

Chapter 1 SUMMARY

Between 1986 and 1989 computerised patient records were installed in 42 Australian general practices. This project was jointly sponsored by the Royal Australian College of General Practitioners and Medrecord (the vendor of the computer system). Throughout the 1980s computer systems had become widely used in general practice for accounting and practice management, however few practices were using computers for clinical applications. The purpose of this project was to generate demonstration sites and to study the implementation of a computerised records system.

Those involved in the evaluation and co-ordination of the CAP project since its inception in 1985 have been provided with an opportunity to observe both the implementation of a clinical records system and the process of conducting a large information technology project in General Practice. The following are presented as a summary of the major findings of this project.

Where practices have chosen to implement computer assisted patient records there has been a high level of acceptance by doctors, practice staff and patients.

The benefits of computer assisted records relate to an improved access to information at both the patient and practice level.

The major problems reported concern the cost of computer systems and increased consultation time in some practices. We will better understand the factors influencing medical record use with further research into doctor's use and attitudes towards the existing paper records systems.

Data is the most valuable component of the computer system. It must be protected by adequate backup routines.

The most successful practices rapidly implemented computerised clinical records. In this project we did not see any generalised use of the stepwise or "modular" implementation of clinical functions.

The experience and opinions of successful users of computerised records are a valuable resource. Experienced users have the vision and expertise to assist with the development of excellent clinical records systems

The CAPP data base could prove to be a relatively easily accessible source of data for research on the nature of Australian general practice.

The practices able to produce reports from their data demonstrated the potential of access to aggregated practice data. Medical records systems must contain a "user-friendly" report generator. Further development of coding system use in Australia is essential.

The existing Medrecord system is unlikely to be further developed, leaving many practices in an uncertain position regarding their clinical records. The issue of medical record data portability across computer systems deserves urgent consideration by medical professional bodies such as the RACGP, and Australian Medical Association, the computer industry and government.

Information technology projects are inherently complex and should:

- **have clearly focused, limited objectives and where possible involve more than one approach to avoid the pitfalls of failed implementation..**
- **be implemented in practices which have already installed a computerised practice management system.**
- **have regular monitoring of progress by an external auditor/evaluator to assist the management committee and funding body.**

Australian GPs must have access to high quality, functional clinical software before any other issue relating to the introduction of information technology can be addressed.

1.1 Study Design

The Computer Assisted Practice Project (CAPP) is a study of the implementation of a computerised records system in a selected group of Australian general practices from 1986 to 1993.

Practices were selected on the basis of their motivation and perceived likelihood of making a successful conversion to computerised records. To be selected practices were required to make a considerable financial commitment by paying for half the costs of the computer system.

The first group of 23 practices participated in a detailed implementation study consisting of data collected from personal contacts, practice visits, questionnaires, and documentation of the organising committee. This stage of the project was known as the Computer Assisted Practice Project - Stage 1 (CAPP1). A report on the first two year of the project was produced in 1990.

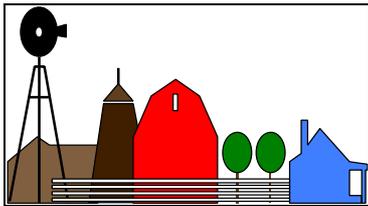
In 1989 a further 19 practices were recruited into the project (CAPP2). Both groups were surveyed in January 1993 by questionnaires and phone interviews.. This report integrates

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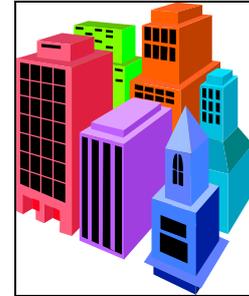
the data and findings of the first stage (CAPP1 1986-1988) with the data obtained in a second study. This study was supported by a Demonstration Practice Grant from the Commonwealth Department of Human Services and Health (January 1993).

1.2 Practice Characteristics

The practices selected represented varying practice sizes, and location to include both urban and rural settings.

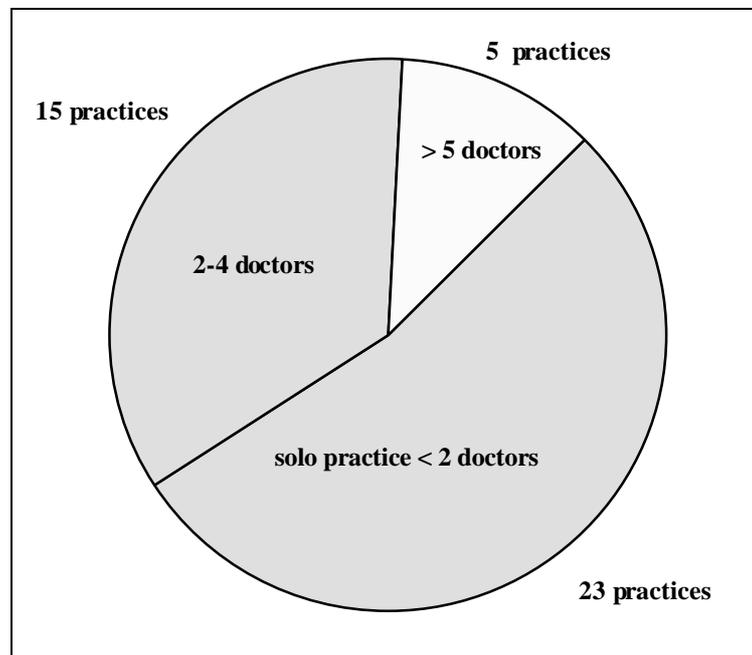


19 Rural Practices



23 Metropolitan practices

Prior to the project most practices or doctors had limited previous computing experience. All practices operated on a "Fee for service" basis, which represents the vast majority of Australian general practices. Community health centres, hospital, or large "entrepreneurial" clinics were not represented in this project. The majority of practices were teaching practices (undergraduate and post-graduate) and all contained members of the Royal Australian College of General Practitioners.

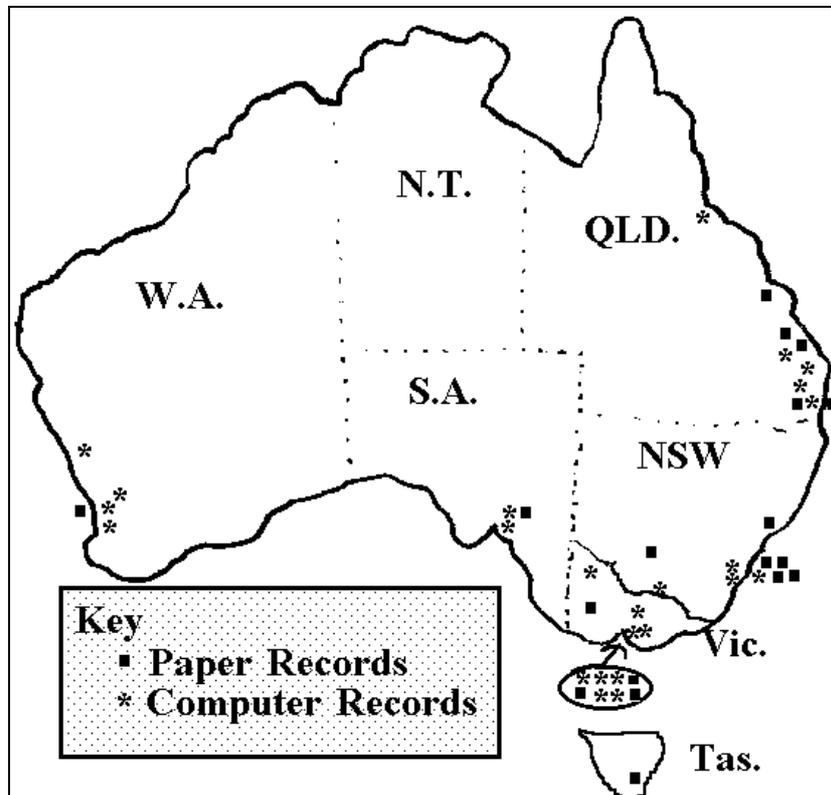


Practice Size - CAPP1 & 2

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Practices were selected from all states (excepting Northern Territory).

The following map shows the location of the CAPP practices and indicates the type of records in use as of January 1993.



Location of Practices

1.3 Installation and training

Changing from a paper based records system to a computerised system and the significant change in a doctor's consulting processes are the major issues affecting the introduction of a computerised records system

The CAP project reflected numerous approaches to the issue of how to start using the computerised records system. Practices should consider this issue at the planning stage and to develop achievable goals and solutions.

Introduction of a computer has a significant effect on the consulting process.

The following approach to installation and training best represents the CAPP experience:

1. Before-Installation

Adequate consultation and discussion with all staff involved in computer use is essential. Doctors and staff should learn to type and develop basic familiarity with personal computer systems.

2. Installation

Install the computer and commence with accounting functions. This will develop familiarity with the system and procedures. Additional staff time and resources need to be available during the installation period. At this stage each practice needs to develop a plan outlining how the records will be implemented. An effort should be made to thoroughly train one or two staff and doctors who can then act as a resource for the rest of the practice.

3. Data Entry

Primary data entry method will be by the doctor when patients present for consultation. Most doctors will prefer initially to enter the records between consultations. Keep the original paper record for reference. Do not attempt to copy all previous records - copy across summary and important data. Until electronic transfer of pathology and xray reports becomes generally available either a copy or summary of these reports is entered by practice staff after the doctor has checked and "highlighted" the relevant sections.

4. Indicate which records have been fully transferred.

Until the doctor is satisfied that the paper record is no longer required, the old record must be available during the consultation. When the record is no longer required signify on both the paper record and computerised notes that data transfer has been completed.

5. Regular review or audit

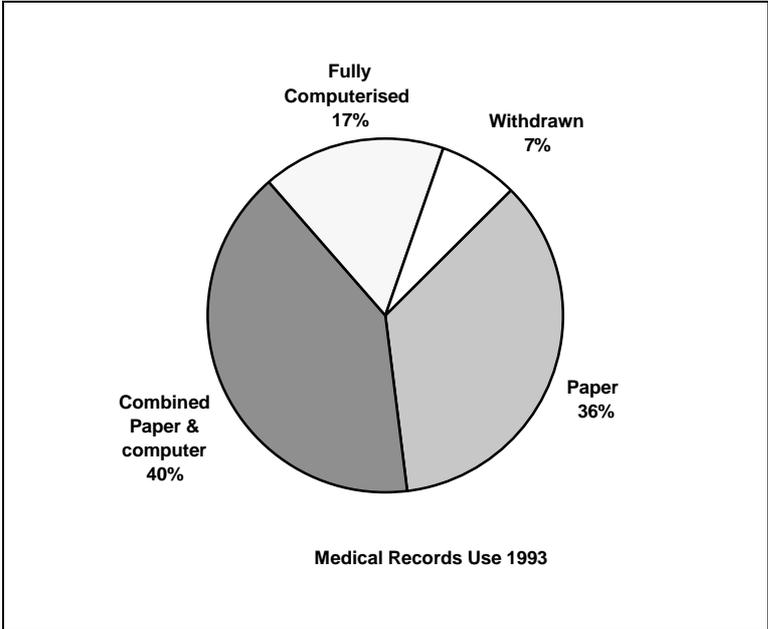
Uptake of medical records functions should be monitored to provide encouragement and peer review for the medical staff.

6. Acceptance of dissent

It is likely that, in all but solo practices, there will be some doctors who do not wish to be involved with a computerised clinical system. The CAPP practices seemed to be able to tolerate the co-existence of manual and computerised records. "Conversion" by the passage of time and example should be considered.

1.4 Computer System Use

In January 1993 24 of the 42 practices (57%) claimed to be using some elements of their clinical records system with 6 practices indicating that they were fully computerised. The following figure presents the levels of computer use.



The majority of practices who commenced using the computer in the early CAP project tended to maintain their level of computerisation in spite of a lack of development in the computer software.

Practices using both paper and computerised records (combined practices) used the computer for x-ray and pathology result storage, preventive prompting and the medication record. Practice staff generally used the clinical system for entry of investigation results and reports and patient recall.

Doctor usage of the computerised patient record varied in group practices. Many practices had some doctors not using the system. This did not cause major difficulties. Locum doctors did have difficulties with computer assisted records, however the extra time often available to a locum was seen as a compensating factor.

Eighteen of the 42 practices are not using any elements of the clinical system although most are using the Medrecord accounting system. While the reasons for this are undoubtedly complex, the most often stated reasons relate to lack of time and enthusiasm. Unless otherwise stated the remainder of this study concerns only those practices using the computer for clinical applications.

1.5 Data Entry

The three commonly used data entry methods were:

- doctor entry by keyboard after the consultation
- doctor entry by keyboard during the consultation
- marking relevant report passages for later entry by practice staff

Doctors rated the ability to type as being important and in the consulting room most doctors positioned their computer screen so that it was accessible to the patient. A few practices routinely used hand written encounter sheets for later typist entry.

