literature from the DADIS but still believed the service was at fault.

Approximately 97% of the HCP's believed DADIS answered their request in an objective manner and none of the inquirers felt the service was unobjective. Three (3.1%) inquirers did not have an opinion regarding the objectivity of the service. Again, a standard of 100% should be desirable particularly for patient specific requests in which the drug information consultants are exercising judgement and recommending changes in a patient's therapy. It was

extremely important to maintain objectivity particularly when this study was funded by pharmaceutical manufacturers (ie. recommending a manufacturer's product may be perceived as being biased). The consumer's opinion of objectivity was not examined because it was believed that the inquirer may not have had sufficient data or knowledge to judge the objectivity of the response.

Drolet (1996) developed a methodology for documenting actual patient outcomes and also determined the impact of the Ottawa Valley Regional Drug Information Drug Information Service (OVRDIS) on patient outcome. Drug information requests were collected for a two week period and were eligible for study if they originated from community pharmacists, were patient specific and if the inquirer was willing to participate in the study. The nature of the request, necessary background information, the recommendation made by the drug information pharmacist to the community pharmacist and the relevant references were documented according to standard polices and procedures at OVRDIS. During the time of the request, the drug information pharmacist was responsible for identifying the desired patient outcome, the method of achieving the outcome and the time frame required for follow-up. More than one desired outcome could be identified per patient request. Following completion of the request, the investigator contacted the community pharmacist by telephone to determine the actual recommendation made to the patient, the patient's representative or the physician. During a 4 week follow-up period, the community pharmacists were asked to communicate with the patient and/or physician to obtain both objective and subjective information about patient outcome. The time to collect the relevant outcome was reassessed as required and the patients and physicians

were contacted as often as necessary to determine the outcome.

A panel consisting of three clinical pharmacists independently assessed the appropriateness of the recommendations made by the drug information pharmacists utilizing the drug information request forms. The panel members classified each recommendation as appropriate, inappropriate, or unable to assess. A separate panel of three physicians classified the impact of each recommendation as: the recommendation resulted in a positive outcome, the patient did not respond to the recommendation and the problem remains unresolved, the patient experienced a negative response, a tangible outcome could not be measured but the patient's pharmacotherapy was improved, and the panel was unable to document the impact of the recommendation on the patient's outcome.

A total of 33 patient specific requests obtained at OVRDIS within a 2 week period were considered to be eligible for the study. Ninety-one percent of the recommendations made by the drug information pharmacists were accepted by the health care professionals. The pharmacy peer review panel agreed that 88% of the recommendations made by OVRDIS were appropriate. The physician panel concluded that fifty-five percent of the recommendations resulted in a positive patient outcome; 10% of patients did not respond to the recommendation and the problem remained unresolved; 13% of the recommendations improved the patient's pharmacotherapy but outcome could not be accurately measured; for 23% of patients, an impact on outcome could not be ascertained.

Since a DIS should not accept responsibility for patient outcomes unless their recommendations are utilized, the outcomes of only *accepted* interventions should be analyzed. If accepted interventions are examined, the results of our study are in accord with the Drolet study. In this investigation, the panel concluded that 94.9% of the health care professional requests and 98.5% of the consumer requests were answered appropriately compared to 88% in the Drolet study. Furthermore, approximately 47% of the DIS' accepted recommendations resulted in a positive patient outcome for the HCP queries and 41% of the recommendations resulted in a positive patient outcome for consumer queries compared to 55% in the Drolet study. For approximately 50% of the health care professionals accepted recommendations and 59% of the consumer's accepted recommendations, an outcome could not be measured due to a variety of reasons. In 24.7% of the health care professional queries and 42.6% of the consumer queries, tangible outcomes could not be measured but the panel believed the patient benefited from the information and education provided from the DIS. This is higher than the 12.9% reported in the Drolet study in which an outcome could not be measured but the patient's pharmacotherapy improved. The differences between the studies (particularly in the consumer section) may be explained by the fact that our study attempted to determine the effect of providing information / education to inquirers which did not necessarily include making specific recommendations regarding a patient's drug therapy. The differences may also be explained by the identification of distinctive desired outcomes between the two investigators.

Although the DIS disseminates drug information in an accurate, timely and objective fashion, it is more difficult to assess whether the service impacts "positively" on a patient's

outcome. There were a significant number of requests for which a tangible outcome could not be measured and this could be explained by the fact that the DIS is not the primary care giver of the patient and that many factors are involved in a patient's care. Drug information services have been described as a support service "that may extend functions, legitimate competence, and generally enhance professional status, but unless they are carried out in a context of professional responsibility for patient welfare, they cannot constitute a professional role" (Hepler 1990). The pharmacist who collects patient, drug, and disease information and identifies drug-related problems and then utilizes services to prevent or treat the problems is delivering pharmaceutical care. The drug information pharmacist who disseminates drug information to the patient-care pharmacist is supporting the delivery of pharmaceutical care (Strand et al. 1992). Although a DIS cannot practice pharmaceutical care, it can enhance the pharmacists awareness to take more responsibility in the provision of pharmaceutical care by encouraging them to obtain more complete patient information. The specialized training of the DIPs allows for better probing of the inquirer and ultimately the patient is more likely to benefit (Watanabe 1978). Drug information requests are often referred to as "the tip of the iceberg", suggesting the request is always not as simple as it appears. One study determined that questions which appeared to be of a general nature were really related to patient specific issues (Cardoni 1978). By probing for more information, the DIP could discover further drug-related problems and have a greater impact on patient outcome. Although drug information services appear to be taking a more active role in enabling pharmacists and other health care professionals to improve the quality of patient care, it is difficult for these services to impact directly on patient care because the service may not have enough interaction with and/or sufficient information on the patient.

