FINAL REPORT

A Study of the Impact of the Use of General Practice Computer Systems on the Ordering of Pathology

A Report to the Department of Health and Ageing
of a study conducted by
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on behalf of the
Royal College of Pathologists of Australasia
and the
Australian Association of Pathology Practices Inc.

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1 EXECUTIVE SUMMARY

There has been an increase in the content of pathology episodes at a time when there has also been a marked increase in the use of computers by GPs to produce their requests. It has been hypothesised that making it easier for requesting practitioners to order pathology tests has led to more tests being ordered.

This study aimed to determine the extent to which the observed increase in the content of an episode can be explained by the increased use of computer systems for the production of pathology requests. The study was conducted in 4 phases.

- Phase 1 - A qualitative assessment based on focus groups to determine the perception of a change in behaviour and attitudes about pathology ordering;
- Phase 2 - A quantitative survey of preference, attitude and stated behaviour of GPs around pathology ordering;
- Phase 3 - A retrospective time-series analysis of Medicare statistics for two cohorts - those known to be using computer produced pathology requests and those using handwritten requests; and
- Phase 4 - A prospective study design

Phase1 – Focus Groups

Three focus groups were held in Brisbane, Sydney and Melbourne in November 2001, to explore general practitioners' views on pathology ordering. Participants represented a wide range of practitioners, all of whom were using computers in their practices.

Some focus group participants made unprompted comments that would support the hypothesis that using a GP computer system to order pathology increases the number of pathology tests ordered. This was not necessarily considered by them as negative however, and the value of pathology to General Practice was generally recognised.

Nevertheless while the factors reported influencing pathology ordering apart from clinical ones, were many and varied, there was general agreement that **the strongest were concern for medico-legal consequences and patient demand.**

Other key insights from the focus groups included:

- Pathology reporting and requesting rank highly among useful functions.
- GPs commonly learnt to use a computer from "trailblazing" GP mentors, who tended to carry a significant burden for their practices.
- GPs learn what they need to that gives them the best "bang for the buck".
- The many benefits of computer systems are balanced by many difficulties, which appear to reflect the0ft004 138.44067 Tm( )Tj/TT2 1 Tf0.00079 T gT4 ( )2 medico

- Despite the widespread usage of electronic pathology reporting and requesting, many GPs were not yet prepared to forgo paper.
- Pathology test ordering was influenced by many factors, including: clinical decision-making, patient management, patient demand, style of practice, business or marketing considerations of the GP practice, economics and health bureaucracy, and medicolegal considerations.
- Optional automated decision support and standard terms for requests and results are seen as desirable.

The detailed findings have broader implications around pathology testing in general practice but provided an important aid in informing the survey to be conducted.

Phase 2 – Survey of GPs

A survey of preference, attitude and stated behaviour was undertaken using a paper based questionnaire. The questionnaire was informed by focus group work done in Phase 1.

An authoritative letter from the Royal College of Pathologists combined with a payment of $25 for returning the survey (with an additional $25 for providing consent to the use of provider Medicare utilisation data) provided strong incentive with a very high response rate of 41% (613) achieved.

91% (557) of these consented to the release of HIC data for the time series analysis; an overall response rate of 37%

Key findings include:

- 66% of GPs utilise some form of computerised ordering to request pathology, with 55% using Medical Director (83% of the sub-sample).

Of these:

- 80% use it for between 91% and 100% of their pathology orders while more than 90% used it most of the time.
- 90% rank their proficiency in pathology ordering using their practice management system as high. There was no correlation to years in practice but there was to time since implementation of the system.
- Around half use panels or test groups in pathology ordering with a third reporting that they use them on every occasion
- 83% report it being much easier to use a computer to produce a pathology request rather than write it by hand. Only 4% ranked it much harder.
- **While 75% of respondents reported that they ordered neither more nor less, 17% indicated they ordered more and only 4% less, using a computerised ordering system**
- **70% of GPs reported improved patient management arising from use of computerised pathology requesting; 52% reported the level of this to be significant**

  - There was a positive correlation between proficiency of use of the computerised ordering system and perceived benefit in terms of improved patient management
- **Aside from management of patient health, the respondents ranked the following factors from highest down according to the perceived impact on their requesting behaviour:**
  1. **Medico-legal considerations**
  2. **Patient demand**
  3. **Practice approach**
  4. **Health bureaucracy and administrative requirements**
  5. **Promotion or advice from pathology practices**
  6. **Business and marketing considerations**
  7. **Ease of ordering**
- Fewer than 1% of respondents took the opportunity to add to the list of factors that impacted on ordering.
- There are some differences in reported behaviour between practice types: sole practitioners report being more influenced by pathology practices and health bureaucracy while those from larger practices report establishing proficiency earlier

The findings from Phase 2 (the survey) confirmed the focus group outcomes, enhanced the understanding of the drivers of pathology ordering and provided a good basis to undertake and interpret the time series analysis of Medicare utilisation data.

Phase 3 – Time Series Analysis of Medicare Utilisation Data

This study involved statistical analysis of pathology requesting data relevant to 532 General Practitioners who gave consent for the release of their requesting data as part of the Phase 2 survey.