Few practices were able to use their patient data for research or practice audit. Those that did, however were able to obtain a rapid and inexpensive answer to many questions about their administration and clinical records.

While the overall uptake of clinical records was less than hoped for at the outset, there are a substantial body of doctors who have used their systems to the maximum. Within these practices there are many doctor/years of computerised notes. These practices could provide a resource of reasonably accessible medical records for research in general practice.

Overall practices who have been more successful in implementation of clinical records are characterised by:

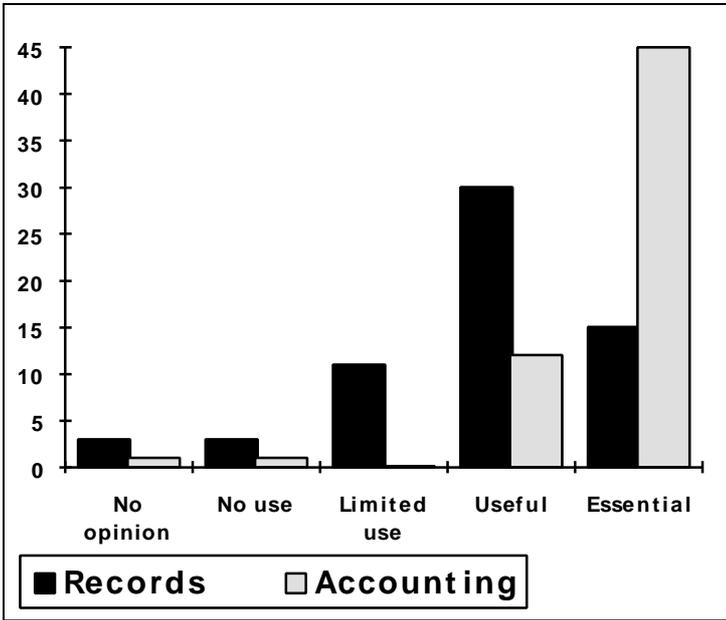
- **early use of all aspects of the records system**
- **involvement of all or the majority of doctors in computerised record keeping.**

1.6 Benefits of Computerised Medical Records

A number of the practices have reached the stage where their systems have replaced and improved upon the pre-existing manual system. These practices are now able to explore applications which would not have been possible with a manual record system.

Overall 72 % of doctors reported that their records system was either useful or essential. The majority of doctors report both increased efficiency and increased enjoyment of their work as an effect of using the computer.

- Major Benefits of Computerised Records**
- Improved access to information
 - Legibility and order
 - Drug information and computerised prescribing
 - Improved preventive care
 - Audit and practice research
 - Doctor and Staff satisfaction



Doctor's opinions of the clinical and accounting system.

The major benefits reported involved improved access to information through:

- faster access to records
- improved access to sections of the record such as pathology results
- access to records at times not usually available such as during phone calls
- reduction in lost or misplaced files
- legible and ordered records and improved records summary

Some practices reported an improved access to information on drugs and drug interactions, and a reduction in writing due to automated referrals and prescriptions. The introduction of computerised accounting has clearly improved practice management.

The use of a computerised opportunistic recall system has been demonstrated to be effective in increasing preventive activities such as cervical cancer screening and adult tetanus immunisation. Computer assisted prescribing lead to a decrease in prescribing errors and was followed by the removal of legal blocks to the printing of prescriptions.

The potential uses of practice data in audit and research have been clearly demonstrated. There is over 100 doctor/years of complete computerised medical records accessible in the 14 higher use practices. This data if aggregated (with due respect for patient and doctor confidentiality) could provide a source of information about the nature of "everyday" general practice in Australia.

Introduction of the computer has provided benefits in the areas of practice management, patient care and doctor and staff satisfaction. This has occurred despite the developmental nature of the software, the lengthy learning and adjustment period for computerisation of records, and the failure of the software to be developed after the initial two years.

1.7 Problems and Difficulties

CAP practices have received few enhancements to the Medrecord system since 1988. Despite this lack of progress 75% of practices were satisfied with the level of support provided by Medrecord.

Practices using the clinical records system were asked to comment on problems and difficulties encountered. Few problems have been reported which relate to the introduction of a computerised records and accounting system. The major problem area has been the capital and ongoing operating costs of the computerised records system. There is no data comparing costs of a computerised records system to a paper based records systems. No practice reported major difficulties with staff co-operation, confidentiality of records or patient acceptance.

Accessible support, rapid resolution of problems and minimal "down time" are essential if doctors are to rely on computerised medical records,

Both doctors and staff indicate that practice operation is severely disrupted when the system is not operating ("down").

Doctors were divided in their response to suggested problem areas Half the doctors felt that their consultation time was increased. There is a perceived increase in patient satisfaction. The use of computerised records did not seem to place a communication barrier between doctor and patient.

Data is the most valuable component of the computer system. It must be protected by adequate backup routines.

The data (information) in the computerised record is clearly the most valuable part of the system. This data is at risk of damage or loss hence the desirability of having a secure system for backing up or making a copy of this information. The backup system was improved after the five episodes of data loss occurring during the first two years of computer operation. Data loss in the remaining four years was minimal. Deficiencies in the backup system were detected in 10 practices. These usually related to using less than the acceptable number of backup tapes/disk sets.

The CAPP experience supports the need for a backup routine, an adequate number of backup copies/sets and procedures to check backup tapes/disks to ensure that they are operational. Both practices and computer professionals need to be wary of communication problems and misinterpretation of instructions during telephone support.

Problem Areas:

- cost
- disruption when system "down"
- potential for loss of data

Summary of problem areas

1.8 Patient Response

Overall there is a high degree of patient satisfaction with computerised medical records. Only 3 percent of patients reporting unhappiness about their doctor using computerised records. The small group of unhappy patients tended also to feel uncomfortable in computer assisted consultations, felt the computer interfered with doctor listening and were concerned about privacy issues.

The major area of concern seems to be related to the consultation process. 19% of patients reported some degree of discomfort during computerised consultations. 9% reported that they always feel uncomfortable. 23% reported that they felt the computer interfered with the doctor-patient communication.

We have no comparative data for patient comfort and doctor's listening ability when doctors keep paper records.

With regard to confidentiality of records, 3% of patients expressed serious concern and a further 17 % expressed "a little" concern. Older patients tended to have less concern than younger patients. The perceptions of doctors tended to mirror the patient response. Three of the 53 doctors responding reported concerns about patient satisfaction. 11 doctors reported that the computer can be a barrier to communication. There were no reports of significant breaches of system security or patient confidentiality.

1.9 Conclusions

The use of computers for clinical applications such as medical records and recall have achieved a high level of acceptance by doctors, practice staff and patients.

The Computer Assisted Practice Project has demonstrated that highly motivated practices have been able to use one medical records system either as the sole record or in conjunction with a paper records system. Other practices showed that they were unable to use this system reflecting over-optimistic expectations and the inability to overcome the practical problems of changing their records system.

The benefits of computerised records seem to relate to an improved access to information about the individual patient and the practice. The problems relate to the cost of computer systems and the time taken to use computerised records in some practices.

One participant commented that medical records are kept "at a cost to the doctor". The use of any records system relies on the doctor having the resources, time and motivation to maintain well organised and comprehensive records.

The practices who have participated in this project have benefited individually as well as substantially contributing to our knowledge of the implementation of this technology in medical practice.

The future holds several issues for the CAPP practices.

- The existing Medrecord system is unlikely to be further developed, leaving many practices in an uncertain position regarding their clinical records.
- The sites that have successfully implemented records hold an estimated 100 doctor/years of medical records data. If the CAPP practices upgrade or change systems then this data will need to be converted to the new computer system. The Medrecord sites are not alone with this problem as there are a few "superseded" medical records systems in use in Australia. While not many practices are affected at this stage, the issue of medical record data portability across computer systems deserves urgent consideration.

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The issue of coding seems integral to the development of powerful medical records systems. The majority of CAPP doctors acknowledged this however shortcomings of the coding system hindered it's widespread use. Further development in this area is essential.

A preliminary attempt to aggregate the data from two CAPP practices suggests that the CAPP data could provide useful information about the management and costs of common problems in general practice.

The previous decade saw the development of affordable and reliable computer hardware. The Medrecord system was clearly the most sophisticated records software developed in the early 1980's yet few practices were prepared to purchase and implement computerised medical records. The computerisation of records, for all its potential and real advantages, was a task for the enthusiast. An issue that must be addressed is access to high quality, functional software. The question for the computer industry is how to develop this in a commercial market-place.

It seems clear that the records system of the future will need to be computerised to meet the doctor's professional obligations, the expectations of patients, and the information requirements of those who pay for our health system. In spite of this there are many barriers to the introduction of this technology in Australian general practice. The identification and removal of these barriers is certainly a task for the 1990's.

Acknowledgments

The Royal Australian College of General Practitioners wishes to acknowledge the contributions of the participating practices, Medrecord Pty Ltd, Professor Neil Carson, Mr. Ross Davey and Dr. David Bennett.

The members of the CAPP evaluation team were: Dr. Peter MacIsaac, Miss Joan Caelli, Dr. Trevor Lord, Dr. Michael Crampton, Dr. Michael Kidd, Mr. Stephen Farish.

Dr. John North was the Chairman of the CAPP Co-ordinating Committee of the RACGP.

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Chapter 2 INTRODUCTION AND PROJECT DESIGN

The Royal Australian College of General Practitioners has been actively involved in medical computing since the early 1980s.

The Fourth Royal Australian College of General Practitioners (R.A.C.G.P.) Computer Conference in 1984 recommended that the College should "...facilitate development of a number of model computer practices...". Following from this recommendation the College proposed a national "Computers in General Practice Project" in which four medical computer systems would have been installed in selected Australian general practices. This project failed to qualify for funding and was not able to proceed.

In July 1985 Medrecord Pty Ltd. proposed to the R.A.C.G.P. that the Medrecord computer medical record systems be established in approximately 20 representative practices located around Australia. The Computer Assisted Practice (CAP) Project developed from this proposal.

2.1 PROJECT OVERVIEW

Over the 3 years between February 1986 and January 1989 the Medrecord computerised medical record system was installed and studied in 23 general practices selected by the R.A.C.G.P. This project was titled the "Computer Assisted Practice Project - Stage 1" (CAPP1).

The Medrecord system provides for both practice accounting and clinical records. It is capable of providing all clinical records functions including prescribing and pathology ordering. A full listing of functions is outlined in chapter 5. The Medrecord clinical system had been accredited as meeting the RACGP Standards for Computerised Medical Records.

The practices paid 50% of the cost of both hardware and medical record software. The remaining 50% was funded by Medrecord. Additional hardware and software such as accounting and appointments could be purchased independently of the CAP project.

In 1989 a further 19 sites were recruited to form a second stage of the CAP project (referred to as CAPP2) under a similar arrangement however the selection process involved a series of public meetings to explain the project to interested practices who then made the decision to computerise without any further assessment by the RACGP.

The objectives of the project were:

- To examine the implementation and use of a computerised medical record system in general practice.

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- To provide specific feedback from the user practices to assist with medical computer software development and to assist the R.A.C.G.P. further develop the "Minimum Standards for Computerised Medical Records"
- To examine the effects that the installation of a computer medical records system has on patient care and other aspects of general practice.

It was anticipated that there would be several secondary benefits as a result of the project. These included:

- An increase in practice awareness of the role of computers and an impetus for other practices to utilise computerised medical records.
- Providing an entry point into computerised records for practices which had lacked the financial backing to introduce it to date.
- An improvement in the quality and range of software available to health-care professionals.
- Provision of opportunities for further research into medical records and patient care.

2.2 PROJECT METHODOLOGY

An organising committee was established consisting of representatives of the R.A.C.G.P., Medrecord Pty. Ltd. and the medical practices involved in the project. The chairman of this committee was Dr. John North.

Practice Selection.- CAPP1 Sites

Approximately 3,600 members of the R.A.C.G.P., representing an estimated 1,800 individual general practices, were invited to express an interest in computerised medical records.

Three hundred and seven practices responded. Meetings were held in all states between representatives of the College, Medrecord and interested practices. Practices still interested were asked to complete a questionnaire which provided details of the practice, it's members and their attitude to the proposed project. Ninety six questionnaires were returned.

Following return of the questionnaire practices were phoned by a College representative to acknowledge receipt of the questionnaire, to gather further details about the practice and to provide further information about the project.

Selection Objectives - CAPP 1 Sites

To be considered for selection a practice was required:

- to contain at least one member of the R.A.C.G.P.
- to accept the financial responsibility for fifty percent of the cost of hardware and software.