None of the recommendations in the Drolet study were judged to have negatively impacted on a patient's outcome while the recommendations of the DADIS were classified to have impacted negatively in approximately 4% of the patients. Two of the three requests involved drug interactions in which the DIP recommended the addition of a drug to a patient's regimen and careful monitoring after the addition of each drug. In one of the requests, the inquirer was concerned about a drug interaction between carbamazepine and fluvoxamine. The DIP recommended the addition of fluvoxamine to the patient's current carbamazepine therapy and cautioned the inquirer about the potential increase in carbamazepine levels and subsequent side effects. During the first week of fluvoxamine therapy, the patient developed tremors and shakiness, a known side effect of fluvoxamine (Luvox (R) product monograph). Carbamazepine blood levels were not measured and the fluvoxamine was discontinued after one week of therapy. In the other drug interaction case, the inquirer was concerned about a reduction in the efficacy of nifedipine with the addition of cisapride to their regimen. The DIP could not locate information involving a drug interaction between the two agents and therefore recommended the addition of cisapride. The patient subsequently experienced diarrhea, insomnia, and nightmares one week after the addition of cisapride to the patient's regimen. No blood pressure measurements were taken and both drugs were discontinued after one week of combination therapy. Although these patients experienced negative outcomes as a result of additional therapy, these effects were not likely attributed to drug interactions - the original reason for the drug information request and the primary concern for DADIS. The third query involved the administration of dextrose 50% in water (D50W) to a patient with cancer of the pancreas. The inquirer asked if D50W could be administered via a cassette pump so the patient could be

discharged from a rural hospital. The DIP determined that the patient had successfully received D50W via a CAD pump during a previous hospital stay. Unfortunately, an intravenous site could not be located for the D50W administration via the pump and the patient could not be discharged. Interestingly, the panel concluded that the three interventions which resulted in negative patient outcomes were handled appropriately by the DIPs. For all three queries, the inquirers believed DADIS' recommendations were beneficial to the patient. Although the three patients may have experienced negative outcomes, it is truly difficult to assess whether the information disseminated by DADIS attributed to the outcome. The negative classification by the panel likely resulted from identification of unclear desired outcomes by the investigator, a problem also documented by Keys (1975). Desired outcomes must be clearly identified and there were some requests for which the panel expressed uncertainty regarding the appropriate desired outcomes.

An area of interest is the number of queries in which the panel concluded the inquirer did not accept the recommendation of the DIS. Although 83.5% and 87.3% of the total number of *recommendations* were accepted by the health care professionals and consumers respectively, the panel concluded that in approximately 24% of the health care professional *requests* and 10.3% of the consumer *requests*, recommendations were not utilized (there may have been more than one recommendation for each desired outcome). This is slightly higher than the 9% reported in the Drolet study (1996). Examples of recommendations which were not utilized in our study involved the patient's refusal to discontinue the use of herbal products despite words of caution from the DIS and/or the intermediary health care professional. For one other request, a

retail pharmacist was intentionally misinformed by a dentist about a product which was prescribed for a child. Since the intermediary was misinformed, DADIS gave a recommendation which ultimately was not utilized. In one other case, a patient died before the health care team could implement the DIS' recommendation. The high percentage of interventions which were not utilized for health care professional queries could be explained by the fact that DADIS is one component of a patient's care and the ultimate decision of whether an intervention is implemented may depend on the prescriber or the patient. It did not appear that poor communication by an intermediary inquirer increased the risk of a recommendation not being utilized. For the health care professional queries, 25% of the recommendations which were not utilized occurred when an intermediary asked the drug information request. When there was no intermediary to the drug information request, 23.5% of the recommendations were not utilized. For the consumer queries in which an intermediary contacted the SCDIS, all of the recommendations were utilized. The important point to emphasize is that the DIS accomplished the task that was asked of them; whether or not an intervention was accepted was dependent on a number of extraneous factors that cannot be controlled by the DIS, the health care professional, or even the patient. Interestingly, almost 67% of the consumers and 54.1% of the health care professionals believed the DIS benefited the patient despite the fact the intervention was not utilized. Thus, the inquirers were generally satisfied with the service and believed the information benefited the patient even though the recommendation may not have been implemented.

