Computer Experience in a Drug Information Centre: Taking The Byte!

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INTRODUCTION

Computers have now been used in pharmacy practice for nearly two decades. First introduced as an aid for maintaining patient profiles and drug labelling, computers rapidly invaded other aspects of pharmacy practice: inventory, IV additive service, pharmacokinetic monitoring, medication administration records etc.[1] Computers have also knocked at the door of the drug information centres.[2] A recent study revealed that 75% of surveyed Canadian drug information centres are using computers in their daily practice.[3] Word processing, formulary maintenance and on-line literature searches are presently the main computer applications in these centres. Less frequently, other functions such as workload statistics, pharmacokinetic calculations, storage of answered questions and indexing of journals and articles have been automated.[3]

At the Ottawa Civic Hospital, an 820 bed teaching hospital affiliated with the University of Ottawa, the drug information centre has been established since January 1984. It occupies a small room of less than 300 square feet, physically remote from the main pharmacy, but with convenient access for physicians. Personnel operating the centre include a full time drug information pharmacist and a part time secretary (four hours/week). The centre contains approximately sixty current textbooks and subscriptions to more than twenty pharmacy and medical journals and abstracting services. A file system using three classifications has been set up: 1) drug classification, 2) disease classification; and 3) pharmacy related topics classification (e.g. total parenteral nutrition, sterile manufacturing, clinical pharmacy practice, etc.). Each file folder properly labelled contains current articles from pharmacy and medical journals.

The centre is accessible by health professionals within the hospital. We currently handle 130 requests per month, with the source of request equally divided among pharmacists, nurses and physicians. Requests are received via telephone (85%) and personal visits (15%), and typically involve drug availability, side effects, compatibility/stability, dosage and administration, therapeutic use and interactions, as well as product identification and drug use in pregnancy and lactation.

Computerization — First Trial

In the fall of 1986, a decision was made to automate the drug information centre. An IBM compatible micro computer was thought to be the most flexible and able to meet our needs. The Management Information Systems department selected the hardware — a MAX-PC with one 640k RAM — 40 MB hard disk drive, one 5¼" floppy diskette drive and a Hewlett Packard Inkjet printer. A CD-ROM reader (from Reference Technology) was also added as we intended to subscribe to the Micromedex CD-ROM system. The total cost of the equipment was approximately $4000. For the next six months, the computer was used extensively for word processing, MedLine searches and access to the Micromedex CD-ROM system.

In designing our own computerized database, we had three objectives in mind: first, to store *all* the information contained on our master drug information sheet (Figure 1); second, to be able to retrieve on-line previous requests; and third, to compile the monthly statistics report.

A review of literature failed to provide any Canadian published experience on this specific topic. A visit to two hospitals which had automated their drug information centres revealed that their computer program was at this point only for indexing journals and other references. From there, we decided to create our own program. An outside programmer was contracted ($3000.) to write a program using dBase III. After a full month of work (April 1987), the programmer was ready to demonstrate his program.

The program allowed a choice of four main operations from the main menu: 1) input new drug information requests, 2) retrieve previous questions by using up to five keywords or by inquirer's name, 3) compile a monthly statistics report, and 4) back-up data (e.g. recopy all stored information on a floppy diskette in case of computer hard disk failure).

With use, we quickly realized that the final program was less than sat-

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isfactory. The first problem was the time consuming task of inputing data from each drug information request. All the information written on the master drug information sheet (Figure 1), including the question, the answer and the references used, was being retranscribed into the computer in order to discard these sheets. Even with the use of some codes to accelerate the transcription, entering each drug information request was requiring approximately five minutes/question. At an average of 130 questions/month, 10-15 hours/month were added to the normal workload. These data were being typed into the computer by the drug information pharmacist, as no extra clerical help was available.

The program did not allow error correction or keyword changes after data input. The statistics report was nicely formatted and took only two minutes to produce, but we discovered a small arithmetical error in calculations. However, the major problem encountered was the time required for the computer to store and sort the data after each documented question was entered. As the number of questions stored increased, the processing time also increased such that one hour of computer time was needed after entering 15 questions. This was originating from a design fault in the program. Unfortunately, the programmer was no longer available for support or consultation as he had moved out of the country shortly after installing our program.

Finally, the computer program crashed (meaning in this case, the program became so busy in sorting data, that it was no longer able to take any new data) early in January 1988 after eight months of use and could not be fixed. This ended a very expensive attempt at computerization.