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The objective of the selection process was to select a group of twenty eligible practices with the following characteristics:

- the number of practices in each state was to reflect the relative numbers of practices in that state,
- the practices selected should vary in size from solo practice to large group
- the practices should have a range of previous computer experience,
- the practice characteristics and attitudes of practice members indicated to the selection panel that the practice would successfully complete the project.

Selection Criteria - CAPP1 Sites

Practices were then ranked according to the following criteria:

- a positive attitude held by each practice member to involvement in the project,
- location and size of the practice,
- degree of previous computer experience,
- use of the RACGP medical record system.

Practices ranked highly were then visited and the following were assessed:

- practice motivation for involvement in project and commitment to use of computerised medical record, evaluation and practice research,
- practice size, volume of business, layout,
- quality of existing medical records, such as the use of problem lists,
- correct use of existing manual record system,
- length of time the existing manual record system has been used,
- proposed method of transfer of records to computer and attitude to this task,
- plans for changing the existing manual records system
- attitudes and expectations of practice members and non-medical staff,
- involvement in the Family Medicine Programme.

2.3 EVALUATION METHODS

Prior to the commencement of the first stage of the CAP project the Department of Community Medicine, Monash University was requested to conduct the evaluation of the project. This evaluation was intended to describe the processes of computerisation of the medical record and to report progress and problems to the organising committee.

The following methodology was used:

1. Questionnaires to practice doctors, staff and patients prior to the beginning of the project, during installation and at 3 months, 1 year and end of CAPP1 (approximately 2 years allowing for staggered installations).

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2. Ongoing phone contact at least 3 monthly (or more often if problems were being experienced) with the doctor responsible for the computer system.

3. Practice visits to individual practices arranged on an ad hoc basis when convenient.

The following comprised the initial team responsible for the evaluation of the first stage of the CAPP project (at the Department of Community Medicine, Monash University):

Drs Peter MacIsaac, Trevor Lord, Michael Crampton, Michael Kidd, Mr. Steve Farish (Statistical consultant), Miss Joan Caelli.

A report of the CAPP1 evaluation was published by the RACGP¹

4. A long term follow-up of the original CAPP1 sites and the CAPP2 sites by questionnaire and phone contact in January to March 1993. This review of the progress in the CAPP sites was funded by Demonstration Practice Project Grant from the Commonwealth Department of Health. This project was undertaken by Drs Peter MacIsaac, Michael Crampton, and Michael Kidd.

The questionnaire was designed drawing on the findings of the CAPP1 evaluation and in this report relevant data from the CAPP1 report has been reproduced (hence the period of coverage of this current report from 1988-1993).

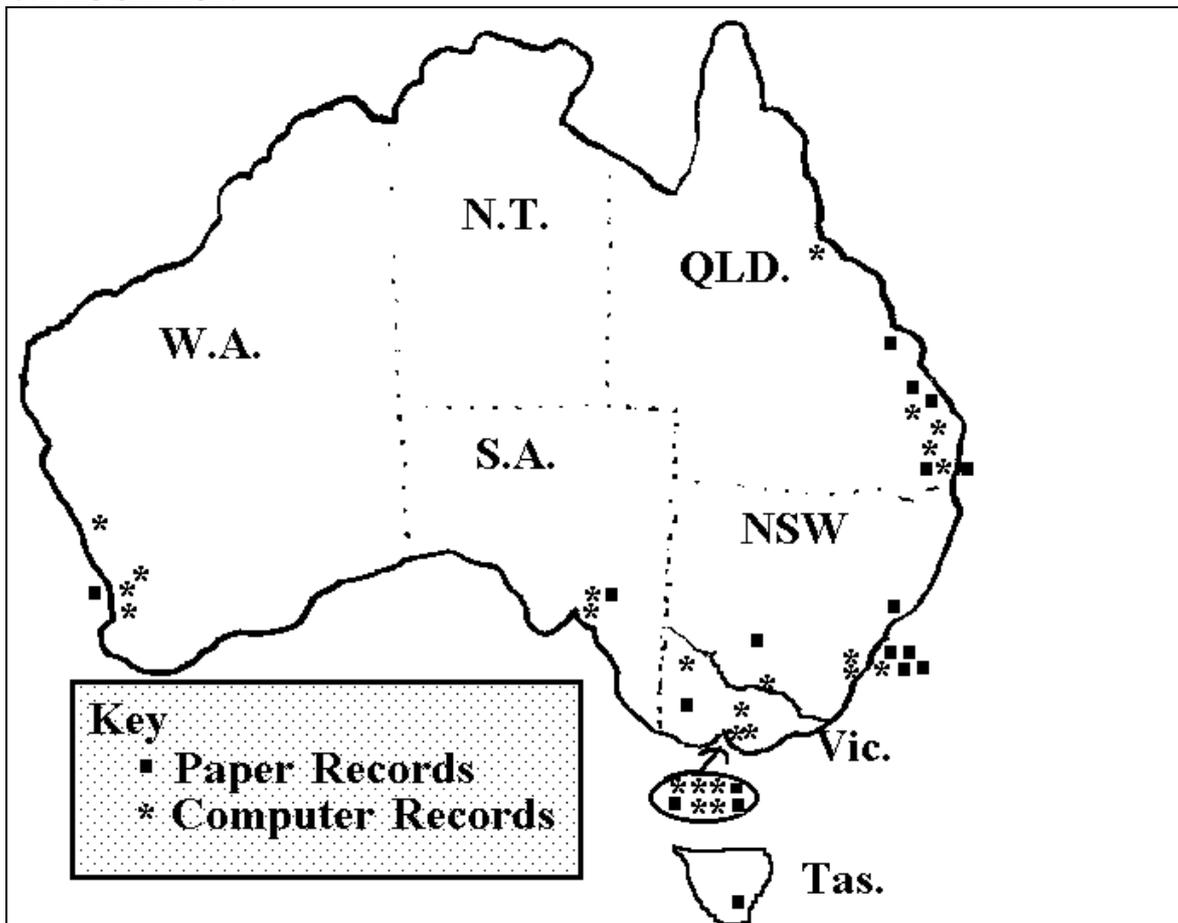
¹ MacIsaac P.A. RACGP computer assisted practice project 1986-1988. RACGP May 1990.

Chapter 3 MAJOR CHARACTERISTICS OF CAPP PRACTICES

The following are the major characteristics of participating practices covering:

- location
- practice size
- previous computer use
- involvement in undergraduate and postgraduate teaching

3.1 LOCATION



Map of Australia showing locations of CAPP sites.

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STATE	No. of CAPP1 Sites	No. of CAPP2 Sites	TOTAL
Qld	3	7	10
NSW	7	3	10
Vic	7	6	13
Tas	0	1	1
SA	2	1	3
WA	4	1	5
Total	23	19	42

Table: Location of CAPP sites by state.

3.2 PRACTICE TYPE

Practices were classified as to their geographic location. CAPP2 practices were only classified as city or rural.

PRACTICE TYPE	Number of CAPP1 Sites	Number of CAPP2 Sites
Metropolitan	14	9
Country - Provincial City	4	
Country - Town	4	
Country - Rural	1	10

Table: location of CAPP sites with regard to city or rural distribution

The CAPP practices are represented in most states of Australia and include urban and rural practices. It is likely that rural practices are over-represented as approximately 25% of the Australian population live outside the capital cities and it is estimated that 10% of GPs practice in rural and remote areas.

All the practices were "Private Practices". There are no Community Health Centres, hospital based practices or large "entrepreneurial clinics" represented.

3.3 PRACTICE SIZE

The practice size included "full time equivalent doctors" representing partners, associates or assistants at the start of the project. These figures exclude Family Medicine Programme Trainees, and locum doctors.

Full-time Equivalent Doctors	No. of CAPP1 Sites	No of CAPP2 Sites
1	13	7
1.5	3	0
2	3	1
3	2	2
3.5	0	1
4	0	6
5 - 6	2	0
6+	0	2

Table: Practice size

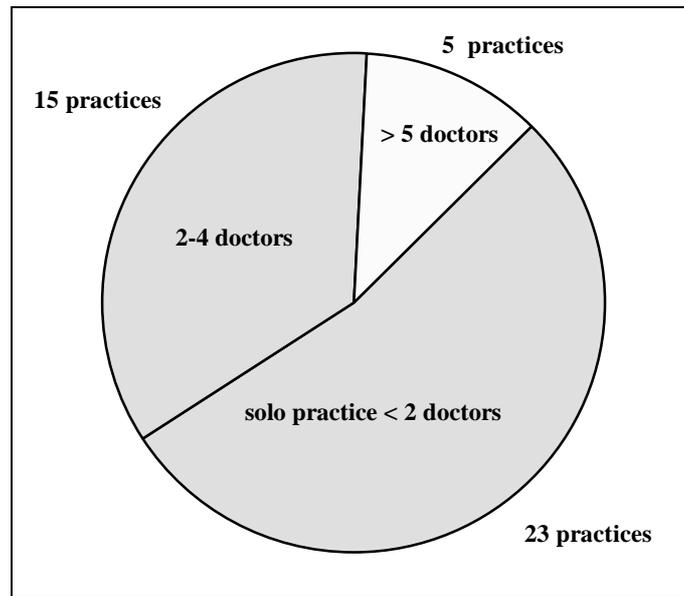


Figure: Practice size

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3.4 PREVIOUS COMPUTER USE IN PRACTICE (CAPP1 ONLY)

Before the commencement of the CAP1 project 12 of the 22 sites had not previously used computers. This information was not sought from the CAPP2 practices.

Previous computer use	Number of CAPP1 Practices
Accounting and practice management	6
Word processing	2
Patient Master Index	2
Medrecord medical records system	1
Medical Record Summary	1
Recall	1
Practice Audit	1
Morbidity survey	1

Table: Previous computer use by doctors (CAPP1 - 1986)

Level of experience	Number of Doctors
Complete Novice	26 (67%)
Previously used a computer - packaged software	7 (18%)
Limited program writing or	2 (5%)
Computer systems operator	3 (8%)

Table: Self rated level of computer experience for doctors (CAPP1- 1986)

3.5 PRE-EXISTING MEDICAL RECORD SYSTEM (CAPP1 ONLY)

Previous computer use for medical records was not common. The one practice using computerised records was the development site of the Medrecord system. While they were clearly at a different stage from the other practices they were formally included in the project.

Medical Record System at start of project	No. of CAPP 1 Sites
Manual - A4 folder	15
Manual - Card	6
Computer summary and A4 manual system	1
Computer Medical Record system	1

Table: Records system at start of CAPP1 (1986)

3.6 INVOLVEMENT IN GENERAL PRACTICE TEACHING

Practices involved in the first stage of the project (CAPP!) were classed as teaching practices if involved in either undergraduate medical student or post-graduate (F.M.P.) education over the 2 years prior to 1986. 15 practices were teaching practices. While accurate figures are not available for the numbers of teaching practices in Australian general practice it is likely that teaching type practices are over-represented in this sample.

3.7 SUMMARY

A total of 42 General Practices installed the Medrecord Clinical Records System over the years 1986-1992. These practices were initially committed to the computerisation of their medical record and were selected because they were considered by the R.A.C.G.P. to be able to successfully adopted computer assisted medical records.

The evaluation was initially performed by the Department of Community Medicine, Monash University. The most recent follow-up study has been undertaken as a Demonstration Practice Project.

The practices selected represented varying practice sizes, location in both cities and rural settings, and on the whole had limited previous computing experience. All practices operated on a "Fee for service" basis and there were no community health centres, hospital based practices, or large "entrepreneurial" clinics.

Notes

Chapter 4 INSTALLATION AND TRAINING

4.1 INTRODUCTION

Events relating to the installation and training of practice personnel were studied during the installation phase of CAPP1. Further examination of the process of transfer from manual to computer records was conducted during the follow-up evaluation in 1993.

Prior to the commencement of this project 12 of the 23 CAPP1 practices had not previously used a computer and all but 2 practices were installing a new system (one practice was the original development site and another had been operating the Medrecord accounting system). Following preliminary discussions and visits relating to selection for the CAP project the following was the usual installation process.

- pre-installation visit,
- hardware delivery and installation,
- on-site training in practice management functions such as billing and use of practice management functions,
- on-site training for clinical records,
- use of clinical records.

There was no predetermined installation or training protocol although it seemed that most practices followed the above procedure.

Following the CAPP1 installation 64% of the practice staff and 50% of the doctors felt poorly prepared for the use of the computer. 28% of practice personnel reported no discussions within the practice before the arrival of the computer. The common forms of discussion were meetings with the system supplier (Medrecord), and informal discussions with other practice personnel.

4.2 PRE-INSTALLATION VISIT (CAPP1)

Pre-installation visits were made in 17 of the 21 CAPP1 practices installing new hardware. Median number of visits was 2 (range 1 - 8). Four practices reported having unanswered questions after this visit. These queries related to details of drug profiles, installation schedule, use of computer in research, external access via modem, transfer of existing data to new system.