A distinct difference between our study and similar studies is that we evaluated queries

from consumers as well as health care professionals. The study also evaluated the inquirer's opinion of the service's impact on the patient as well as the patient's opinion; an important component of pharmaceutical care. The majority (73.5%) of the inquirers in the health care professional section believed the service had a beneficial impact on the patient while 92.2% of the consumers believed the DIS was beneficial to the patient's care. The difference in the two sections could be explained by the fact that health care professionals may have had a more objective perspective on patient care than the consumers. Cardoni (1978) evaluated the requester's opinion of the impact of the University of Connecticut's DIS on patient outcome. A total of 491 requests were received from all health care professionals during a 3.5 month collection period. Of the 491 requests, follow-up interviews were conducted for 443 and it was determined that 421 were related to a patient's care and 350 (83%) were patient specific. Pharmacists accounted for 71% of the patient specific requests, nurses for 17% and physicians for 11%. Of the 350 patient specific requests, 329 (94%) were judged by the requester to have provided useful information and 58% (202) resulted in the provision of information that affected patient outcome, while 22% had an indeterminate effect on patient outcome. Of the 202 requests that were judged to have affected patient outcome, 78% were identified as having a positive effect while it was impossible to determine the effect of the information on the patient in 22% of the cases. It was concluded that drug information centres provide useful information to health care professionals, the information is being applied to patient specific problems, and the information has a positive impact on patient outcome. A limitation of the Cardoni study is that the classification of the impact on patient outcome was based on the inquirer's judgement who may have lacked objectivity when rating the effect of the service. In the Drolet study (1996),

91% of the community pharmacists felt the DIP's recommendations were beneficial while 9% felt the recommendation had no impact.

Most of the consumers who contacted the DIS utilize retail pharmacists as their primary source of drug information. Approximately 35% of the inquirers consulted a health care professional before contacting the DIS. Approximately 33% of these patients stated that their pharmacist or physician either failed / refused to provide them with any information or they contacted the DIS for a second opinion of the information provided for them. Twenty-five percent of the respondents stated the information provided by their pharmacist or physician was unclear or inadequate. These results are quite similar to a study conducted by Golightly (1988) in which 54% of the inquirers contacted a DIS because their physician or pharmacist had failed to provide information about their medication. Twenty-four percent of the inquirers desired a second opinion to verify the information provided by the pharmacist or physician and 22% percent considered the information provided by the physician or pharmacist unclear or inadequate. These results suggest a demand for an alternative service for consumers to fulfil their drug information needs because other health care professionals are either not providing the information the consumer requires or the information is not clear or adequate. Approximately 65% of the inquirers called directly to the DIS without previously contacting a pharmacist or physician. Although these consumers were not surveyed, we assume they utilize the SCDIS because of caller anonymity and the accessibility and efficiency of the service.

The panel concluded that the majority of the patient specific requests were of a

potentially serious nature. The number of requests categorized as potentially serious for the consumer queries were not as frequent as the health care professional queries. This difference could be explained by the differences in the nature of the drug information requests. For most of the consumer requests, inquirers contacted the SCDIS to verify the information the pharmacist or physician had given them on dosing or therapeutic use of the drug or request the DIP for general information on their drug therapy. Health care professional requests involved drug interactions and adverse drug reactions which are potentially more clinically serious situations than requests for general information. To the best of the author's knowledge, no other study has investigated this type of information for *patient specific* queries. A study conducted by Connor (1980) demonstrated that approximately 90% of consumer calls received at the Rocky Mountain Drug Consultation Centre were considered not serious or information requests; approximately 10% were considered to be potentially serious problems and less than 1% were classified as serious. In another study conducted at the Rocky Mountain Drug Consultation Centre, serious or potentially serious medication problems were present in 16.3% of the cases (Golightly et al. 1988). The differences in results could be attributed to the fact that our study analyzed patient specific requests and not just requests for general information. Our results are encouraging because it suggests that drug information pharmacists are providing useful information to health care professionals and patients regarding potentially serious drug-related problems.

5.1 Limitations

There were several limitations to this study. Improvement in technique or performance by the DIPs knowing they will be involved in a study may have introduced bias (ie. Hawthorne effect). The DIPs made a conscious effort to provide the panel with more complete patient histories and better documentation of answers. Also, the investigator ensured appropriate documentation of answers to facilitate panel assessment; this is not a standard policy and procedure at the DIS.

Another potential limitation of this study was the inherent difference in the manner in which questions were handled by the drug information pharmacists. Although not part of the study protocol, the investigator identified some queries which could have been classified as patient specific requests with further probing by the DIP. It is important to determine if the request is patient specific because it will give the DIP a better understanding of the actual request and the circumstances of the request. Further probing will also enable the DIP to provide a more useful response which is appropriate to the specific clinical circumstance of the request. Unless a DIP probes for further information, an inappropriate response may be given since the caller may have asked only a fragment of the question (Watanabe 1978). The quality of the answer given to a health care professional and the documentation of the query could have depended on the experience and training of the drug information pharmacist. Requests answered by hospital pharmacy residents were not included in the study because a small proportion of residents rotated through the DIS at the time of the study. On average, five residents undergo a

four week rotation at the DIS for the purpose of training and practical experience in the handling of drug information requests. If the residents involved in the study had abilities significantly different from the residents that were not involved in the study, the results may have been skewed. Queries answered by hospital pharmacy residents were not evaluated in this study and this may be viewed as another limitation since they constitute an important part of the DIS. The 1995 - 1996 hospital pharmacy residents answered 12.4% and 0.9% of the total requests for the DADIS and SCDIS respectively. Consequently, the results of this study may have been more generalizable if the residents responses had been included in the evaluation.