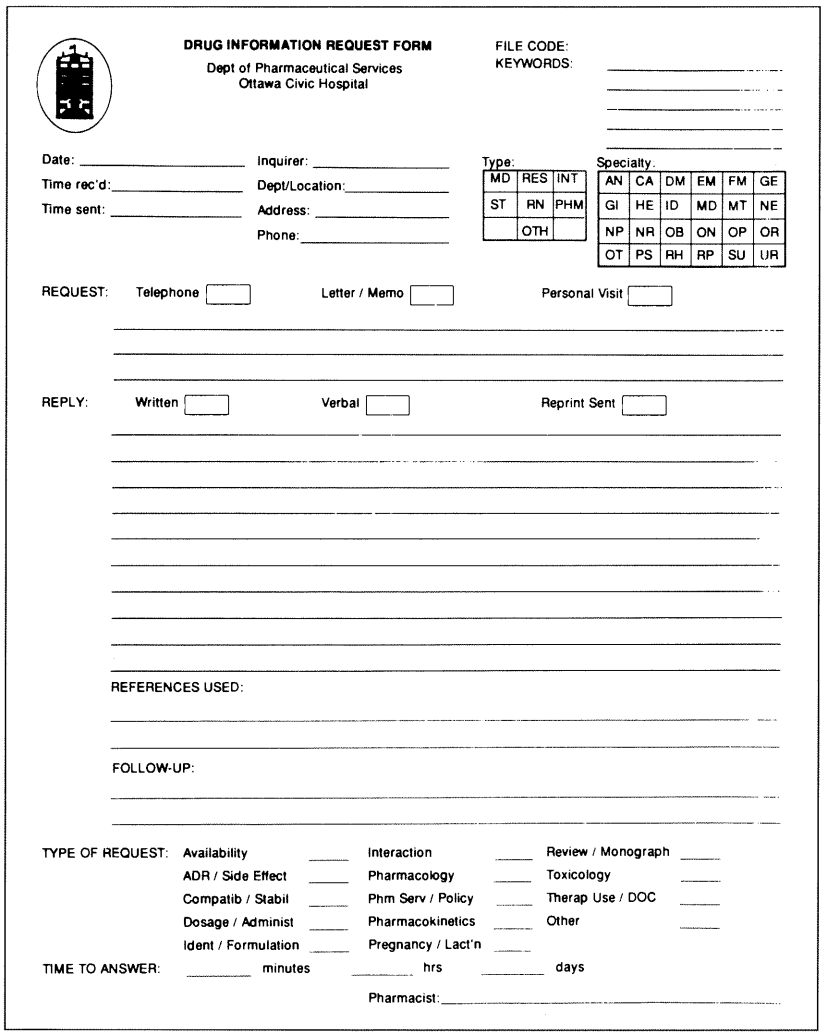
Computerization — Second Trial

For the second trial, our objectives were more realistic. We abandoned the idea of storing all information contained on our master drug information sheets as this was too time-consuming. Instead, we selected the information that was essential to produce a monthly statistics report and have a system to retrieve previous questions, knowing that we would keep all the master drug information sheets on file.

A second programmer was contracted and after briefly reviewing the first program, he decided to design a new one rather than try to fix the existing one. A two-week period (July 1988) was allowed to design and write a program which would be written this time in C language modified for greater flexibility.

The second program met our expectations. The main menu of four operations is about the same as in our first program and includes: 1) input new drug information requests, 2) retrieve previous questions by using up to five keywords, 3) compile a monthly statistics report, and 4) back-up data.

One of the tangible improvements with our second program is fast and easy data entry. For each request, we assign a unique file code composed of seven numbers. Then keywords are assigned to describe the topic of the question. A total space of eighty characters allows four to six key-


DRUG INFORMATION REQUEST FORM
Dept of Pharmaceutical Services
Ottawa Civic Hospital

FILE CODE:
KEYWORDS:

Date: _____ Inquirer: _____
Time rec'd: _____ Dept/Location: _____
Time sent: _____ Address: _____
Phone: _____

Type:

MD	RES	INT
ST	RN	PHM
	OTH	

Specialty:

AN	CA	DM	EM	FM	GE
GI	HE	ID	MD	MT	NE
NP	NR	OB	ON	OP	OR
OT	PS	RH	RP	SU	UR

REQUEST: Telephone ☐ Letter / Memo ☐ Personal Visit ☐

REPLY: Written ☐ Verbal ☐ Reprint Sent ☐

REFERENCES USED:

FOLLOW-UP:

TYPE OF REQUEST:

Availability	____	Interaction	____	Review / Monograph	____
ADR / Side Effect	____	Pharmacology	____	Toxicology	____
Compatib / Stabil	____	Phm Serv / Policy	____	Therap Use / DOC	____
Dosage / Administ	____	Pharmacokinetics	____	Other	____
Ident / Formulation	____	Pregnancy / Lact'n	____		

TIME TO ANSWER: _____ minutes _____ hrs _____ days

Pharmacist: _____

Figure 1: Master Drug Information Sheet

words to be entered. Then basic data for compiling statistics are entered (Figure 2). Use of easy to remember codes facilitates the input data step. Each request requires less than thirty seconds to enter. The design of the program allows data to be sorted very quickly once entered. Any data entered can be easily changed or corrected later.