A "User-Group" meeting after installation reported that many practices were naive at outset, and that in retrospect many matters were not understood. Problem areas were installation, training and documentation, maintenance, and unexpected costs such as electrical installation and consumable items (such as stationary, printer ribbons). (Vic User Group minutes 18/8/86.)

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It was reported that installation could have been improved if allowance were made for the extra time and staff required during installation. Suggested improvements were installation outside practice operating hours or reduction in patient bookings during this time.

4.3 INSTALLATION (CAPP1)

Practices were asked to record all computer related activities before and during installation. These activities included installation planning, furniture alterations and relocation, cabling and electrical work, hardware installation, dealing with problems, and data loading.

The largest single component recorded was training (70 % of total installation activity). Each practice member had an average of 3 training sessions and there appeared to be no uniform approach to training. Initially some training was conducted away from the practice however it seemed that most was conducted at the practice site. When asked to rate various methods of learning about the computer system the most useful was help from other practice members and time spent practising.

The following means of learning about the computer were rated as being either fairly or extremely useful:

	% Doctors	% Staff
Help from other practice members	54%	83%
Time spent practising	70%	75%
Training	23%	38%
Manuals	9%	19%
Talking to other practices	5%	8%
Books or courses	11%	11%

Table Useful methods of learning about the computer system (CAPP1 1988)

26% of practice personnel expressed dissatisfaction with the training. Suggested means of improving training were for more time for training and ongoing training (as compared with training in a block).

Learning from manuals was not generally found useful. When asked if satisfied with the manuals 50% of personnel were neutral, 20% dissatisfied and 30% fairly satisfied. The manual has been rewritten during the project and there are no data on this updated manual.

Despite the close geographical proximity of some practices little inter-practice communication seems to have occurred during or soon after the installation phase.

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Throughout the remainder of the project a small group of enthusiastic, competent and high use practices provided mutual support and assistance with software use and development. Inter-practice contact and support has significant potential to assist newly computerised practices.

4.4 TRANSFER FROM MANUAL TO COMPUTER SYSTEM

Usage of the computer system is detailed in the next chapter. Twenty-four of the 42 practices reported using some elements of the clinical records system. Details of record transfer were only sought from these practices. (one practice failed to complete the questionnaires)

16 of 24 practices using the clinical system commenced using the accounting system prior to using the computerised clinical records . Basic demographic data on each patient was entered at the time of patient registration for the accounting system.

The following methods were employed to allow transfer of data from paper records to the computer:

	No. of practices
the doctor enters data as each patient presented	13
data entered by doctor outside usual consulting hours	7
patient questionnaire	6
data entered by nurse/receptionist	5
doctor completes a paper summary which is entered by staff	3
records transferred one family at a time	2
data electronically transferred from previous computer system	1

Table: Methods of data transfer.

The following items of data were entered initially (not all practices were intending to use, or did use all the modules of the clinical records system) . The number of practices entering each section of data is given in brackets.

Allergies (12), Progress notes (11), Problems (11), Medications (10), Path and Xray results (9), Social profile (7), Correspondence storage (4), Paediatric profile (3), Obstetric delivery summary (2), and Family History (2).

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The most popular data entry approach was for patient data to be entered at the time of consultation hence the frequency of data items entered reflects the frequency that this data is presented (progress notes, problems, and medications) in the consultation. The popularity of allergies most likely reflects the importance placed on this information by the doctors.

The doctor responsible for the computer system in each practice (Practice leader) was asked to advise a similar practice on installing medical records. The following were examples of this advice:

- commence with an interest area e.g. scripts, chronic health problems, vaccinations
- start with social profile and summary, add progress notes later
- update RACGP paper summary and have staff enter
- use half an hour before session to enter information on booked patients
- use a patient questionnaire to collect demographic and clinical data for entry by staff.
- enter all members of the family of the current patient
- have patience
- entering data as patient presents will cover the vast majority of active patients over the first year of use
- run some patients on paper notes and some on computer as it would take too long to transfer all records.
- continue to use paper records for historical information and enter new notes on the computer. After 3-5 years it will be necessary to refer to old records 3-4 times per week.
- summarise problems, medications, investigations and correspondence for typist to enter. Make an initial decision on what will be transferred. Thorough organisation and commitment to a timetable.

A number of difficulties relating to data transfer were mentioned. These included:

- the large amount of work involved,
- the difficulty in identifying family groups,
- the inability to delegate the task of summarising and entering data to other practice staff such as a nurse,
- difficulty summarising the manual record,
- entering data during the consultation increases consultation time,
- the uncertainty of knowing for which patients complete data transfer had been achieved.

13 practices tackled this last problem by marking either on the patients paper file, moving a completely transferred file to other storage area or by indicating on the computer when complete transfer had been achieved. One doctor, when he was satisfied that relevant past

notes were entered, 'flagged' the file by creating a problem code to signify "notes completely transferred". This allows searches to be done only on completed notes.

4.5 CONCLUSION

Data transfer and the significant change in a doctor's consulting process are important issues affecting the introduction of a computerised records system. After two years of operation of the clinical records system a number of practices were still in the process of transferring from the manual records system to the computer. Some practice had chosen to only use some of the components of the system and some practices (and doctors) had chosen not to use the records system at all.

The CAP project reflected a diversity of approaches to the issue of how to start using the computerised records system. It would seem important for practices to consider this issue at the planning stage and to develop goals and solutions which are appropriate to their individual circumstances.

The following approach to data transfer best represents the CAPP experience:

1. Pre-Installation

Adequate consultation and discussion with all staff involved in computer use is important to identify problems with changes to the practice or attitudes towards computerisation. This process will ensure that all staff and doctors have a degree of "ownership" regarding decisions made. Doctors and staff should learn to type and develop basic familiarity with personal computer systems. This can be achieved through computerised typing tutors and computer tutorials.

2. Install the computer and commence with accounting functions

This allows for familiarity with system and procedures e.g. backup, and allows for patient registration and creation of the Patient Master Index. During this phase doctors can train on the system and become familiar with their software. At this stage each practice needs to develop a plan outlining how the records will be implemented, for example what functions will be computerised and set a timetable. Doctor participation has been a problem in a number of practices and formulating a plan and achieving commitment at the outset may decrease doctor rejection of the computerised notes. Training represents a major investment in time and effort. As most practice members rate learning from others as their most useful method this suggests that suppliers should concentrate on training one or two staff and doctors who will then act as a resource to the rest of the practice.

3. Primary data entry method will be by the doctor after the consultation.

This can be expected to slow down the consultation rate initially. Other methods such as the doctor entering essential elements of the notes before the consulting session or after hours, patient questionnaires and staff entry of data from paper record may assist however the bulk of the work will fall on the doctor. In order to maintain enthusiasm and support among medical staff there should be some clear goals set, such as producing computerised prescriptions for all patients in a set time frame, or being able to recall patients for smears or influenza vaccines.

4. Keep the original paper record for reference

Only one of the CAP practices reported attempting to transfer all data from the patients paper file. The nature of the medical record in General Practice is such that detailed notes which are some years old are not usually required at the vast majority of consultations. They can be archived and referred to as required.

5. Mark records to signify completion

At some stage the doctor will recognise that for a particular patient all essential data has been transferred from the paper record to the computer. It is important to mark the cover of the record (coloured sticker) when all essential information has been transferred. This file could then be archived and need not be presented when the patient attends. Likewise the computer record must be "marked". This informs the doctor that the paper record is not required at the consultation. Data analysis, such as audit of smear rates, is then only performed on completely transferred medical records.

6. Regular review or audit

The system administrator should have access to reports on the number of consultations which generate progress notes, scripts etc. This will allow the monitoring of the uptake of medical records functions and provide encouragement and peer review for the medical staff. The Medrecord system did not have software specifically developed to assist with this review. Software suppliers could consider providing suitable reports to monitor usage.

7. Acceptance of dissent

It is likely that in all but solo practices that there will be some doctors who do not wish to be involved with a computerised clinical system. This attitude is not usually accepted from practice staff. The realities of most practice structures allow individual doctors to make a personal decision as to their level of commitment and use of the system. The CAPP practices seemed to be able to tolerate the co-existence of manual and computerised records hence conversion by the efflux of time and example should be considered.

Chapter 5 COMPUTER SYSTEM USE

The following quotation from an evaluation questionnaire suggests that the elements of good medical record use are independent of whether the record is kept by computer or on paper.

"One of the problems with computerised medical records is common to records in general - it takes time to provide good records. Medicine is geared to the 'sausage machine' style, partly because of the way medicine is funded and partly because patients want your complete attention and don't want you spending time keeping YOUR record of THEIR consultation. The keeping of records is totally at the doctors expense. The time taken to keep a good record on a computer is not more than that taken for (a good record on) a manual system. In practice good records are not kept. It is far easier and less time consuming, and better to keep a sloppy record on a manual system than on a computerised system.

The implication is that patients need to understand that an accurate record is worthwhile and those who fund medicine also need to see that it is worthwhile."

Twenty-three practices commenced the project in 1986 (CAPP1) with a further 19 in 1988/89 (CAPP2). Two practices withdrew because of unwillingness to continue with medical records after the resignation of the doctor responsible for the purchase of the medical records system. One practice withdrew within 3 months of CAPP1 commencement and this practice did not participate in the CAPP1 evaluation, they have begun using clinical records since and have been included with the CAPP2 data.. The second withdrew 18 months into the project and it has been included in data analysis. Because of a staggered installation programme the period of use of the medical records system varied between 18 and 32 months at the end of the initial CAPP1 evaluation period in December 1988. In January 1993 the mean length of usage was 4.5 years a range of 1-7 years (excluding the original Medrecord development site which commenced computer use in 1977).

Before the commencement of the CAP project 12 of the 23 CAPP1 sites had not previously used computers and 66% of doctors described themselves as "computer novices."

5.1 MEDICAL RECORDS USE

At the time of survey in Jan. 1993 twenty four practices (57% of all practices) claimed to be using some elements of their clinical records system. Seven practices (17%) regarded their records as fully computerised with a further 17 practices (40%) using various sections of the computerised record along with the paper records system.

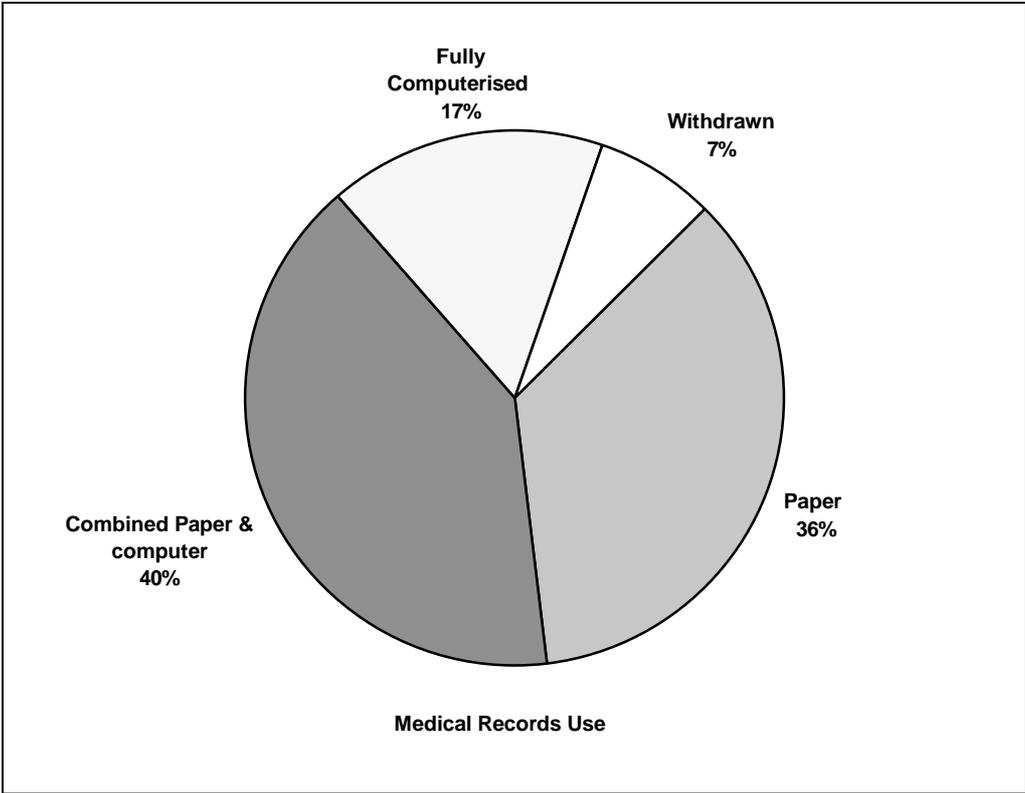
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The response rate during the follow-up study was 96% (23 of the 24 practices). Some information about the missing practice was gained through a telephone interview and has been included in the analysis.