Selection bias may be another potential limitation of this study. Inquirers who utilized the service in the past may have been more likely to have had positive results and could have been more likely to have given a positive opinion of the service. Thus, the inquirers may have given their opinion of the quality of previous experiences of the service rather than the impact the DIS had on patient outcome. For consumers, however, new users of the DIS believed the service benefited their care in 93.3% of cases while repeat users believed the DIS benefited their care in 91.2% of the cases. Thus, selection bias may not have been as significant as originally anticipated, at least for the consumer queries. For both health care professional and consumer queries, the potential for bias was minimized as much as possible by allowing the investigator to collect the inquirer's opinion of the service.

The number of patients lost to follow - up was another limitation of the study. The patients lost to follow - up could have been more likely to experience either a positive or

negative outcome as a result of the intervention which may have introduced bias. The patients lost to follow-up in the professional section (13.0%) was slightly greater than the consumer section (8.2%). This could be explained by the fact that the consumer section did not have an intermediary health care professional who provided them with drug information. The DIPs may have been more motivated to follow - up with their patients than the health care professional involved in the study. Also, patients in the consumer section may have been more concerned with their care and better informed than the patients in the health care professional section.

One could also argue that some of the outcome measures used in this study (eg. drug compliance and intravenous compatibility) are better defined as *process* indicators that are potentially correlated with clinical outcomes and improved health. Process refers to things done to and for the patient and its assessment involves determining how well services conform to accepted standards of practice (Repchinsky 1987). Some of these measures may be strongly correlated with, but not direct measures of, clinical or quality of life outcomes (Rupp 1992). The danger of using process indicators is that relationships with outcome that are often thought to exist do not (Enright 1988). However, if a health care professional's input is considered as a link in the chain of care, process and the endpoint to that process can be measured with the assumption that improvement in one link should lead to improvement of global outcome (Repchinsky 1987). The DIS is a part of an important process which leads to patient outcomes.

Outcome can be defined as the consequence of an intervention or a change in a patient's health status that can be attributed to preceding health care (Oakley 1983). There may

be several important elements of patient care in which outcomes cannot be measured and it is unknown whether a patient's outcome would have improved regardless of contact with the DIS. Because this study was primarily evaluating clinical outcomes, there was potential for conflict in results since a patient may have improved clinically but may have experienced adverse effects due to therapy; this is not compatible with the philosophy of pharmaceutical care. Thus, it was difficult to assess whether the patient actually experienced a "positive" outcome as a result of a DIS intervention. As described by Cardoni, it is not appropriate to attribute a patient's improvement primarily to recommendations suggested by the DIP because so many variables affect a patient's outcome. However, it would also be extremely difficult to isolate the effect of the DIS on patient outcomes by the use of controls (Cardoni 1978).

A final limitation of the study may have been the panel's assessment of the appropriateness of responses from the DIPs. Because of time constraints, panel members were not expected to conduct literature searches to determine the validity of the responses; the assessment was based on previous experience and the judgement of the panel members. In order to minimize this limitation, only panel members who had experience and were currently practicing in the area of general medicine were selected. Also, the panel members themselves may have introduced bias because they were willing to be involved in the study and may have had a vested interest in drug information.

5.2 Recommendations

Several recommendations have resulted from this study:

1. An external drug information services review committee should be struck whose mandate would be to sustain the objectives of the DIS. The committee's primary responsibility could be to regularly review the operations of the DIS to maintain high standards of quality in the distribution of drug information. The responsibilities of the committee may include but not be limited to the following:

    a) To ensure competence among the drug information pharmacists by regularly reviewing randomly selected drug information requests,
    b) To accept, process, and act upon complaints from health care professionals and consumers who use the DIS,
    c) To make recommendations regarding funding of the service, and
    d) To make recommendations regarding policies and procedures of the service.

A distinct disadvantage of a review committee would be the amount of time involved in preparing for each meeting and the duration and frequency of meetings (Smith 1990). Although the committee would not be required to conduct literature searches to determine the completeness or appropriateness of the responses, a significant amount of time would be required to review the queries. Another limitation to this approach is that documented responses

may not reflect the communication which took place between the DIP and the inquirer. Thorough documentation of requests, responses and references would be necessary to ensure the documents reflect the information exchanged during the query.

An alternative to an external review committee would be an internal peer review program. The advantage of such a program is that the review process would be quicker than an external review committee and the verbal exchange of information could be more carefully evaluated. The obvious disadvantage of such a program is that peers have a vested interest in the drug information service and its objectivity. This process would also be extremely time consuming.