While 557 (91%) of GPs responding to the Phase 2 survey had initially given consent for the release of their data, incomplete or ambiguous responses excluded some, leaving 532 GPs available for the analysis.

Pathology requesting data was analysed for the period January 1999 to December 2001.

Key findings include:

- There was a tendency for some doctors to change their pathology ordering habits during the observation period.
- This change was not uniform in direction and does not explain the overall increase in ordering noted.
- Changes in ordering rates were inconsistent between the various States and Territories.

- At a national level, there is no statistically significant difference in the rate of change in pathology tests per episode between those doctors who did not use a computerised system and those who computerised during the study period.

The findings from the analysis of Medicare utilisation data do not support the views expressed by GPs in both focus group and paper survey phases. That is, we could not demonstrate any strong support for a relationship between increased use of computerisation and increased ordering of pathology, either at the overall level or in terms of increased numbers of tests per patient episode.

It is possible that the observed increase in services per episode is caused by some change in the reporting system such as how the data on services associated with an episode is constructed, or there has been a change in medical practice over this period or there has been a change to the population being tested such as its relative ageing.

Phase 4 – Design of a Prospective Study Around GP Computer Systems and Pathology Requesting

A blinded cross-over study design is provided to investigate how GP computer systems might influence pathology requesting toward best practice. This draws on the work of the studies described here and on recent work done in electronic decision support for asthma management. The study design gives the opportunity to further investigate pathology utilisation data and to shed more light on the observed trend to increased services per pathology episode.

2 INTRODUCTION

There has been an increase in the content of pathology episodes at a time when there has also been a marked increase in the use of computers by GPs. It has been hypothesised that making it easier for requesting practitioners to order pathology tests has led to more tests being ordered.

The Pathology Quality and Outlays Agreement was the second co-operative agreement between the Australian Government and the two peak pathology professional bodies - the Australian Association of Pathology Practices (AAPP) and the Royal College of Pathologists of Australasia (RCPA) - to manage pathology expenditure under the Medicare benefits arrangements. It represented a five-year partnership from 1 July 1999 to 30 June 2004. A third agreement is currently being negotiated.

The 1999-2004 Agreement's objectives were to:

1. Manage growth in pathology outlays under the Medicare benefits arrangements within agreed expenditure parameters;
2. Facilitate ongoing structural reform of the pathology sector; and
3. Improve quality in pathology testing, use and practice.

The target for outlays under the agreement, at the time this project was initiated, were being exceeded. Episode growth was within its targeted growth rate and so the entire blow-out was attributable to an increase in the benefits paid per episode. In the 12 months to March 2001 there was a 2.3% pa growth in the number of test services per episode while there was a 2.7% increase in the benefits paid per episode when adjusted for MBS price changes. That is to say 5/6 of the blow-out was because there were more services being requested for each patient encounter and 1/6 because there was a move to more expensive services being requested.

The count of Medicare services per pathology episode continues to rise as shown in Figure 2-1.

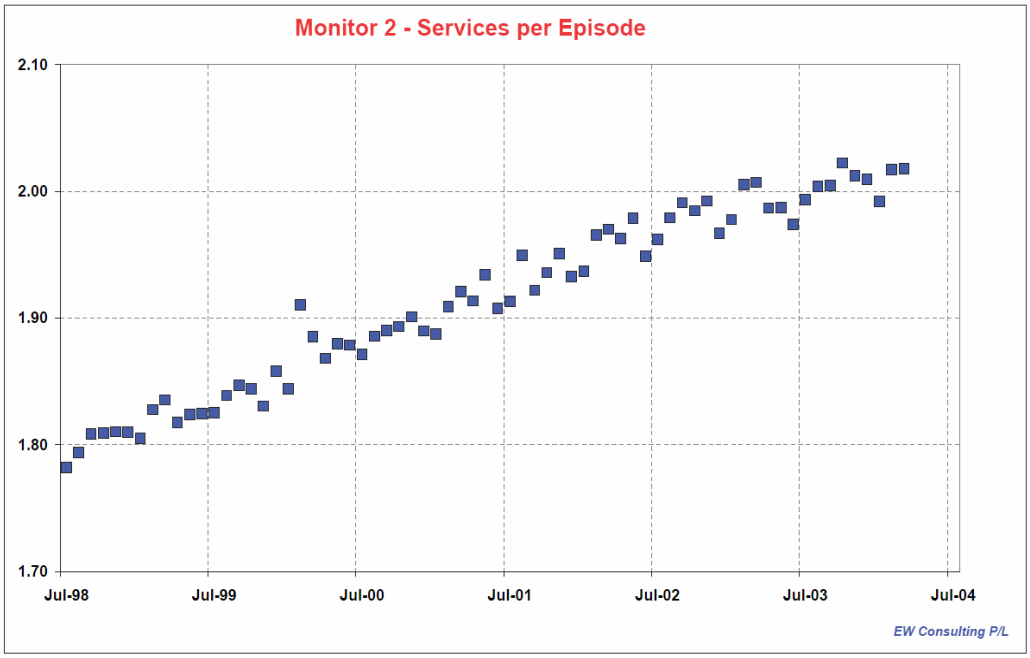

***Figure 2-1 - Pathology Medicare Services per Episode*[1]**

With the success of the Commonwealth GP Practice Improvement Program, during this period of growth in episode content, there was a doubling in the adoption of GP computer systems used for the prescribing of pharmaceuticals (in November 2000, 64% of patient's were being looked after by practices with electronic prescribing up from around 35% in August 1999)[2]. While the growth in the use of these same systems for pathology ordering is not known it seems not unreasonable to assume that it is of similar magnitude although probably from a lot lower base.