The following table outlines the computerised records use for both CAPP1 and CAPP2 groups in Jan. 1993.

	No. of CAPP1 Practices	No. of CAPP2 Practices	TOTAL (CAPP1 & 2)
Paper	7	8	15
Combined Paper & computer	9	8	17
"Fully" Computerised	5	2	7
Withdrawn	2 ²	1 ³	3

Table Clinical records use in all CAPP sites (Jan. 1993)



² 2 practices closed

³ this practice changed from Medrecord to Synapse medical records system

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Practices have been classed according to the degree of utilisation of computerised patient records into:

- **Paper records practices** - do not use the computer for clinical applications
- **Fully computerised practices**- use the computerised patient record for the majority of clinical applications
- **Combined practices** - where the computerised patient records are used for some applications and the paper system is used for the remainder.

Computer use in CAPP1 practices 1988-1993

The majority of the first group of 23 computer users (CAPP1) maintained their usage pattern between 1988 and 1993. Usage of the computer declined in 5 practices. Three sites reverting to paper records reported that the increased time involved in using computer records was a factor in this change. One site recommenced using paper records when the solo practitioner changed practice and took the computer with him.

Records system	Number of CAPP1 practices
Unchanged	15
Computer to paper	4
Ceased practice	2
Combined to paper	1
Paper to combined	1

Change in records system in CAPP1 practices (1988-1993)

Those practices decreasing their use of computerised patient records may have been influenced by the lack of development in the Medrecord clinical system over these years. The issue of time may reflect on the inability of those doctor to effectively utilise the computer system to minimise consulting time. The period of this study has also seen increasing pressure on the financial viability of many general practices.

5.2 RECORDS USAGE

Computer records use in "combined records" practices

Practices using a paper records system combined with modules of the computerised patient record are described as "combined records" practices.

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Six of the 17 practices using a combination of computerised and manual records system stated that they were working towards a fully computerised section, 4 were uncertain and 7 were not intending to fully computerise the clinical records system..

The following computer modules were used by the 17 practices using a combined records system:

Module	No of practices
Accounting	17
Word Processing	16
Recall	15
Pathology report storage	13
Xray report storage	10
Preventive prompting	10
Medication record	9
Problem list	8
Alcohol/smoking	8
Correspondence storage	7
Progress notes	7
Prescribing	6
Drug interactions	6
Social Profile	6
Family History	5
Protocols	5
Certificate printing	5
Pathology requests	4
Xray requests	4
Delivery summary	4
Medical database access	4
Paediatric profile	3
Electronic transmission of pathology results	2
E-mail	2

Computer assisted prescribing did not become generally available until 1990 (1993 in Victoria). The preventive prompting modules automatically prompts the doctor on a pre specified range of preventive measures e.g. smear test, tetanus immunisation, blood pressure as appropriate for an individual patients age, gender and current status for these measures. Information on the use and storage of vaccination results was not sought in the practice questionnaire (due to an oversight)

Paper records use in "Fully computerised practices"

Some elements of the paper records system are used by practices who report that their current records are fully computerised. These functions were prescribing, investigation requests, storage of correspondence, certificate printing and referral to 'old' records.

5.3 USAGE BY PRACTICE NURSES/STAFF

The major modules used by practice nurses and staff were:

Nurse/Staff use	No. of Practices
Xray result storage	16
Pathology result storage	15
Word processing	14
Patient recall	13
Correspondence storage	12
Encounter sheet	3

Table: Staff use of records (1993)

The usage by practice staff was generally limited to entering pathology, xray and correspondence summaries. Three practices used encounter sheets for the doctors to write their findings for later entry by staff. This usage pattern mirrors the findings of the CAPP1 study (2 year survey) except that word processor use seems to have increased substantially.

5.4 DOCTOR USAGE

The usage pattern of doctors in multi-doctor (group) practices was studied. In 12 practices all doctors used at least part of the system. Nine practices reported that some doctors did not use the computer records system at all. In this group usage varied from one doctor in the group not using the system to only one doctor using it. Fully computerised practices tended to have all doctors use the computer. Practice reporting only partial doctor acceptance tended to maintain a manual records system with limited computer use.

Only three of the nine practices reported problems with having doctors who do not use the computer system.. In one practice these difficulties were overcome by printing a paper copy of all notes (in a group practice with one doctor using most elements of the system). In a similar situation the sole computer user manually updated the paper medication record, and a third reported that sufficient information was kept on paper.

5.4.1 Data Entry

Sixty-five of the 88 (74%) doctors working in the 24 practices using clinical records responded to a questionnaire about their individual use of the medical records system.

The most frequently used methods were keyboard entry by the doctor either during or after the consultation and the highlighting of reports or results for entry by staff. The

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following table indicates data entry methods used (some doctors have used more than one method)

	Number of doctors	Preferred data entry method
Keyboard after consultation	31	18
Keyboard during consultation	27	20
Mark text or results for staff entry	29	18
Encounter sheets for later entry by staff	5	6
Dictation	1	5
Pathology by modem	2	

Table: Data entry methods used by doctors (1993)

Doctors were asked to comment on the merits of different methods of data entry. The following are examples of the responses

1. Keyboard entry during consultation

Advantages: provides prompts during consultation
 data check/accuracy doctor entry
 less time consuming/data update immediately
 patient interaction possible
 notes kept more concise
 improved accuracy and clarity

Disadvantages typing slows consultation
 patient disapproval/dislike
 distracts from eye contact
 difficult to enter records from another location e.g. home, hospital
 noisy, distraction
 need to learn to type
 record trivial information
 if a third person is present they are able to read the notes

2. Keyboard entry after consultation

Advantages uninterrupted patient contact
 maintains structure
 takes less time than the paper record previously used by this doctor
 improved accuracy and clarity

Disadvantages increased time, duplication of initial written notes
 recall of details/history
 no diagrams
 not transportable
 notes too brief, tend to omit details

3. Encounter Sheet

Advantages	no interference with consultation no typing ability required
Disadvantages	delay in data entry by staff staff time/cost staff misinterpretation misspelling terms/error data entry no feedback from computer possible e.g. preventive prompts

4. Dictation

Advantages	time saving for doctor
Disadvantages	cost of employing staff to enter data delay in data entry

5.4.2 Typing Skills

54% of doctors rated their own typing level as being either "10 finger" or "touch typist". 85% of doctors rated the ability to type as important, very important or essential.

Anecdotally many doctors claim to be "waiting" for alternative data entry technologies such as voice and hand writing recognition. This will only be possible when this technology has reached sufficient maturity to reliably enter critical data, and when voice recognition is able to be commercially incorporated into existing medical records systems. Until then it is clear that the ability to type and use the keyboard is of major importance if we wish to make use of currently available computer systems.

5.4.3 Use of Computerised Records by locum doctors

Locums in some practices found difficulty learning and using the computerised records system. Fourteen practices reported using locums with 7 practices finding that locums had difficulties. These related to learning how to use the system and lack of typing skills. Some practices commented that as locums are often not as busy as the principals this extra time allows them to learn to use the computer and take longer with individual consultations.

5.4.4 Research and Data Analysis

It is apparent that few practices made use of the "query" or data searching capabilities of their computerised records system. Data searching involves using a query language and mastery of the query system was evident in only 3 sites who reported using up to 230 different data search queries. Examples provided included:

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- Prevalence of tetanus immunisation and cervical cancer screening
- Prescription audit
- Listing of current obstetric patients and estimate date of delivery
- Selection of patients eligible for H. influenza vaccine
- Selection of patients eligible for flu needle (by age, presence of asthma, or COAD)
- Pap smear recall
- Age and sex demographics (used in 11 practices)
- Billing review
- Audit of blood pressure monitoring
- Epidemiological study of otitis media
- Identification of patients with specified problems (asthma, epilepsy)
- Monitor pathology requests sent and results returned
- Letter to patients in certain postcode areas regarding branch practice closure.
- A study of urinary tract infections presenting in two practices.
- standard queries (procs) to produce data for the Inter-practice comparison.

An estimate of the usage pattern of records in 14 practices (where medical records are used extensively by all or some doctors) suggests that within the CAP Project there is likely to be over 100 doctor /years of medical records. This data could provide a major resource for research into patient care in Australian General Practice.

5.4.5 Use of Coding System

The coding system provided in the Medrecord system is a modified version of the International Classification of Health Problems in Primary Care (ICHPPC). Coding of data entered is not mandated by the system. The decision on whether to code is made by the doctor entering the data. Doctors were asked about their use of the coding system and opinion regarding the importance of coding.

Coding Use	No. of Doctors
Rarely or never code	18
Ongoing, chronic or important problems only	17
Most Problems	20
Some investigation results	11
Some symptoms or signs	5

Table: Use of coding by Doctors (1993)

Some doctors commented that they code all investigations, another doctor reported coding "important results", while another codes specific results e.g. Pap smears.

Symptoms and signs are coded by 5 doctors. Some doctors code the "important" symptoms while one doctor coded "undifferentiated" symptoms and signs Other data

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coded by some doctors were childrens' problems, immunisation history and recalls, other recalls, and medical certificates.

The majority of doctors who present an opinion on the value of coding support its use, however actual use varies greatly. It is not necessary to code to use the patient records, however searching for specific data for audit or practice research does generally require coded data.

Problem coding is:	No. of doctors
of no importance	1
of little importance	11
useful	24
essential	11
no opinion	5
I do not use the computer	9

Table: Doctors' opinion regarding coding

Doctors were asked to comment on the coding system used by Medrecord. 4 of the 31 responses found the coding system adequate. 17 responses related to lack of specificity and comprehensiveness. Many doctors reported that they couldn't find the right code or that the code was not sufficiently specific for the problem. One example provided was the grouped code "Menopausal symptoms/Post menopausal bleeding". The presence of this description in a patient's problem list would require reference to the relevant consultation note to clarify the problem.

4 doctors reported that the coding system was slow although it was also reported that speed improved with use and familiarity.

The coding system does allow for user defined codes and this feature was used by 4 doctors. Using self-defined codes has several advantages and disadvantages. The doctor using self-defined codes has an automatic familiarity with the codes and should tend to use them consistently. This will facilitate the searching of that doctor's database. Self-defined codes will prevent consistent use of codes and searching within a group practice and between practices. Lack of uniformity in coding of problems was reported as a problem in one practice.

5.5 CONCLUSION AND SUMMARY

In 1993 twenty four practices (57%) of the 42 practices who have installed computerised records report that they are using some element of the clinical records system. Six (14%) practices were fully computerised with the remaining 17 (40%) using elements of the computer system in combination with paper records.

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Five of the 23 CAPP1 practices have moved away from record use. Lack of time, and change in key personnel were described as factors responsible for this trend. The failure of the supplier to develop the product and changes in ownership of Medrecord were also potential factors affecting practice confidence.

Several practices using a combination approach claimed to be moving towards complete computerisation of their records. There has been no evidence in this project of practices continuing to increase their involvement in medical records in a "modular or step wise approach", if anything, the drift is away from computer use. The practices who have achieved most have commenced using a many of the records modules as possible. Admittedly there has been little incentive to increase the computer use given it's static state of development and uncertainties about the future viability of this records system under AMFAC.

Use by practice staff was generally limited to entering pathology, xray and correspondence summaries. Three practices used encounter sheets for the doctors to write their findings for later entry by staff.

In group practices it was common to have some doctors not using the computerised records, and this was only considered a problem by 30% of practices.

Practices who have been more successful in implementation of clinical records are characterised by:

- early use of all aspects of the records system
- involvement of all or the majority of doctors in computerised record keeping.

The preferred methods of data entry involved keyboard entry by the doctor either during or after the consultation, and the marking of relevant sections on investigation reports for subsequent entry by practice staff. Given the need for doctors to enter data via the keyboard it is not surprising that the ability to type was generally rated as being very important. Locum doctors often found difficulty in using the computerised records system.

The majority of doctors support the use of coding, however actual use varied considerably. The coding system used has numerous shortcomings.

The use of the data held in computerised records for audit, practice research or practice reports was low. The "Pick operating system" allows extensive access to the data stored however only a handful of practices acquired the mastery of the query language necessary to interrogate the data-base. The studies which were done, however demonstrate the potential usefulness of having access to the information which is usually "locked up" within the medical record.

Chapter 6 BENEFITS AND ADVANTAGES OF COMPUTER ASSISTED RECORDS

The following section discusses the direct benefits of computer use as reported by participating practices. Several indirect benefits of the CAPP project include the contribution to the preparation of the "Standards for Computerised Medical Records" (RACGP, 1988), input into medical software development, and the ongoing education of the College's computer enthusiasts.