2. DADIS and SCDIS should encourage the Canadian Drug Information Centre Exchange to re-institute a Canadian drug information service peer review program. This program involves mailing drug information questions to various centres to determine if the particular centre could answer the request appropriately. This program has not been utilized for several years but would be another method of quality assurance and encourage communication with other drug information services in handling drug information requests.

3. Criteria are needed to define acceptable standards of practice within drug information centre circles. One study (Beaird et al 1994) identified an inconsistency in the accuracy of responses among drug information centres. Beaird suggested that although standardized policies and procedures and on-line searching capability contributed to increased accuracy, there is a need for enhanced quality assurance efforts to ensure all callers will receive an acceptable level of service. A logical group for establishing criteria would be The Drug Information Centre Exchange Committee. Guidelines for the provision of drug information services have been published by the Canadian Society of Hospital Pharmacists (CSHP 1995) and these guidelines are useful in defining the references required, scope and availability of services, policies and procedures, record keeping, quality assurance, etc. These standards, however, do not address a number of important issues including whether a service is appropriately staffed to handle a specific number of requests (ie. define minimum staffing for a specific number of requests) or *how* to follow - up with patients to measure patient outcome. The methodology utilized in this study appears to be a useful tool in measuring the impact of drug information centres on patient outcome.

4. Further study is needed to determine why consumers utilize the SCDIS. It is assumed that many inquirers contact the service because it is efficient and the caller remains anonymous to the DIP. This study only addressed consumers who had originally contacted another health care professional prior to contacting our service.

5. DIPs should follow-up with inquirers for patient specific requests that are potentially serious or serious in nature. Follow-up will ensure that the inquirer received information in a timely manner and will allow the DIP to document the effect of the DIS on patient care. Follow-up is an essential component of pharmaceutical care and DIPs should take every opportunity to encourage pharmacists and other health care professionals to assume a greater responsibility in determining patient outcomes.

6.0 Conclusions

This study demonstrated that the Dial Access Drug Information Service and the Saskatchewan Consumer Drug Information Service provides drug information in an accurate, timely, and objective manner to inquirer's with potentially serious drug-related problems. Although it is desirable for a DIS to answer requests in a timely, objective, and accurate manner for 100% of the queries, this may not always be possible. Thus, methods for identifying why a service may not be fulfilling its objectives are necessary in order to strive to maintain high standards of practice and impact positively on patient care.

It is more difficult to determine if the DIS impacts "positively" on a patient's clinical outcome. For outcomes that could be measured, the DIS appears to have impacted positively on patient care. The panel found several queries for which a tangible outcome could not be measured but the service benefited the patient with respect to providing information on their therapeutic regimen. There are many factors which contribute to a patient's care and the DIS is an integral support service which assists the primary care giver in achieving desired patient outcomes. Certainly, the inquirers of the service believe the information had a beneficial effect on patient care. Although over half of the requests that were received at the DIS were not eligible for study, eventually, the information provided by the DIS will better prepare the health care professional to assume greater responsibility in the provision of patient care.

7.0 References

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APPENDIX A

DIAL ACCESS DRUG INFORMATION SERVICE INQUIRY FORM

Caller Information:

Inquirer: _____ Date: _____

Address: _____ Needed by: _____

Telephone: _____ Call received by: _____

Location: _____ Profession: _____

Background Information:

patient specific: [ ] yes [ ] no age: _____ wt: _____

---

medical problems:
major organ function:
adverse effects/allergies:
medications:

Ultimate Question:

Classification: (Check one)

___ Adverse Reaction
___ Availability
___ Biopharmaceutics/Kinetics
___ Compatibility
___ Contra-indications
___ Dosage
___ Drug Abuse
___ Drug Interaction
___ Formulation/Pharmaceutics
___ General Information
___ Identification
___ Lactation
___ Pregnancy
___ Side Effects
___ Stability
___ Therapeutic Use/Drug of Choice
___ Toxicity
___ Other _____

References Searched:

PHARM/THER	DISEASE	PREG/LAC	FORMULATION	SECONDARY
1 [ ] Martindale 2 [ ] AHFS 3 [ ] CPS 4 [ ] CSM 5 [ ] Clin Drug Data 6 [ ] F & C 7 [ ] G & G 8 [ ] Appl Ther 9 [ ] Herfindal 10 [ ] Pharmacotherapy 11 [ ] Med Letter 12 [ ] USP DI 13 [ ] Hdbk Non Pres.	16 [ ] CONNS 17 [ ] Harrison 18 [ ] Merck manual 19 [ ] Other **PEDIATRICS** 20 [ ] APhA 21 [ ] Ped Drug Dosage 22 [ ] Pagliaro **INF DIS** 23 [ ] MSD 24 [ ] Sanford 25 [ ] Med Lett Hdbk	26 [ ] Briggs 27 [ ] Koren **IDENT/AVAIL** 28 [ ] CDIC 29 [ ] Merck Index 30 [ ] Mexicana 31 [ ] MIMS 31 [ ] Other MIMS 32 [ ] New Drugs 33 [ ] Unlisted Drugs 34 [ ] EDI 35 [ ] INVEST/ EMERG **HERBAL** 36 [ ] CRC Handbook 37 [ ] Herbal products 38 [ ] Pharmacognosy 39 [ ] Lawrence	40 [ ] Extemp CSHP 41 [ ] Remingtons **ADR/DI** 42 [ ] DI Facts 43 [ ] Hansten 44 [ ] Meyler 45 [ ] Davies 46 [ ] Reactions **FILES** 47 [ ] AHFS File 48 [ ] Disease 49 [ ] Misc.	50 [ ] Drugdex 51 [ ] Medline 52 [ ] Iowa **CONSULTS** 53 [ ] Manufacturer 54 [ ] Other Consult