In producing an order for pathology, these practice management software packages allow for pathology "tests" to be picked from a list of possible tests for a particular laboratory. The most popular of these software packages also allows for the individual practitioner to define their own groups of tests. This means that with a single click on an entry such as "non-specific tiredness" a predetermined battery of tests can be selected and subsequently appear as individual tests on the printed request form.

The thesis to be investigated then is that making it easier for requesting practitioners to order tests has led to more tests being ordered.

Because of the past belief in this hypothesis rules have been included in the Pathology Services Table that regulate the form of pre-printed pathology request stationery and the degree to which groups of pathology tests can be ordered.

[1] Episode as reconstituted according to the definition used by the HIC. Source: Australian Association Pathology Practices & EW Consulting P/L

[2] www.gpcg.org.au

Medicare Benefits Schedule note PB 2.1 Form of Request states:

"There is no official "request in writing" form, and the requesting practitioner's own stationery, or pre-printed forms supplied by Approved Pathology Practitioners/Authorities are acceptable, provided there are no check lists or "tick-a-box" lists of individual tests or groups of pathology services on the forms. However, pre-printed request forms issued by Approved Pathology Practitioners/Authorities for use by requesting practitioners must be approved by the Health Insurance Commission. Forms submitted for approval should be accompanied by other information or documentation such as that contained in notes for guidance, cover sheets, etc., provided to requesting practitioners."

It should be noted however that there has never been a direct study to support this view. Further there is an argument put that even if this were so that the benefit from the improvement in the clarity of request would far outweigh the cost of increased testing.

There is however evidence that you can influence the ordering of pathology by changing the manner of requesting.

Van Wijk et al (2001)[3] have demonstrated a change in pathology ordering behaviour with an on–line decision support system.

Likewise there are examples such as the influence of feedback on ordering in hospitals. St Vincent's Sydney in the early nineties was a good example but this was generally with junior doctors still in training[4].

The New Zealand GP group Pegasus Health[5] has shown significant modification in ordering by changing their paper request forms although the change here was to different tick boxes.

In Australia now there is a desire to incorporate clinical practice guidelines into GP computer systems with the expectation that this will change behaviour[6] with some projects showing success[7].

[3] Van Wijk, M; van der Lei, J; Mosseveld, M; Bohnen, A; and van Bemmel, J, (2001) Assessment of Decision Support for Blood Test Ordering in Primary Care, Ann Intern Med 134(4):274-81
[4] Prof Les Lazarus, Personal communication
[5] http://www.pegasus.org.nz/
[6] Kidd, MR and Mazza, D (2000) Clinical practice guidelines and the computer on your desk Med J Aust 173(7):373-5)
[7] Presentation by John Johnson, Brett Esler and Tarkan Shahho (Pen Computer Systems) to HL7 3rd Australian Conference, Sydney August 13-14, 2003 on there implementation of the Integrated Care Project available at www.hl7.org.au

This study aimed to determine the extent to which the observed increase in the content of an episode can be explained by the increased use of computer systems for the production of pathology requests. The study was conducted in 4 phases.

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3 QUALITATIVE ASSESSMENT BASED ON FOCUS GROUPS TO DETERMINE THE PERCEPTION OF A CHANGE IN BEHAVIOUR AND ATTITUDES ABOUT PATHOLOGY ORDERING - (PHASE 1)

Phase 1 was designed to explore the hypothesis and to inform the design of the survey instrument and the conduct of the subsequent phases of this project.

3.1 Methodology

Focus groups were conducted in Brisbane, Sydney and Melbourne in November 2001. Participants were recruited using local networks of general practitioners interested in informatics or through mass communication (paper mail, fax, email) by Divisions of General Practice.

Some attempt was made to select participants to ensure a number of different pathology ordering systems were represented, since it is likely that a random sample would include a great majority of users of the market dominant package (estimated to have 80% market share). Attempts were also made to ensure representation of different demographic groups of general practitioners.

A moderator guide was prepared and approved for use at each focus group (Shown in Appendix 1 - Moderator Guides (Phase 1). Two different guides were used to ensure adequate coverage of the research question.

Focus groups were conducted in meeting facilities regularly used by doctors. Groups were held from 7-9pm. Participants were provided with a light dinner and drinks. All groups were recorded on digital audio media for reporting purposes. Participants received a fee of $100 for their contribution.

More than 100 GPs were invited in each city with the intention of recruiting 10-12 for each group. Participation was generally low, consistent with general experience of market researchers recruiting doctors. In total, 14 attended the sessions as shown in Table 3-1:

Table 3-1 - Participation in Focus Groups

Location	Participants	Dropouts
Brisbane	7	1
Sydney	4	2
Melbourne	3	1

Participants were all experienced active GPs. Most were men but each session included a woman.