The following is one solo GPs report about the effects of the computer on his practice.

" one change is that my writing has got worse, but my typing skills are much improved... There hasn't been much change to practice personnel. My oldest secretary was 65 when we went to computer. She has stayed on and is using the system without any problems.

Previously we had one staff member typing all month to send out accounts, now it takes 20 seconds to get the computer to do this and another 10 minutes for the printer. Financial control is vastly improved.

Staff can spend more time assisting the doctors, inputting summaries of correspondence, lab and xray results. In general there is a quantum leap in efficiency and service. Easy for the staff to answer patient queries and check on whether test results are back.. "

It is estimated that there are 88 doctors working in the practices using the computer for clinical applications. Of these 65 completed the questionnaire giving a response rate of 74%.

The duration of use varied between less than one year to 12 year as described in the following table. The variation reflects the turnover of doctors and the 2 cohorts of practices participating in the 1st and 2nd stages of the CAP project.

Duration (years)	Number of Doctors
< 2	14
2-3	25
4-5	11
6-7	12
8	2
12	1

There were also major variations in individual use of the system with 11 doctors claiming that they do not ever use a computer terminal.

The analysis of the doctors response has been presented for all doctors without attempting sub-group analysis. What is presented represents the view of the whole group, not just the group of long term users or enthusiasts.

6.1 THE USEFULNESS OF COMPUTERISED ACCOUNTS AND RECORDS

Doctors were asked to rate the usefulness of their accounting and clinical systems.

Rating	Records	Accounting
No opinion	3	1
No use	3	1
Limited use	11	0
Useful	30	12
Essential	15	45
Total	62	59

Table: Doctor opinion on usefulness (1993)

Overall 72 % of doctors found their computerised records system to be either useful or essential. 96% of these doctors found their accounting system to be either useful or essential. When asked a similar question at the end of the first 2 years of the CAPP1 project there was a similar positive response in 66% of doctors for records and 100% for accounts.

Staff attitudes were not covered in the most recent study, however in the CAPI study only one staff member (out of 66) found the accounting system to be of limited or no use and only 2 responded that they wished to return to using a manual system.

Doctors were asked whether the use of the computer for records had improved efficiency and/or effectiveness, and had made their work more enjoyable. Opinion was divided with the majority indicating that there had been an increase in efficiency and enjoyment of practice.

	Increased efficiency or effectiveness	Increased enjoyment
Certainly	13	16
Probably	19	12
Uncertain	6	9
Probably not	12	13
Certainly not	5	5

Table: Doctor opinions on computer efficiency (1993)

The doctor responsible for the computer system (in each of the 24 practices using some element of their clinical system) was asked to grade a number of potential benefits of computerisation of clinical records. These benefits were reported in free response

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questions by doctors participating in the CAPP1 study. It should be remembered that these doctors are commenting on their own records system with its individual problems and limitations, and not medical records systems generally.

THE COMPUTERISED CLINICAL SYSTEM HAS LEAD TO:

	Certainly	Probably	Uncertain	Probably Not	Certainly not
Faster access to the records	19	1			1
Improved access to sections of the record, e.g. pathology reports	18		2		1
Access to record at times not normally available e.g. while on phone	16	3			3
Legible and ordered records	15	4		1	1
Improved preventive medicine	12	5	2		2
Improved record summary	9	4	3		5
Information on drugs and drug interactions	8	5	3	1	3
Reduction in "lost" or misplaced records	8	8	1	1	3
Reduction in writing due to automated referrals and scripts	8	1	4	3	5
Self audit, clinical review, research	6	3	4	2	5
Improved information presentation e.g. grouping data on one problem or graphing BP results	5	4	4	1	5
Increased patient involvement	3	3	7	4	4

Table : Benefits (1993)

Other benefits reported include reduced storage space for records, the ability to run multi-site practices, printing of patient held summary, provision of an audit trail for pathology tests (to alert to those test results which do not return), a decrease in prescribing errors, calculation of normal values e.g. peak flow, and production of labels.

The CAPP1 study also listed the benefits described by practice staff. These were (listed in order of frequency):

- time saving/speed of access/efficiency
- ease of lookup of patient details, information at "finger tips", ability to assist quickly with queries
- reduction in errors/completeness of data e.g. patient registration
- improved accounting/ reports
- end of month processing and ability to issue duplicate accounts
- access to pathology reports
- print information for patients/printout of patient profiles
- word processing
- makes receptionist job more interesting, lightens the workload

- follow up of overdue accounts/ bad debts
- "one write" does everything e.g. banking summary
- ease of operation/learning

Other advantages:

space saving, no paper, improved legibility and clarity of records, easier bulk billing , preventive recall, access in other practice sites, interaction with RACGP manual file system, less staff, improved typing skills, improved medication record , reliability, less problem with lost records, savings in doctors time.

6.2 PREVENTION AND RECALL

Recall for preventive measures was widely perceived by doctors and staff to be a benefit. Preventive activities such as a cervical smear every 2 years or tetanus immunisation every 10 years can be achieved by:

- **Active recall** - identifying and contacting appropriate patients with an invitation to attend the practice.
- **Opportunistic Recall** - identifying appropriate patients before or during a consultation initiated by the patient for the management of a different problem.

The Medrecord system originally allowed for specific individual recalls to be set and a reminder letter generated.

Following reports of active and opportunistic recall systems (Dr. J. Ravet and Dr. W. Hogg, 5th RACGP computer conference) a preventive system was developed under the guidance of Dr. Michael Crampton (RACGP Computer Fellow). This system generated prompts on the screen for a range of predetermined preventive measures. These were highlighted to draw the attention of the doctor when they became overdue.

Using an opportunistic approach one practice was able to increase the percentage of patients with current recorded tetanus immunisation from less than 30 % to 75% after 15 months. This study showed a slower increase in immunisation after the first nine months of operation. Using a similar prompting system the rate of cervical smear tests rose from 34% to 92% of eligible women [4]

6.3 DRUG INFORMATION AND PRESCRIPTION PRINTING

65% of practices reported an improved drug and interaction information system. As the project progressed individual practices compiled drug and interaction profiles which were distributed to other practices. These profiles could be accessed during a consultation and basic information such as formulation and quantities were provided when updating the

[4] Ravet J. Opportunistic recall - a plateau (letter) MJA, 48.4,211

medication record. Drug interactions were automatically checked. A computer version of the "A to Z of Drugs" by Ros Green had also become incorporated in the software. This information is used to provide patient information.

One CAPP sites participated in a trial comparing hand-written and computer printed prescriptions in Western Australia [5]. This trial showed an 8 fold reduction in prescribing errors (including legibility and omission of details and instructions). This study clearly demonstrated a doctor preference for using this system instead of hand written prescriptions and was followed by legislative changes to allow routine use of printed prescriptions.

6.4 CHRONIC DISEASE MANAGEMENT

Forty-six percent of doctors in the CAPP1 study reported improved management of chronic disease. This was most likely achieved through the structure imposed by the computer system, improved legibility and order. While disease management protocols have been developed for conditions such as hypertension, these are not as yet in widespread use in the CAPP sites. One of the unexpected outcomes of the project was the extent to which computer literate doctors wrote software to enhance the basic Medrecord programs. One doctor produced a program to extract and graph recent blood pressure recordings [6].

6.5 CLINICAL REVIEW AND RESEARCH

In order to use the computer for clinical review or research the desired information must be stored and a means of retrieval available.

By the end of 1992 many practices had not completed the transfer to the computer or had chosen to use individual sections of the program. Access to information in the data base at present requires a knowledge of the Pick operating system and the structure of the database. This knowledge is reasonably specialised and may well be beyond the majority of users. The Medrecord software lacked a report generator which will take the user step-by-step through the process of making an enquiry or database search.

Examples of the data queries are:

- incidence of current tetanus immunisation and cervical smears (Dr. Jan Ravet)
- a listing of the 48 most commonly prescribed drugs (Dr. A. Newman-Morris)
- a listing of all current obstetric patients and their estimated date of delivery (Dr. Buckley)
- a listing of all patients over 65 years of age (Dr. Buckley)

[5] Jones A, Ravet J et al. A comparison of computer-assisted printed prescriptions with hand-written prescription. Aust J Hosp Pharm. 18,6,p364-370.

[6] Dr. J. Ravet, Grove Clinic

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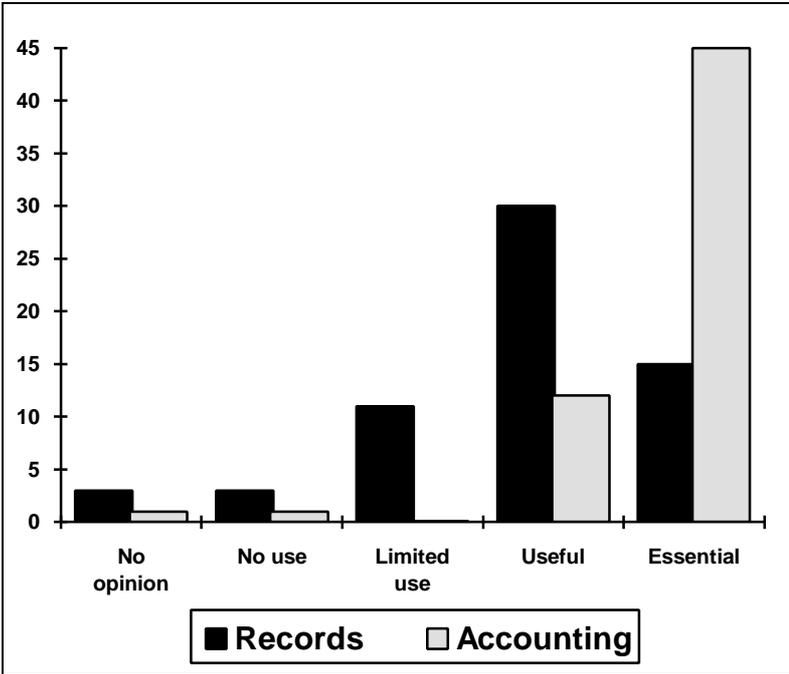
- identification of patients with cardiac failure who are not taking ACE inhibitors for inclusion in a study (Drs Karna, Crowe)

The CAPP experience has been that it takes a considerable period of time before a practice had entered sufficient data to allow analysis. It is also essential to have some marker to identify patients on whom data entry is complete. One practice used a specific problem code to signify a completed record which could then be included in subsequent searches to prevent inclusion of incomplete records.

6.6 SUMMARY AND CONCLUSION

A number of the practices have reached the stage where their systems have replaced and improved upon the pre-existing manual system. These practices are now able to explore applications which would not have been possible with a manual record system.

Overall 72 % of doctors reported that their records system was either useful or essential. The majority of doctors report both increased efficiency and increased enjoyment of their work as an effect of using the computer.



Doctor's opinions of the clinical and accounting system.

The major benefits reported involved improved access to information through:

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- faster access to records
- improved access to sections of the record such as pathology results
- access to records at times not usually available such as during phone calls
- reduction in lost or misplaced files
- legible and ordered records and improved records summary

Some practices reported an improved access to information on drugs and drug interactions, and a reduction in writing due to automated referrals and prescriptions. The introduction of computerised accounting has clearly improved practice management. There may also be other management advantages from the use of a computerised records and accounting system.

The use of a computerised opportunistic recall system has been demonstrated to be effective in increasing preventive activities such as cervical cancer screening and adult tetanus immunisation. The only controlled study of computerised prescribing undertaken in Australia to-date was undertaken in one of the CAPP sites. This study demonstrated a decrease in prescribing errors and was followed by the removal of legal blocks to the printing of prescriptions.

The potential uses of practice data in audit and research have been clearly demonstrated. There is over 100 doctor years of complete computerised medical records accessible in the 14 higher use practices. This data if aggregated (with due respect for patient and doctor confidentiality) could provide a source of information about the nature of "everyday" general practice in Australia.

Introduction of the computer has provided benefits in the areas of practice management, patient care and doctor and staff satisfaction. This has occurred despite the developmental nature of the software, the lengthy learning and adjustment period for computerisation of records, and the failure of the software to be developed after 1988.

Chapter 7 PROBLEMS AND DIFFICULTIES

This section addresses the problems and difficulties faced by the CAP practices. While some of these problems are directly related to the Medrecord system, much of this experience is applicable to computer systems and computer assisted clinical records in general.

At the time of this survey few practices had major problems with any aspect of their computer system. Those that did generally related to the costs of operating a medical records system.

7.1 System Support

Computer system support refers to "after-sales" service. In the case of medical computing systems this is usually provided by the software developer. This service covers correction of software or hardware malfunctions ("bugs") and developments to improve the function of the system or add new features.

Support from AMFAC/Medrecord was provided to 15 of the 21 practices responding. Ten practices reported their level of support as being either excellent or generally satisfactory. Current support problems seem to relate mainly to the speed of response.