65

TE/ ME	REPLY	TIME SPENT ON	
		RESEARCH	FOLLOW-UP

Answered: _____ **Time:** _____ **Responder:** _____

APPENDIX B

CONSUMER DRUG INFORMATION SERVICE INQUIRY FORM

Caller Information:

Name: _____ Date: _____

Address: _____ Age: _____

Telephone: _____ Source of Call: _____

City/Town: _____

Background Information:

_____

medical problems:
adverse effects/allergies:
medications:

_____

Ultimate Question:

Classification: **(Check one)**

___ Administration
___ Adverse Reaction
___ Availability
___ Biopharmaceutics/Kinetics
___ Compatibility
___ Contra-indications
___ Dosage
___ Drug Abuse
___ Drug Interaction
___ Formulation/Pharmaceutics
___ General Information
___ Herbal
___ Identification
___ Lactation
___ New Product Data
___ Pregnancy
___ Side Effects
___ Stability/Storage
___ Therapeutic Use/Drug of Choice
___ Toxicity
___ Other _____

References Searched:

PHARM/THER	DISEASE	PREG/LAC	FORMULATION	SECONDARY
1 [ ] Martindale 2 [ ] AHFS 3 [ ] CPS 4 [ ] CSM 5 [ ] Clin Drug Data 6 [ ] F & C 7 [ ] G & G 8 [ ] Appl Ther 9 [ ] Herfindal 10 [ ] Pharmacotherapy 11 [ ] Med Letter 12 [ ] USP DI 13 [ ] Hdbk Non Pres.	16 [ ] Conns 17 [ ] Harrison 18 [ ] Merck manual 19 [ ] Other **PEDIATRICS** 20 [ ] APhA 21 [ ] Ped Drug Dosage 22 [ ] Pagliaro **INF DIS** 23 [ ] MSD 24 [ ] Sanford 25 [ ] Med Lett Hdbk	26 [ ] Briggs 27 [ ] Koren **IDENT/AVAIL** 28 [ ] CDIC 29 [ ] Merck Index 30 [ ] Mexicana 31 [ ] MIMS 31 [ ] Other MIMS 32 [ ] New Drugs 33 [ ] Unlisted Drugs 34 [ ] EDI 35 [ ] Invest/ Emerg **HERBAL** 36 [ ] CRC Handbook 37 [ ] Herbal products 38 [ ] Pharmacognosy 39 [ ] Lawrence	40 [ ] Extemp CSHP 41 [ ] Remingtons **ADR/DI** 42 [ ] DI Facts 43 [ ] Hansten 44 [ ] Meyler 45 [ ] Davies 46 [ ] Reactions **FILES** 47 [ ] AHFS File 48 [ ] Disease 49 [ ] Misc.	50 [ ] Drugdex 51 [ ] Medline 52 [ ] Iowa **CONSULTS** 53 [ ] Manufacturer 54 [ ] Other Consult
COMPAT 14 [ ] Trissel 15 [ ] IV Manual				

TE/ IE	REPLY	TIME SPENT ON	
		RESEARCH	FOLLOW-UP
			68

Answered: _____ Time: _____ Responder: _____

APPENDIX C

TELEPHONE STATEMENT TO HEALTH CARE PROFESSIONALS REGARDING THE STUDY, THEIR INVOLVEMENT, AND CONSENT

May I explain a study which is being conducted at the Dial Access Drug Information Service ? The study is entitled "Impact of the Dial Access and Saskatchewan Consumer Drug Information Services on Patients' Clinical Outcome". The objective of this study is to determine the impact the service has on patient outcome. If you were to participate in this study, the potential benefits to your practice include improved communication with your patients and a possibility of improving a patient's drug therapy. The disadvantage of participation in this study is the extra time required to interact with the investigator and the patient or physician.

If you agree to participate, you will be required to document the specific patient's name and telephone number for future use. After our service has answered your drug information request, we will identify a possible patient outcome and time frame necessary for follow-up (refer to appendix E, statement 5). In approximately 1-2 days, the investigator (Paul Melnyk) will contact you by telephone to determine the actual recommendation made to the patient. This may require that you consult with the patient and/or patient's physician to determine the actual recommendation. During the specified follow-up period, you will be contacted by Paul and asked to obtain subjective and/or objective information surrounding the actual patient outcome from either the patient and/or the patient's physician. You will also be asked your opinion of the impact the centre had on patient outcome.

You would be permitted to withdraw from this study at any point in time and your question will be answered regardless of participation in the study.