Participants tended to have a high degree of computer literacy and interest in health informatics.

All reported that they were using computer systems in their practices. All but one used their systems to receive pathology reports electronically and to generate pathology requests. 11 of the 13 users (85%) used Medical Director to generate their pathology requests .

3.2 Focus Group Results

The findings from all three focus groups are reported collectively below. They appear roughly in the order of discussion and in accordance with the moderator guides.

3.2.1 GP Use Of Computerised Practice Management Systems

Proficiency

Proficiency can be separated into individual user proficiency and the collective usage of a new system by all members of a practice. Individual participants generally took one to three months to reach a level of comfort using a new software package, up to six months or longer to develop a sound knowledge of usage. Widespread usage in a practice sometimes took much longer.

> *"I suppose after about a month to feel comfortable and that using it with the patients in the practice I wasn't going to make a fool of myself. I suppose to learn the package to its full extent took several releases I suppose over six months I suppose. I'm still not using the whole lot - just using bits of it. The difficulty in a group practice is that unless everyone in the practice is using the same bits of it, it's really counterproductive to use bits of it yourself, because you have to duplicate systems. So a lot of it is really actually convincing other people to use it and everybody doing it together. That's why it has taken an awful long time."*

> *"Prescribing in the practice I was the second person in the practice. A GP registrar had coincidentally been using the system in another practice before he came to work in our practice and he was pleased to step into the practice. In a period of three months, they were all doing their prescribing on the software and starting to use varying degree of other functions, including letter writing and so on."*

> *"I think the issue of how the practice becomes proficient at it has been touched on by everybody else. You move at the pace of the slowest person and its been an ..um... evolutionary change and there's been resistances and its taken us about 18 months."*

> *"The hardest part was the first six months. Some people were still complaining about it six years later."*

> *"Around the time the PIP first came in, the principal of the practice thought it was a good idea and put it in and he was convinced that it worked and then everybody else started to put it in. It took years, ages convincing the front staff was a considerable challenge -*

> *producing new systems. There were considerable mutinies around at the time when these things went in."*

Changing from one computer system to another avoids the time and difficulty associated with converting non-users to users, but still entails several months of learning to become proficient.

> *"The change over to Medical Director was relatively quick and painless in achieving most of its functions, but it took probably 3 months before all the doctors were totally comfortable and proficient at getting the most out of it. I think the main change was that the doctors weren't used to using Microsoft products."*

> *"MedTech change over took about a month. Most of the useful stuff took about a month and we had some training from the MedTech people in preparation for that."*

Some GPs had a major change in attitude over eighteen months.

> *".... from starting 18 months ago from where the principal said 'I never want to be computerised' to now where he'd prefer to be paperless, has taken about 18 months."*

Even those with a good working knowledge don't use all of the functionality of their software, just "bits of it" that they find useful.

> *"It took me around three months to become comfortable with the bits that I use which is mainly prescribing and pathology ordering and downloading and the databases...the travel medicine and all those sorts of things. I still don't use all the functions that's for sure. I'm still finding new things during the idle seconds that you have during the day when you can open up a window and suddenly, there's brand new stuff there."*

It was commonly described that one GP led the introduction of a new computer system and became the mentor for the others.

> *"I found that I probably had to spend the most amount of time in the first month after we brought it on board. And probably spent anything between 2-3 hours a day for the first 2-3 weeks to learn the system and find out what it could do. And then the next three months were virtually spent answering questions from other doctors and showing them exactly how do that thing with such and such thing. So it consumed a lot more of my time."*

One participant described a more focused effort to master a system in one week, but that was preceded by a major effort to become computer literate.

> *"It's a hard one - to actually get proficient with computers I actually spent four years, but I suspect that's a bit over the top, because I took some postgraduate training. From that point to become proficient with any application, I decided that the easiest way to become proficient was to teach it, so instead of taking Serepax at night, I'd lie there with users manuals and read them in bed. So for me to become proficient, I can become proficient in any application, but I work at it really hard and it takes me about a week."*

To some the desire to gain proficiency was limited by system problems.

> *"We had all sorts of problems with hardware at the time and the software was flaky and caused considerable angst. But I can say now that the system is working reasonably well and everyone is happy with it. But it has taken ages to get everyone in the practice on board."*

Order Of Learning

Prescription writing seemed a common first feature to learn, because it is useful. Pathology downloading is also a commonly used feature, especially if it makes retrieval of results easier. In general use of a particular feature was a combination of "usefulness" and perhaps also having someone to lead the way by example, as described in the last section ("Proficiency").

> *"One of first things was pathology. That was the major benefit, we worked out that it saved about an hour and a half of receptionist time."*

> *"In regards to the actual computerisation, I decided to go for scripting first because having done the research, scripting was probably the major benefit to the practice in terms of efficiency. We did an education program first. It's taken the practice approximately six months to become proficient at using it. We started with scripting and moved to pathology and from pathology into recall systems then took the leap into totally paperless I guess. And it's worked really well for everybody."*

One participant used to have staff retype paper pathology reports into the system before downloading became available. This was perceived to be beneficial.

> *"We got to the stage in the early 1990s where we were actually typing the paper pathology reports into the computer. Cost of getting someone to type them in was considerable, the doctors felt that there was certainly a huge benefit in being able to get the results online for the patient."*

Other features perceived as useful were radiology reports and clinical notes.