Amfac have satisfactorily corrected problems or bugs to the satisfaction of 18 practices. Since 1988 there has not been any substantial development of this product. Of the 10 practices who have requested software improvements 9 report that few or none have been included in the software. Since "taking over" Medrecord AMFAC have continued to provide support but limited system development as it is their intention to develop a new medical records system.⁷

Availability of support and the rapid resolution of problems are essential prerequisites for doctors relying on a computerised records system.

There is a significant feeling of disappointment and bitterness held by many practices towards Medrecord. These practices felt let down by the lack of support and the failure of the system to develop over many years. Despite these problems an number of CAP practices maintain that their system is still very competitive with the other computerised record systems currently being marketed.

⁷ Personal communication (1993)- Garath Kentish, Vic. Director AMFAC/MEDRECORD).

7.2 Specific Problem Areas

Problem areas can be divided into:

1. Problems caused by the **introduction** of a computer system such as staff co-operation, capital and running costs, security of data and patient acceptance.
2. Specific problems related to the **use** of a computerised patient records such as slowed data entry, poor presentation of information, or difficulty in dealing with multiple problems during one consultation.

Problem area	Major	Minor	No problems
Staff Co-operation	0	7	16
Capital cost	7	10	6
Running cost	4	8	11
Unauthorised access	0	0	23
Confidentiality of records	0	0	23
Patient acceptance	0	3	20

Table: Problem areas rated by the practice leader

Practices were asked to comment on major problem areas. The few comments relating to costs mentioned:

- costs of upgrading hardware to more powerful "486 machines"
- cost of telecom lines (\$16,000 p.a. for one practice with 3 sites)
- cost of maintenance. Some practices reported organising their own hardware maintenance.

Cost of Computerisation

There are no data on the relative costs of computer as compared with. paper based records systems. Anecdotally a number of practices have found definite savings in staff costs and increased cash flow which have more than offset the costs of the computer system.

Eleven of the first group of CAP practices participated in the 1988 RACGP Interpractice Comparison. This study compares each practice's financial performance and efficiency against other similar practices. It is not known which of the other participating practices use a computerized accounting system. A review of the performance of the CAP practices by the Inter Company Comparison Centre did not show any specific trends in CAPP practices when compared to other practices .

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In the 1989 Inter-practice Comparison (IPC) participating practices were asked whether they have a computer. Of the 85 participants 29 (33%) were equipped with a computer. The results of this study suggested that in computerized practices as compared with non-computerised practices:

- more charges made directly to patient with less direct billing (which tends to increase the fee charged). There is better control over their charges and a higher revenue per service
- overheads: overall are lower. Specific areas: staff are better paid, lower labour on-costs, higher consumables, lower accountancy, higher lease and finance, higher debt collection

The conclusion of the Inter-practice comparison related to the performance of computer equipped practices was "...unless you are operating a highly profitable non-computer equipped practice, it would be unwise not to be computer equipped. Certainly the figures show that a median or below median practice is much better off with a computer.."

Comments relating to the costs of upgrading the computer system to a more powerful unit should be considered in the light of the rapid progress in development of personal and small business computers. The computers installed in 1986-1989 period were advanced machines for their time (based on '286 and '386 processors) however advances in technology have provided machines which are able to work much faster and handle more complex software.

A multi-site practice in outer suburban Adelaide commented on the high costs of telephone links between their practices. Costs of communication and sharing of medical records are inevitable if a practice wishes to operate a large distributed clinic. This practice has been operating for several years and clearly has had the opportunity to make a business decision regarding whether to maintain the phone linked computer records system or to use alternatives such as staff or couriers to transport records.

The costs of maintenance of a paper record system tends to be included with stationary and staff costs. It is possible that many doctors do not know the cost of operating the paper system. On the whole we suspect that doctors also do not "value" their records system highly and hence object to committing resources to it's maintenance.

The cost of a good records system is a subject that deserves further consideration.

Issues concerning doctors use and attitudes towards their current paper records system are worthy of further research.

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The next table covers the commonly perceived practical difficulties arising from each practices experience with computerised records.

	Agree	Uncertain	Disagree
Practice operation is severely disrupted when system "down"	14	2	6
Consultation time is increased	7	2	13
Information is cluttered and presentation limited by screen size	7	5	9
Data entry is slow or difficult	6	3	13
Problems with typing data entry	5	4	12
Records are not portable	9	1	11
It is difficult to scan the notes	3	1	13
Difficulty with multiple problems in one consultation	8	3	10
Patients and 3rd parties are able to read record during consultation	10	4	7
Staff access to confidential information when entering clinical data	4	5	12
It can be difficult to find information on the last visit/progress note	3	3	15
Unauthorised access to records has been a problem.	0	1	20

Table: Problems (1993)

Other areas of difficulty reported were acceptance of system doctors, lack of a comprehensive summary (similar to RACGP paper records).

The difficulty practices have when their records and accounting system is not available because of break-down, or maintenance indicates how essential the systems can become for both accounting and clinical management. While paper records have the advantage of never "going down" they are not as accessible as discussed in the previous chapter. Problems with power can be overcome to some extent with Uninterruptable Power Supplies (UPS). One practice has installed a generator.

Although the screen is accessible to third parties it should be stressed that doctors did not generally experience problems related to record confidentiality.

7.3 Staff Comments on Disadvantages of Computer System

In the CAPP1 study practice staff commented on the disadvantages of the computer record system. The major problem reported related to periods when the computer was not operational and practices were required to revert to the manual accounting system.

7.4 Effect on the Consultation

Doctors working in practices indicated their experience with the computerised records in the consultation.

	Certainly	Probably	Uncertain	Probably not	Certainly not
Increased patient satisfaction	18	25	7	1	2
Increased patient involvement	8	14	7	14	9
Able to achieve more in the consultation	12	7	10	17	7
Consultation time is increased	10	14	6	16	7
Barrier to communication	1	7	3	21	21

Table: Effect on Consultation (1993)

Overall it seems that for approximately half of the doctors their consultation time was increased. This finding contradicts the opinion of the practice leaders regarding consultation time presented in the last table. There was a perceived increase in patient satisfaction. The issue of patient satisfaction is further covered in a later section.

7.5 Data Loss and Backup

Information can be lost from either a paper records system or a computer system by physical destruction such as fire, theft, water damage. Computer systems are also subject to loss of information due to malfunction. Backup is the process of making a copy of the computer data which can be "restored" to the computer after repair of the fault.

Back-Up Method

At the outset of the project practices were instructed to backup daily to both an electronic media (tape or floppy) and to paper (printed journals). Most sites used tape backup.

The printed journals contained all daily transactions which can assist in restoring lost data, and act as a contemporaneous record for legal purposes.

Newer forms of backup such as duplicate hard disks are not currently used in any practice.

Adequacy of Backup

Sites were asked to provide detail of their backup systems, numbers of tapes used, frequency and occurrences of data loss.

Type of backup	No. of Practices
No backup	0
Daily Tape	22
Daily Floppy disk	2
Monthly disk/tape archive	16
Backup adequate	14

Table: Types of Backup used in 24 practices using clinical system. (1993)

The backup process was regarded as being satisfactory or adequate in 14 of the 24 practices. Backup was considered inadequate if:

- insufficient numbers tapes were available to allow backup on each day of the working week (3 practices)
- a monthly archival tape was not created (8 practices).

Irretrievable Data Loss

Data is arguably the component of the system which is the most valuable and difficult and costly to replace. Total loss of data is the equivalent of losing an entire paper records system in a fire.

In the first two years of the CAP project 5 practices experienced data loss. Two practices lost some data and on 3 occasions all data was lost. Each of these instances is described below. The experience gained from these problems has resulted in only two practices reporting data loss in the next 5 years of operation. In one situation only one consultation record was lost and in the second an unknown (but probably not significant) quantity of records were found to be missing and the cause of this was not determined.

The following case histories are from the CAPP1 period and have been included as the events demonstrate a number of potential errors and problems involving data security.

Case 1

Following intermittent problems with the tape backup system a problem arose which resulted in the loss of some data from the hard disk. Following several unsuccessful attempts to correct the problem, the practice leader was advised by phone that he should re-format the hard disk and then restore from one of two current backup tapes. When this was done it was found that neither tape contained data due to a failure of the tape drive.

As a result between two and three weeks of accounting and medical record data was lost and had to be restored as far as possible from existing records.

Case 2

The practice reported a printer problem to the supplier and was told by phone to turn the machine off and then turn it on again. He interpreted this as meaning to insert the "start up disk" which re-formatted the hard disk causing the erasure of all his data. An attempt to restore data from floppy disks was not successful as a working backup did not exist. The practice member did not know how to correctly backup to floppy disk. He had used only one floppy disk for backup (reinserting the same disk when requested to change disks during backup).

Case 3

Following a series of problems over many weeks the practice staff member was advised on the phone by Medrecord support to re-format the hard disk. It was not possible to restore the data as a working backup did not exist. This practice was using floppy disk backup and the operator did not understand backup procedure. He had been reinserting the same floppy disk when requested to change disks during the backup. The data was restored from printed journals.

Case 4

During the upgrade to Pick Version 2 the computer operator was instructed by phone to place the backup disk to allow restoration of data. The current backup disk was not selected and the disk inserted contained data some 3 weeks old. The missing data (apart from 3 days) was eventually restored.

Case 5

During the upgrade to Pick Version 2.1 on an Ultimate minicomputer the technicians (from Ultimate) deleted all files without first checking the validity of the backup tapes. When an attempt was made to restore the data it was found that all tapes were not usable. This occurred because for an unknown period of time a faulty tape drive controller had prevented the production of a valid backup. As no paper printouts of journal files were kept the loss of over 2 years accounting and records data was irretrievable.

These 5 incidents have a number of features in common:

- initial lack of a backup routine
- failure to have working backup(s) because the backup tape was not operational.
- support from the supplier over the phone.

- practices with supplementary records such as paper printouts of the transactions are better placed to recover from data loss.

The sense of security in having 5 recent backup tapes soon fades with the realisation that none will work because the backup system had failed some time ago without warning. This problem was subsequently corrected by automatic checking of the tape after backup to ensure that the system had completed the backup successfully. Phone support has lead to inappropriate instructions and misinterpretation. Extreme caution needs to be exhibited by support personnel when giving instructions which may have an effect on data integrity.

7.6 Practices not using Clinical Records

Fifteen of the 18 practices who are not using clinical records responded to a questionnaire asking for comments on changes in their practice, changes in computer use, and reasons for not using the clinical system now.

The following were given as reasons for not using the system now:

Reasons	No of practices.
Lack of time	5
Lost enthusiasm	4
Lack of summary	2
Practice ceased	2

Other reasons (1 practice each)

Change to another system, frequent breakdowns, lack of editing facilities, practice staff incompetence, failure of system to develop or progress, loss of doctor responsible for the system.

18 of the 42 practices are not using clinical records. The majority of these did not ever start using records despite a declared intention to do so. A few practices have decreased their use with the commoner reasons being lack of time and enthusiasm. These are factors which could well be independent of the use of computerised records.

It seems clear that many practices entered the CAP project with overly optimistic expectations and were soon confronted with the problems of changing any records system. Lack of supplier support and development of the product tended to discourage increased practice use.

7.7 SUMMARY AND CONCLUSION

CAP practices have received few enhancements to the Medrecord system since 1988. Despite this lack of progress 75% of practices were satisfied with the level of support provided by AMFAC/Medrecord.

Availability of support and the rapid resolution of problems are essential requirements for doctors relying on computerised medical records.

Practices using some element of the clinical records system were asked to comment on problems and difficulties encountered. Few problems have been reported which relate to the introduction of a computerised records and accounting system. The major problem area has been the capital and ongoing operating costs of the computerised records system. There is no data comparing costs of a computerised records system to a paper based records systems. No practice reported major difficulties with staff co-operation, confidentiality of records or patient acceptance.

Both doctors and staff indicate that practice operation is severely disrupted when the system is not operating ("down").

Doctors were divided in their response to suggested problem areas. Half the doctors felt that their consultation time was increased. There is a perceived increase in patient satisfaction. The use of computerised records did not seem to place a communication barrier between doctor and patient.

Eighteen of the 42 practices are not using any elements of the clinical system although most are using the Medrecord accounting system. While the reasons for this are undoubtedly complex the most often stated reasons relate to lack of time and enthusiasm.

The data (information) in the computerised record is clearly the most valuable part of the system. This data is at risk of damage or loss hence the desirability of having a secure system for backing up or making a copy of this information. The backup system was improved after the five episodes of data loss occurring during the first two years of computer operation. Data loss in the remaining four years was minimal. Deficiencies in the backup system were detected in 10 practices. These usually related to using less than the acceptable number of backup tapes/disk sets.