The results of this study will be used in a masters' thesis and it will be extremely beneficial in determining the effectiveness of this drug information service. The data gathered from this study will also help us to improve our service to health care professionals of the province. No patient, pharmacy, pharmacist or physician names will be utilized. All data will be presented in aggregate form.

Do you have any questions regarding this study ?

Would you like to participate in the study ?

The name of the person conducting this study is Mr. Paul Melnyk. He is a graduate student in the College of Pharmacy and Nutrition at the University of Saskatchewan. If you have further questions regarding this study, please do not hesitate to contact Paul at this number: 1-800-667-3425.

NOTE: Document consent in appendix E, statement 2.

APPENDIX D

TELEPHONE STATEMENT TO CONSUMERS REGARDING THE STUDY, THEIR INVOLVEMENT, AND CONSENT

May I explain a project which is being conducted at the Saskatchewan Consumer Drug Information Service ? The study is called "Impact of the Dial Access and Saskatchewan Consumer Drug Information Services on Patients' Clinical Outcome". The reason for the study is to determine whether our service actually improves your drug therapy by answering your questions. The possible benefits of this study are that we help you with your drug therapy (for example, make it easier to take your medication or explain how your medicines work).

If you agree to be in the study, we will call you on the telephone in a few days and ask you some questions about your medications. You will also be asked your opinion of the Consumer Drug Information Centre's service and its impact on your care. It should take about 10 to 15 minutes.

There is no risk to you by participating in the study. We will answer your questions whether or not you agree to participate in the study. You are free to withdraw from the study at any time.

The information gathered in this study will assist in determining the effectiveness of this service. The results will likely be published in the medical literature, but the information will be combined with information from many other callers so your name will never be known by anyone other than myself and the person who is responsible for conducting the study.

Do you have any questions ?

Would you like to participate in the study ?

The name of the person conducting the study is Mr. Paul Melnyk. He is a graduate student in the College of Pharmacy and Nutrition at the University of Saskatchewan. You can reach him by calling back this number: 1-800-665-3784. Please do not hesitate to contact us at anytime with questions about this study.

NOTE: Document consent in appendix E, statement 2.

APPENDIX E

DATA COLLECTION FORM - DI PHARMACIST

1. Document query as per the DIS' standard policies and procedures.

2. Once the query has been answered and meets the entry criteria, will the health care professional or consumer participate in the study ? Read either appendix C (health care professional) or appendix D (consumer) regarding the study, consent, and their involvement in the study.

_____ yes _____ no _____ date

_____ name of inquirer +/or patient

_____ drug information pharmacist's signature

3. If the health care professional agrees to be involved in the study, ensure they will note the name and telephone number of the patient and the patient's physician. Also mention that the investigator will be contacting them during the follow-up period.

4. If the consumer agrees to be involved in the study, ensure the drug information pharmacist will note the name and telephone number of the consumer and that they will be contacting the consumer during the follow-up period.

5. Determine the possible patient outcome and time frame necessary to monitor the outcome.
Possible outcomes include: (check appropriate outcome and specify)

____ - the resolution of the therapeutic problem (eg. cure of a disease)
_____

____ - the reduction or elimination of symptomatology (eg. ADR resolved)
_____

____ - the arresting or slowing of a disease process (eg. treatment of heart failure)
_____

____ - the prevention of a disease or symptomatology (eg. ADR or disease avoided)
_____

____ - medication administration optimized (eg. improved compliance, IV compatibility)
_____

other_____

6. Recommendations from the drug information pharmacist (please check and specify recommendation and time frame for follow-up)

Specify *Time Frame*

____ No change in drug regimen_____

____ Recommend/add drug_____

____ Discontinue drug_____

____ Change/recommend dose_____

____ Recommend/change drug administration_____

____ Information/education_____

____ Refer patient to physician/pharmacist_____

____ Monitor parameters_____

____ Other_____

QUESTIONS 7 - 8 FOR CONSUMER INQUIRIES ONLY

7. Did you accept our recommendation ?

____ accepted ____ unknown

____ modified and accepted (explain_____

_____)

_____ rejected (explain_____

_____)

8. Document the actual patient's clinical outcome for the consumer inquiry.

9. Document the time necessary for answering the question AND time necessary to obtain study results (ie. consent and follow-up with patient).

time to answer question: _____ min. time for consent / follow up: _____ min.

TOTAL TIME: _____ min.

APPENDIX F

DATA COLLECTION FORM - INVESTIGATOR

1. Was the information/recommendation made by the health care professional the same as the one made by the drug information pharmacist ? In cases involving consumer inquiries, the answer will be yes.

_____ yes _____ no

If no, what was the intervention ?