A staged implementation seemed a useful way to develop GPs' comfort in the system prior to introducing new features.

> *"A staged process, especially for those that aren't very IT literate, is the easiest way to go because you could see the overwhelming thought of a computer really scared a lot of people half to death and it was a really good phasing in process for us I guess."*

> *"We had a staged introduction, for a few months we were entering health summaries.. clinical notes plus scripts, then pathology then x-ray forms and so on over a year."*

3.2.2 Benefits And Deficiencies Of GP Computer Systems

General Benefits Expected

Benefits expected to be delivered by the system included:

- Ability to search the patient database.
- Medicolegal protection - audits, quality
- More support - eg dosing advice
- Less paper and reduced costs - paper, staff.
- Access to higher quality data.
- More information intensive consultations.

General Benefits Delivered

Feedback on benefits delivered was diverse, some positive some negative.

> *"So what has changed, what has changed is that as the systems have improved we've found that we've got far better data access. That's only as good as what you put in though, so if your input is not good, you only get that back. So if you are able to monitor and maintain some decent input there is no problem, you get a very good return for that. Certainly, in the last few years, particularly things like downloading pathology results, has been a huge, huge plus. There's nothing worse than looking for when the last HDL was done or the last pap smear was. So that's improved hundredfold. Suddenly, at the click of a button you can have a look."*

> *"The accuracy of the dosages, the interactions, that's been a huge bonus. Knowing what cross-reacts to what . Assuming that the database we use is accurate and kept up to date. In terms of overall, I think we're doing what we're doing in the same length of time and delivering a far more information intensive consultation to the patient at virtually the same cost level. In other words, we're now able to tell a patient exactly the state of affairs as far as the prescription pattern was, as far as the pathology data collection was, as far as the monitoring of the disease process was compared to say ten years ago. Unless you had superb clinical notes that kept cross-referenced data on a variety of different things. Most people were using 8x5 cards and 8x5 cards were probably the worst possible system for notes keeping."*

> *"I wanted some medicolegal protection - better documentation, better auditing, better setting up of recalls, so that I could hopefully follow up on tests and referrals and those sorts of things. I suppose I thought that the quality of the practice would improve if our ability to view our data was clearer, rather than having to track through screeds and screeds of handwritten some better than others notes. To a certain extent, it has delivered that - not perfectly. The other thing that I wanted was as I was getting older, was more support with doses."*

Users who can type described how their personal record-keeping efficiency improves.

> *"I think the biggest difficulty, despite the mouse and the mouse clicking, the biggest difficulty is actually typing. Once you get over the typing problem, the big barrier, the wall, suddenly life becomes dead bloody easy. It's amazing. You cannot write notes and look at a patient and talk, because you would not be able to do it properly, but you can damn well type. You can keep eye contact and keep on typing. I don't use the mouse at all, I just type short-cuts."*
>
> *"I absolutely agree."*
>
> *"Yeah."*

General Patient Benefits

Doctors reported a range of perceived benefits for patients:

- Extra copies of reports.
- Educational information - better access to consumer information, to drug information
- Less likely to get drug interactions or allergies.
- Allergy testing not reliable - may not detect what is entered.
- Drugs and doses, error reduction.

  > *"Drug information, list of drugs and doses is quite important, especially for elderly patients and their carers. I think that's made a huge difference in the reduction of medication errors."*
  >
  > *"As long as they're kept up to date. It's one of the problems that we're finding that by the time you type in the drug and the repeats [it takes longer]."*

- Travel medicine.
- Answers from the notes.
- Easy access to supportive information.
- To be able to answer patients queries better.

  > *"I think it's made patient access to their results better. It's facilitated a more pro-active approach to delivering the results to them."*

- Meticulous patients benefit, because they have a copy of their reports.
- Safer doctors. "More safe and more reliable in what we do overall. The prescribing is probably done more accurately.

  > *"The patient can read what is ordered, but it's still in code, it's not understandable to the patient."*

General Deficiencies

The many deficiencies described seem to reflect the fact that the maturity of the medical software is still developing, as is the infrastructure that supports it. Deficiencies have their roots in many factors:

- the nature of business systems

- hardware capabilities
- software design
- usability problems
- quality of data entry
- knowledge of system capabilities
- system issues outside the practice

One long-time user notes that purported benefits in use of paper or staff costs did not materialise.

> *"We were led to believe it was going to cut down the amount of paper in the practice, it was going to cut down our costs of support staff, it was going to improve our access to the information. Well it hasn't cut down our use of paper, we buy paper in enormous quantity at the moment, I mean quite enormous. I don't think it has made a difference to the amount of staff, compared to what we had before it is virtually the same."*

Several participants noted that using a computer seemed to reduce their dependence on their memory to the extent that they no longer remember things they used to know.

> *"Picking from lists all the time, instead of having to remember it, you don't remember it any more."*

> *"The same applies to medications too, if I really knew my medications today like I used to, before Medical Director came along. I don't know the pack sizes or anything any more." "Yes, really annoying."*

Raw system performance was noted to be a factor that limited the utility of the system to users. (It was noted that some of these performance problems were resolved with hardware upgrades.)