The data retrieval is very efficient with a question being retrieved by keywords and up to five keywords may be used. Boolean logic for searching is limited to the use of "and" to link keywords. A search combining the keywords with "or" and "and not" is not possible. The computer takes between 30-120 seconds to search back in the entire database, depending on its size. When the search is complete, the file code numbers of the question sheets that have been assigned all the keywords requested, appear on the screen. The program, instead of storing the whole information from the requests, is an aid to trace our previous sheets. A filing cabinet holds all master drug information sheets, arranged by their file code numbers.

At this point, it is important to mention that keywords should be standardized in order to facilitate future retrieval. To ensure consistency in the wording, we established rules designating keywords that would correspond to the filing system.

The statistics report can be printed on a monthly or year-to-date basis. The program usually takes thirty seconds to produce the report. A recent upgrading of our program (November 1989) has improved the readability. (Figure 3).

Figure 2: Input New Drug Information Requests — Example

```
FILE CODE:  90-03-001
KEYWORDS:  CIPROFLOXACIN WARFARIN INTERACTION
INQUIRER:  TYPE  MD     SPECIALTY   FM
REQUEST MODE:  T  (T,L,V)
REPLY MODE:  WRITTEN _____  VERBAL  Y   REPRINT SENT  Y
TYPE OF REQUEST:  INT
TIME TO ANSWER:  020
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FILE CODE:	YY-MM-001 up to 999
KEY WORDS:	80 character space
INQUIRER:	in this case, MD for physician and FM for family medicine
REQUEST MODE:	T for telephone L for letter V for visit
REPLY MODE:	Y for yes
TYPE OF REQUEST:	in this case, INT for drug interaction
TIME TO ANSWER:	20 minutes (three mandatory character space)

Guidelines for Computerization

Retrospectively, analyzing what occurred during our computerization process, we can offer guidelines to assist someone designing and implementing their own program.

1. The first step in computerization should be a true assessment of needs. Why do you want to be computerized? Which part of your work do you want to automate? Will this really make your job easier? You may also benefit from other people's experience; a review of literature or visits to other drug information centres which have been through computerization may help you in setting realistic goals.
2. Choose a simple method for each step of the process. A program which is too sophisticated may not be helpful or may even slow you down. The computer should save time and/or improve effectiveness. Entering data by using some codes may be part of the solution.
3. A direct interaction between the user of the program (in this case, the drug information pharmacist) and the programmer is recommended. The programmer should have a precise idea of what is needed and the user should also have an understanding of what the programmer can do.
4. The programmer hired should be available for a period of six months to one year to support the program which has been designed.
5. It is advisable to include some performance indicators into the contract, such as speed of data input and retrieval, expectations for report formats, follow-up support etc.

Our drug information centre has created its own database by storing the drug information requests received. The first attempt did not succeed, but with the experience gained, a second trial has achieved a useful and effective program. Retrieving previous questions answered as well as compiling statistics is now an easy and quick task. The key to success is to be realistic and selective when automating a task and to guarantee follow-up from the programmer. It is hoped that our experience will be valuable to other drug information centres.

See figure 3 on following page

Figure 3: Statistics Report

Drug Information Centre, Clinical Services
Department of Pharmaceutical Services, Statistics

Month: March
Year: 1990

NUMBER OF REQUESTS	124
REQUESTOR TYPE	48 39% Physician 34 27% Nurse 34 27% Pharmacist 8 6% Other
PHYSICIANS	28 58% Staff 14 29% Resident 3 6% Intern 3 6% Student

SPECIALTY TYPE

—	Anaesthesia	1	Nephrology
1	Cardiology	—	Neurology
9	Dermatology	—	Obstetrics/Gynaecology
1	Emergency	3	Oncology
5	Endocrinology/Metabolism	—	Ophthalmology
8	Family Medicine	1	Orthopaedics
1	Gastroenterology	2	Otorhinolaryngology
1	Geriatrics	2	Psychiatry
—	Haematology	—	Respirology
2	Infectious Diseases	—	Rheumatology
9	Medicine	1	Surgery
1	Neonatology	—	Urology

REQUEST TYPE

22	18%	Dosage/Administration
20	16%	Compatibility/Stability
18	15%	Identification/Formulation
15	12%	Review/Monograph
15	12%	Therapeutic Use/Drug of Choice
12	10%	Availability
8	6%	ADR/Side Effect
5	4%	Pharmacology
3	2%	Interaction
2	2%	Pregnancy/Lactation
1	1%	Pharmacokinetics
—	—	Pharmacy Services/Policies
—	—	Toxicology
3	2%	Other

REQUEST MODE

107	86%	Telephone
14	11%	Visit
3	2%	Letter/Memo

REPLY MODE

102	82%	Verbal
37	30%	Reprint Sent
6	5%	Written

TIME TO ANSWER

	Minutes						Hours		
	1	2-5	6-10	11-20	21-30	31-60	1-2	2-4	>4
#	5	33	16	21	15	28	5	1	—

Median time to answer: 15 minutes
Mean time to answer: 25 minutes

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