The CAPP experience supports the need for a backup routine, an adequate number of backup copies/sets and procedures to check backup tapes/disks to ensure that they are operational. Both practices and computer professionals need to be wary of communication problems and misinterpretation of instructions during telephone support.

Chapter 8 PATIENT RESPONSE

This section examines the effects of a computer assisted practice record on patients. These effects were examined by surveying the opinion of doctors and patients in practices using some element of the clinical records system.

8.1 Doctor assessment

Individual doctors using the system were asked to rate the following effects on the consultation

	Certainly/Probably	Uncertain	Probably not or Certainly not
Decreased patient satisfaction	3	7	43
Increased patient involvement	22	7	23
Created a communication barrier	8	3	42

The doctor responsible for the computer system was asked to rate the significance of problems related to patient acceptance or confidentiality of records. Of the 23 responses none reported any problems with confidentiality with 3 practices indicated minor problems with patient acceptance.

84% of doctors involved in the first stage (CAPP1) reported that the computer screen was positioned to be visible to both patient and doctor. The ability of the patient to read the medical record (through the accessibility and legibility of the computer record) is certainly a factor contributing to increased patient involvement. This degree of accessibility can cause problems when third parties are present in the consulting room. However an awareness of the potential for this problem could allow the third party to be seated away from the monitor.

8.2 Patient Questionnaire

Practices were asked to administer a questionnaire to 50 patients (10 consecutive patients per day for one week). To facilitate compliance forms were bundled in groups of 10 with a printed label indicating the day of administration.

Responses were tabulated for sex, age group. The Chi-square test was applied to these tables (14 analysis in total) for each of the 4 questions. Results are only presented when chi square indicated a P value of <.05). The Mantel-Haenszel chi square was used to control for patient age grouping in analyses where age was a potential confounding factor.

Results:

923 responses were received from 19 practices (out of a possible 24).

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Responses were excluded in 104 cases as the patient indicated that their doctor doesn't use a computer (in response to any of the four questions.)

This survey method was chosen as being practical given the resources of this study. The patients chosen may have been subject to selection biases and respondents who reported that their doctor didn't use a computer were excluded. It is possible that patients of these computerised practices and doctors have selected this form of medical care because they have a greater than average tolerance to the use of computers. The use of a Case/Control study design with comparison with patient attitudes in CAP practices which have never used computerised records could help to eliminate some of the bias in this study.

A similar study design was used to study patient attitudes before and after 2 years of computer use in the CAP1 study. There was no significant change in patient opinions over the duration of that study.

Characteristics of respondents:

Sex	Number
Male	266 (33%)
Female	551 (67%)

Age	Number
15-34	246 (30%)
35-54	276 (34%)
55-65+	298 (36%)

Question 1.

Overall how do you feel about your doctor using a computer to help keep your medical records or history?

Response	Number
1. Very happy	456 (56%)
2. Happy	287 (35%)
3. Unsure	43 (5%)
4. Unhappy	20 (2%)
5. Very unhappy	6 (<1%)

Patients who indicated that they were unhappy were more likely to report that they also felt uncomfortable, the computer interfered with their doctor listening to them, and were worried about confidentiality.

Question 2

Do you feel uncomfortable when your doctor uses a computer during your visit?

Response	Number
1. Always	73 (9%)
2.. Often	17 (2%)
3. Sometimes	28 (8%)
4. Never	654 (81%)

Patients who reported feeling uncomfortable tended to report that their doctor didn't listen and had concerns about confidentiality, and overall were not happy with computerised records..

Question 3

Does using the computer stop the doctor listening to you?

Response	Number
1. Always	21 (3%)
2.. Often	15 (2%)
3. Sometimes	141 (18%)
4. Never	625 (78%)

Patients reporting that their doctor didn't listen tended to report concern about confidentiality, level of comfort and overall unhappiness.

Question 4

Are you concerned or worried about privacy or confidentiality of your personal medical history when it is kept on computer?

Response	Total
1. Not concerned at all	651 (80%)
2. A little concerned	137 (17%)
3. Very concerned	28 (3%)

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The responses to the four questions were analysed to determine if there is an association for patient age and sex. using the chi square test.. There was no association at the p=0.05 level for sex. Age seemed to be associated with concern about confidentiality.

Response	Age 15-34	Age 35-54	Age 55 +
1. Not concerned at all	187 (23%)	199 (24%)	265 (32%)
2. A little concerned	50 (6%)	62 (8%)	25 (3%)
3. Very concerned	7 (<1%)	15 (2%)	6 (<1%)
Total	244 (30%)	276 (34%)	296 (36%)

Chi-square 30.57 DF 4, P<0.0001

An analysis of the expected values for each cell indicates that older people tend to be less concerned about the confidentiality aspects of computer use.

8.3 SUMMARY AND CONCLUSION

Overall there is a high degree of patient satisfaction with computerised medical records. Only 3 percent of patients reporting unhappiness about their doctor using computerised records. The small group of unhappy patients tended also to feel uncomfortable in computer assisted consultations, felt the computer interfered with doctor listening and were concerned about privacy issues.

The major area of concern seems to be related to the consultation process. 19% of patients reported some degree of discomfort during computerised consultations. 9% reported that they always feel uncomfortable. 23% reported that they felt the computer interfered with the doctor-patient communication.

I have no comparative data for patient comfort and doctor's listening ability with doctors keeping paper records.

Confidentiality of records seems not to be a significant issue. 3% of patients expressed serious concern and a further 17 % expressed "a little" concern. Older patients tended to have less concern than younger patients.

The perceptions of doctors tended to mirror the patient response. 3 doctors of the 53 respondents reported concerns about patient satisfaction. 11 doctors reporting that the computer can be a barrier to communication. There were no reports of significant breaches of system security or patient confidentiality.

Chapter 9 - CONCLUSIONS AND FUTURE DIRECTIONS

Where practices have chosen to implement computer assisted patient records there has been a high level of acceptance by doctors, practice staff and patients.

The benefits of computer assisted records, demonstrated in this project, seem to relate to an improved access to information. Improved access relates to the individual case record, collective information about the practice and patient population and the ability to provide enhancements such as computerised recall and medication management. Although the Medrecord software has not been significantly developed since 1988, users claim that it is at least the equal of more recently developed products.. It is likely that the benefits of the CAPP experience are probably generalisable to any sophisticated computerised records system.

Those involved in the evaluation and co-ordination of the CAP project since its inception in 1985 have been provided with an opportunity to observe both the implementation of a clinical records system and the process of conducting a large information technology project in General Practice.

9.1 Project Design and Implementation

The RACGP was initially criticised for only using one records system in this project. In 1986 there was only Medrecord was prepared to provide the resources required to conduct this project. Their records system alone complied with RACGP specifications.

The implementation of any information technology project may involve several steps including:

- the design and specification of software
- software development and testing
- selection of test sites
- implementation of software and successful integration within a general practice
- formal evaluation or hypothesis testing

Any one of these steps can be a major undertaking and it may be overly ambitious to attempt to implement all these steps. In the case of CAPP the implementation commenced with selection of test sites. The demonstration sites experienced with failure to develop the product and changing ownership of the Medrecord company. **Information technology projects should have clearly focused and limited objectives and where possible involve more than one approach to avoid the pitfalls of failed implementation..**

The RACGP used a careful selection process with the aim of producing a representative user base who were expected to successfully computerise. All practices were able to computerise their accounts however less than one third were able to implement clinical records. In retrospect many practices were probably motivated by the opportunity to

introduce computerised accounts at a discount and were not sufficiently motivated to introduce the records modules. **Information technology projects should be implemented in practices who have already installed a computerised practice management (accounting) system.**

With regard to implementation of records systems traditional advice has been to adopt a step wise approach: install one module at a time ("the escalator approach" - one floor at a time) rather than rapidly attempt complete computerisation ("taking the elevator"). While this may be a common sense, we are not aware of any evidence to support this approach.. **The experience of the CAPP practices suggests that the most successful practices rapidly implemented computerised clinical records. In this project we did not see any generalised use of the stepwise or incremental implementation.**

Throughout the initial 3 years of the project the evaluation team was able to regularly provide reports to the management committee regarding records uptake and the development of major problems. **Because of the complexity of many information technology projects regular monitoring of progress by an external auditor/evaluator would assist the management committee and funding body.**

Medrecord, along with other computer companies, has seemed to ignore the potential contribution of their high use practices ("Power Users"). These users have reached the limits of the current software and demand development and functionality which is in excess of the ability of the supplier to develop, given commercial constraints.

Power users also challenge accepted views about software design. In the CAPP project a small group of users developed the ability to produce useful software modifications and reports. The successful CAPP practices (along with the small number of other doctors who have developed their own systems, or are using other commercial systems) would have the potential to contribute greatly to a medical records development strategy. **The experience and opinions of successful users of computerised records is a valuable resource.**

One method of tapping this collective experience could be through workshop on medical records. This could usefully be restricted to doctors with a first hand experience of computerised records and software companies who have made significant developments in computerised records. A regular feature of workshops and meetings on medical computerisation is the protracted discussion between the "converted" and the "sceptical" on whether computerised records have a place, what are the "blocks" to implementation and important, but peripheral, issues such as confidentiality. All of these discussions presuppose mature and market ready products and a market that is ready for these products. We are clearly not at this stage in Australia. **Experienced users have the vision and expertise to assist with the development of excellent clinical records systems**

9.2 Records Use

The Computer Assisted Practice Project has demonstrated that highly motivated practices have been able to use one medical records system either as the sole record or in conjunction with a paper records system. These practices have proven to be able to innovate and have developed considerable experience and over 100 doctor-years of clinical records. **The CAPP data base could prove to be a relatively easily accessible source of data for research in general practice.**

The major problems reported relate to the cost of computer systems and the increased consultation time some practices. One participant commented that medical records are kept "at a cost to the doctor". The use of any records system relies on the doctor having the resources, time and motivation to maintain well organised and comprehensive records.

Many practices showed that they were unable to use this system reflecting :

- lack of motivation
- over-optimistic expectations
- the inability to overcome the practical problems of changing their records system
- failure of the system to satisfactorily meet their needs

This study and the original CAPP study (1988) have concentrated on practices which have successfully used the computerised records system. There is a wealth of anecdotal evidence about medical records use which is not surprising given that all doctors keep records of some kind. **We will better understand the factors influencing medical record use with further research into existing paper records systems.** Factors which should be studied include the costs, usage and doctor attitudes towards records. A clear understanding of these issues could well reveal barriers to the introduction of information technology.

The practices able to produce reports from their data demonstrated the potential of access to aggregated practice data. The following factors limited the use of the reporting system:

- the limited degree of system use in many practices
- lack of doctor interest
- inadequacy of the coding system
- unfamiliarity with the reporting language.

Medical records systems must contain a "user-friendly" report generator.

The issue of coding seems integral to the development of powerful medical records systems. The majority of CAPP doctors acknowledged this however shortcomings of the coding system hindered its widespread use. **Further development of coding system use in Australia is essential.**

The practices who have participated in this project have benefited individually as well as substantially contributing to our knowledge of the implementation of this technology in medical practice.

Data is the most valuable component of the computer system. It must be protected by adequate backup routines. The major threat to data security in a computerised records system is accidental loss of data, not unauthorized access or breach of confidentiality.

9.3 Future of the CAPP practices

The existing Medrecord system is unlikely to be further developed, leaving many practices in an uncertain position regarding their clinical records. The sites that have successfully implemented records hold an estimated 100 doctor/years of medical records data. If the CAPP practices upgrade or change systems then this data will need to be converted to the new computer system. The Medrecord sites are not alone with this problem as there are a few "superseded" medical records systems in use in Australia. While not many practices are affected at this stage, **the issue of medical record data portability across computer systems deserves urgent consideration by medical professional bodies such as the RACGP, and Australian Medical Association, the computer industry and government.**

A preliminary attempt to aggregate the data from two CAPP practices suggests that the CAPP data could provide useful information about the management and costs of common problems in general practice.

9.4 General Issues

The previous decade saw the development of affordable and reliable computer hardware. The Medrecord system was clearly the most sophisticated records software developed in the 1980's yet few practices were prepared to purchase and implement computerised medical records. The computerisation of records, for all its potential and real advantages, has been a task for the enthusiast. **Before any other issue relating to computerisation of clinical records can be addressed Australian GPs must have access to high quality, functional software.** The question for the computer industry and the medical profession is how to develop this software in the current general practice environment.

It seems clear to us that the records system of the future will need to be computerised to meet the doctor's professional obligations, the expectations of patients, and the information requirements of those who pay for our health system. The forty two practices that participated in the joint RACGP/Medrecord project during the late 1980's have contributed to the identification of the benefits and barriers to achieving this goal. The removal of these barriers is certainly a task for the remainder of 1990's.