> *"I started Medical Director in 1994 on DOS [which was] 'very fast', then when we got the Windows version, everything slowed considerably."*

> *"[We used to] sit there waiting ten seconds for screens to change and that's a long time in general practice."*

Poor usability may actually slow down computer users.

> *"Five years ago, if the computer could have just printed the blank form, with a pension number and everything on it, that would have been a tremendous workflow improvement, instead now I'm wasting a lot of time in Medical Director freaking around for medication."*

Data retrieval and use seems to be seriously limited for some users.

> *"The other issue that nobody's mentioned is that in terms of proficiency with the system, there's proficiency that I want that I can't get because the system doesn't deliver them. ... Just in terms of accessing the information that's actually in there. You actually need to really be able to pull the information out and put it into relational database structures and create joins and do complex queries and the package that I'm using doesn't really allow you to*

> *access the information that I've struggled and trained everybody to put in and to query it. So in terms of proficiency, I find that profoundly frustrating. I would not say that I'm proficient in how I want to use the system but partially that's because the system doesn't deliver."*
>
> *"Searches are very limited. Ultimately, [...] in terms of extracting data and analysing it is one of the major disappointments at this stage. Since I last tried it, there were serious limitations in terms of analysis."*

Data entry difficulties may seriously adversely affect the quality of computerised notes. (This is described more in the section on pathology requesting, where the rationale for requesting tests may be poorly documented, presumably because of the time cost of data entry.)

> *"... about probably three or four months ago, I started taking a laptop up to a retirement village - that's useful, but I must admit I'm not a good typist and I still find difficulty in even the click and point things for history taking. I'm a person who tends to write voluminous handwritten notes, particularly on things like psychological aspects. [...] I'm doing a fair bit of medicolegal reports these days as well. Some of the ones I looked at from the point of view of ...of... They say the doctor's notes are here and they're computerised and all it has is "doctor Bloggs prescribed Vibramycin" or something like that and that's that entry for that day [...]. They say they're using full clinical notes but all they're doing is... you know "URTI Vibramycin" or "Anxiety Valium" or something like that just where I can write half a page in the time it takes to click through various examinations and things. So I am still writing quite a bit of clinical notes and using the prescribing software mainly."*

Entering information and keeping it up-to-date are two separate things.

> *"Every time the patient goes to hospital and comes back, half the drugs are deleted and a new lot have been put in. But we may not get that information straight away, we may get the information at a much later date, or some of the information may not have come through and you think that you have an accurate record but it's not."*

Data quality is impaired by a lack of standard mechanisms for organising data within the software system.

> *"Flagging of allergies, as Medical Director does it anyway, is not sufficiently reliable. It enables the entry of allergies that are not recognisable to the system. So the doctor may think that it has been entered in a way that the system can use for checking future prescribing against that allergy, but the system will never recognise it. The different way that sulphonamides can be entered, the different spelling, and so on. The system should not accept something that it's not capable of recognising. It's a serious fault. If we start to rely on it too much, we'll fall into a trap because it's just not that reliable."*

Serious errors are common when using computer systems in general practice. The most common of these is entering data in the wrong patient's chart and generating prescriptions or pathology requests for the wrong patient. This had been done by all participants.

> *"You get all the small detail right, but it's for the wrong patient."*
>
> *"You can have a very beautifully and accurately printed script for the wrong patient."*
>
> *"Or you change the dose or the strength but don't change the dosing instructions. That's why I have to read the script to the patient. Otherwise you're talking to them and you're typing and you just print it off and give it to them and it's not good."*
>
> *"We've all done that. It's usually picked up by the patient or the pharmacist if you're lucky."*

3.2.3 General Experience Of Electronic Pathology

Experience Of Electronic Pathology Reporting

Electronic pathology reporting is one of the most commonly used functions of general practice software, because it reduces the workload of filing for practice staff and improves retrieval of results. The systems seem to work OK, but still there is room for bugs to be ironed out.

> *"Unfortunately there's a lot of duplication [of pathology reports] that goes on, because they send you reports that haven't been authorised, then they send you the same report. That would be something that would be beautiful if they could superimpose without me needing to delete it."*
>
> *"My biggest problem is paper and managing all of that. It is just totally and absolutely unmanageable basically. So if IT can be used to help index that properly and store it properly, but it has to be in a reliable sort of way, it would be a great benefit for us. Report management or storage is the big issue for us. We waste a lot of time trying to get data that's not available or you can't find or it's been lost or it hasn't been delivered, or that sort of thing. So again IT offers a solution there, but we don't have that solution yet."*

Yet, GPs harbour some serious concerns about the reliability of the business systems reliant on electronic reports, and how that impacts on their medicolegal liability. They seem reasonably happy with the reliability of the paper system, which they are used to.