2. Who was the recommendation made to ? ____ physician ____ patient ____ pharmacist

_____ other (specify_____)

3. Was the recommendation accepted ?

_____ accepted _____ modified and accepted (explain_____)

_____ unknown _____ rejected (explain_____)

4. **The desired patient outcomes include:**

_____ the resolution of the therapeutic problem (eg. cure of the disease)

_____

_____ the reduction or elimination of symptomatology (eg. ADR resolved)

_____

_____ the arresting or slowing of disease process (eg. treatment of heart failure)

_____

_____ the prevention of a disease or symptomatology (eg. ADR or disease avoided)

_____

_____ medication administration optimized (eg. improved compliance, IV compatibility)

_____

_____ other_____

_____

5. Recommendations (please check and specify recommendation and time frame for follow-up)

____ No change in drug regimen_____

____ Recommend/add drug_____

____ Discontinue drug_____

____ Change/recommend dose_____

____ Change drug administration_____

____ Give information/education_____

____ Refer patient to physician/pharmacist_____

____ Monitor parameters_____

____ Other_____

QUESTIONS 6 - 10 FOR HEALTH CARE PROFESSIONAL QUERIES ONLY

6. Did our service answer your question in a timely manner ?
____ very timely ____ timely ____ no opinion ____ untimely ____ very untimely

Explain:

7. Do you feel the information provided was objective ?
____ very objective ____ objective ____ no opinion ____ unobjective ____ very unobjective

Explain:

8. Was it necessary for you to look further for information ?
____ yes ____ no opinion ____ no

Explain:

9. Please classify the impact our service had on the patient:
____ very beneficial ____ beneficial ____ no impact ____ detrimental ____ very detrimental

____ unable to assess

Explain:

10. Document the time necessary to obtain study results (ie. data collection / follow-up for each query).
_____ min.

QUESTIONS 11 - 16 FOR CONSUMER QUERIES ONLY

11. Where do you normally get your questions about your medications answered ?
____ Pharmacist

____ Physician

____ Saskatchewan Consumer Drug Information Service

____ Other (explain_____

_____)

12. Did you seek information elsewhere before contacting our service with this request ?
____ yes ____ no

13. If the answer to question #12 was yes, classify why are you calling the Consumer Drug Information Service.

____ pharmacist/physician were too busy to explain your therapy

____ pharmacist/physician failed/refused to provide information

____ the information provided by pharmacist/physician was unclear or inadequate

____ desired a second opinion to verify accuracy of information provided by pharmacist or physician

____other (explain_____

_____

_____)

14. Did you look for any more information regarding this question after you contacted our service ?

____ yes ____ no

If yes, explain_____

15. Did our service answer your question in a timely manner ?

____ very timely ____ timely ____ no opinion ____ untimely ____ very untimely

16. Please classify the impact of our service on your therapy.

____very beneficial ____ beneficial ____ no impact ____ detrimental

____ very detrimental ____ unable to assess

17. Document the total time required to answer question and obtain study results (add times from Appendix E, statement 9 and Appendix F, statement 10)

_____ min.

APPENDIX G

DATA COLLECTION FORM - DOCUMENTATION OF OUTCOMES

1. Description of actual patient outcome (s), even if recommendations (s) was (were) not implemented (for investigator to complete).

QUESTIONS 2 - 3 FOR EACH PANEL MEMBER TO COMPLETE

2. Classify the DIS' recommendation +/or information as one of the following:

_____ appropriate _____ inappropriate _____ unable to assess

3. Based on the information provided, classify the significance of the outcome (circle one).
i) The recommendation resulted in a positive outcome based on:

a) **subjective data** (eg. patient feels symptoms have improved)

b) **objective data** (eg. blood pressure normalization)

ii) The patient did not respond to the recommendation and the problem remains unresolved.

iii) The patient experienced a negative response (ie. the outcome was adversely affected by the recommendation).

iv) A tangible subjective and/or objective outcome cannot be measured based on the recommendation, but the patient's pharmacotherapy improved (eg. therapeutic alternative for a pregnant patient)

v) A tangible subjective and/or objective outcome cannot be measured based on the recommendation, but the patient benefited from education on their therapeutic regimen.

vi) Unable to document the impact of the recommendation on the patient's outcome because:

a. Unable to obtain necessary information from patient or health care professional

b. Six week follow-up period insufficient time to determine outcome

c. Inappropriate documentation by the drug information service

d. Intervention was not utilized

APPENDIX H

CLASSIFICATION OF QUERY IMPORTANCE

For panel members to complete

Please classify the importance of each of the queries as either **not serious, potentially serious,** or **serious.** Classify each question after completing **Appendix G.**

Definitions

Not Serious:

- The query **did not** have a significant impact on morbidity, mortality, hospitalization (or prolonged hospitalization) or required a significant medical intervention.

eg. Availability of a vitamin preparation

eg. Locating the least expensive therapeutic alternative

Potentially Serious:

- The query **could** have potentially had a serious impact on morbidity, mortality or hospitalization (or prolonged hospitalization).

eg. Use of alternative herbal therapies in patients receiving drugs for chronic conditions (eg. anticoagulants, antihypertensives, etc.).

eg. Recommending drug use during pregnancy

Serious:

- The query **had** a significant impact on morbidity, mortality, hospitalization (or prolonged hospitalization) or required a significant medical intervention.

eg. Adverse drug reaction causing hospitalization.

eg. Identification of a drug interaction of major significance.