> *"I've always wondered in practices, single GP practices and large practices of all the reports that come in that all the reports are looked at before they are filed, for medicolegal reasons I am quite pedantic that they are always looked at before they are filed. So it's sort of a double filing system where the reports have to be presented to the doctor to be looked at and then they get filed in the patient notes. I presume that all doctors look at reports before they get filed."*

> *"We have a system that the doctor has to initial the report before it gets filed – no-one is allowed to file a report until it's been initialled."*
>
> *"I think we're in its infancy as far as electronic records go at this stage. I think we let the computer do what the computer does best and the paper do what the paper does best. And I think there are paper solutions to your dilemma [about storage and retrieval] as well as electronic ones and not necessarily only electronic ones."*
>
> *"[In 1996] There was initially a bit of concern about the doctors in terms of the reliability of the system and the need to keep hard copies, so we kept the hard copies in a box until we needed them but found we never needed them."*
>
> *"I'm still a bit paranoid about the small proportion of results that don't come by computer for whatever reason and medicolegally I feel uncomfortable."*

Many GPs still get both paper and electronic reports. Paper seems to have the advantage in readability, speed of reading, and a familiar paper-based workflow. Electronic seems to have the advantage of speed of reporting and ease of retrieval. Some GPs no longer receive paper reports.

> *"I find I can read the hard copy a lot better than I can the electronic. The only time I regularly like to get the electronic is when the hardcopy doesn't come fast enough. I am quite happy to get the hardcopy."*
>
> *"Overall it's been OK. Sometimes [electronic reports] get lost, just like the paper, sometimes they get misfiled just like the paper because of some misspelling or demographic errors. You actually have to read the file a bit more as opposed to scanning it as you could do on paper. But overall it's been OK."*
>
> *"I find [electronic reports] slower, because the screen isn't big enough."*
>
> *"My scroll-mouse doesn't work with Medical Director - well bits of it, so I can't scroll with the scroll mouse down the page. I have to move over to the arrow and that slows me down."*
>
> *"I look electronically when I don't have the hardcopy and I need it. It's not actually in a really functional way at the moment, it's still an image and you have to scroll down. And its also not functional, it doesn't tell you anything that you can't see on paper."*
>
> *"Pathology reporting is substantially better than radiology, because of the time lag."*
>
> *"I notice a lot of the reports that come electronically don't dump well to the screen. I think it's that. And there are certain results which are obviously received that don't appear on the screen. But I'm using the old path manager still."*
>
> *"[If I need a result quickly] It's easier to download if it's available than to ring up."*
>
> *"I actually look at all the paper reports as well. This is something I do quite deliberately. The other guy doesn't check the paper reports, which is probably more important for him to do since he's*

> *colour-blind. I think he misses some things because of that. I actually like to use the paper reporting. I will extract out the sheet of the paper report that I want to follow up, even though I recognise that I'm wasting a lot of paper."*
>
> *"One of our doctors doesn't like the computer at all and she still receives all her reports via paper. But the rest of us don't receive paper as well, except for radiology, that for some reason that we still get radiology reports on paper. I mean I'm still duplicating a lot of my notes, so I'm not ready for a paperless practice yet, but that's the way we will go when the other doctor is ready."*
>
> *"I think they're obliged, from what I understand, the pathology companies are still obliged to send us paper reports. We are still getting paper reports but we're downloading them and we hardly ever use the paper."*

Reporting seems more onerous for those who use more than one pathology company, due to "system" design problems making retrieval more onerous. Some pathology companies don't seem interested in delivering electronic reports to practices where there is competition for the pathology service.

> *"Reporting is a two step but very lengthy process - you have to click on the icon on the desktop to get the fetch thing happening and if you're promiscuous like me and use several pathology labs trying not to be preferential to one or the other, then you have four icons on the desktop to try to get your pathology. Yeah, there is a system by which you try to remember which pathology company you used that time. And then you do that and them you have to do the medical Director thing and then you have to wait all this time and I just don't do it really a lot. I do it at the end of the day and I tend to use the paper."*
>
> *"If I forget for a few days, it's really terrible, because you have to wait such a long time."*
>
> *"Mainly we are hooked up to one and the other guys don't seem so interested in hooking us up."*

GPs seem unhappy that, with electronic reporting, they are incurring costs and effort to retrieve reports that used to be carried by the pathology companies to deliver them on paper.

> *"These systems where you have got to dial up and manually or electronically get a password. It's just not the right way to do things. If you refer a patient to another practitioner, it's their responsibility to get the information back to you not your responsibility to get back to them and ask for the information because they're not going to give it to you. It's a question of who is initiating the flow. I shouldn't have to dial in to three or four providers to get my mail, it should all just come to my mailbox."*

Electronic reports still do not offer the kind of functionality that could be important for reducing patient harm when a report reveals a seriously abnormal result.

> *"I'll tell you an example - a colleague of mine, a very senior GP, [was seeing] an old lady who [...] went into renal failure. He [...]*

> *sent her for blood tests and looked at the [faxed] blood test results and checked her creatinine [which] maybe [had] a star on it (it was all monochrome), [...] [T]he next day that he [...] sent the patient to hospital. What he didn't notice was that the potassium was quite high. He should have acted sooner, [...] the patient was fine, but he felt absolutely dreadful because he'd missed a really abnormal result. I'm just thinking that the current way pathology results are reported is flat - it's the same as paper, it's no advantage. What you really need is for the electronic report to bark at you - that there's two abnormal results here and have you checked them both."*

One GP thought that a high quality cervical screening management system in a practice was a good early application which would have spin-off benefits for other practice systems.

> *"Because I think cervical screening is like the 'first cab off the rank' and any practice that you find that has a good system for handling cervical screening they will have a good system for everything else. Because cervical screening looks at the recruitment of the patient, the quality of the taking of the test, how you handle the result when it comes back, and how you handle the abnormality when it's detected and how you tell the patient the result. That pathway is the pathway for any test. So if you've got your cervical screening system in place, then it should actually work for [anything else]."*

Experience Of Electronic Pathology Requesting

Electronic requesting improves the legibility of the request which reduces data entry errors at the pathology lab.

> *"The biggest advantage of printing requests is just legibility. The practice may get one or two results per month that may not be spelled correctly or have to be mapped in. Pre- the computer-generated requests, there would be hundreds of misspelled people ... duplicates coming back. That's probably been the biggest benefit."*

> *"One hundred and twenty percent of the population is on the pathology databases, so there are a lot of people in there twice. That puts a big problem on a recall system."*

However, problems are still created by data entry, even when information is legible.

> *"There's still errors and its a shame that we still are dependent on the pathology service's data entry to enter the data correctly."*

Requesting using the computer can be less time consuming and more convenient, especially for commonly ordered lists of tests. This to some extent is determined by the specific software and also by the user's knowledge of the software. User's use of automated lists of tests varied widely. There was not a "standard" list. Users designed their own lists to suit their own needs and improve their efficiency.

> *"I suppose the pathology requesting is determined by the software and the smarts that the software's got in it, which at the present time is not that many, but you can set up sophisticated glossary*

> *systems that assist in requesting pathology using pull-down menus in Medical Director."*
>
> *"You can set it up as a glossary of tests so that there might be an antenatal screen or a chronic fatigue screen and it plonks these tests in, or you might have some text that helps in the interpretation of the result."*
>
> *"[The glossary function] is useful when [doing] the new diabetic screens to be able to put in HBA1c or urinary albumins. To actually have that in a chunk of text saves a lot of typing or pulling things off lists, which is slower."*
>
> *"The only thing I have is antenatal tests."*
>
> *"I use it to set up my ten most frequent ordering, which surprise, surprise includes Pap smears." (female GP)*
>
> *"I find I'm adding on quite a few of the tests don't seem to be on our list, so I find I'm adding them on by hand, which is a pain."*
>
> *"I think we've all set up our own request system. Even before setting up the favourites, you've got it in your mind, and then you put it in the favourites list, and then you just keep on ordering [after that]."*

Some users in the focus groups did not think their software was capable of certain things, but were corrected by others. This implies that learning to use medical software is a very-lengthy process for some and reinforces the value of the peer to peer learning model described previously (See section on "Proficiency").

Reconciliation of tests requested with what was reported seemed a particularly useful feature which GPs liked. However, many technical and usability problems limited its usefulness.

> *"You can check whether the test has been completed - any outstanding requests."*
>
> *"Medical Director actually tells you if that particular event series is complete or not. If it is, it will tell you that all series of tests are complete in that group that you've ordered. Which is quite a useful thing so that you know whether any tests that you've ordered are outstanding."*
>
> *"The other value in it is that I'm able to look down the track and remember what I had ordered. The catch is that I tend to afterwards write something else on the pathology form, and of course that doesn't get audited."*
>
> *"What I do is, because ultimately all my results end up in Medical Director, I order out of Medical Director just to set the flag, and I know that if I do that it's very unlikely that I'll get a result that I can't load back into Medical Director. If I just ordered direct, say by a handwritten order, its very likely that I'd be doing a lot of work just to upload the results into Medical Director."*
>
> *"It's not automatic, it doesn't happen ... there's no automatic reconciliation."*
>
> *"The menu of tests that can be requested is quaint and full of inaccuracies. I've sort of been expecting that with each quarterly*

update that suddenly there'll be all these funny things on the list of tests will be fixed up, but it hasn't happened. Sort of half-completed term, not abbreviations, just strange. I think it needs bit more dynamic attention rather than just rolling on year after year."

"The automatic process of tallying the tests against the completed pathology testing and reporting and it doesn't happen reliably, because I suspect the nomenclature of the test coming back doesn't match the request and the software doesn't correlate it. Sometimes tests that have been done haven't been checked off against the list of completed tests, so I wouldn't want to be placing too much reliance in that at the moment."

"We're hooked up to 5 or 6, of which we regularly use three, one for cytology and two other pathology groups, and two main x-ray systems. I'd say that reception of results has generally been very good, very quick. You get the odd result that doesn't come through. I don't know if it is our fault or theirs, I'm not enough of a computer expert to tell. There doesn't seem to be a system for alarming us when a test has been ordered and hasn't come back, something which [colleague] says should be very basic for the system."

"I can't [use the automatic reconciliation system] because I order a lot of tests in hospital on paper. Also a lot of my patients don't get tests done."

"We don't download our radiology stuff, so there's eighteen months worth of radiology investigations sitting on the screen [in the not completed window]. So it tends to obscure [the incomplete pathology] a little bit"

Some participants identified that the main efficiency benefit of electronic ordering is the demographics and not the actual test selection.

"I handwrite the forms. The reason it's easier to me is I have laser printed labels. I take the label off and stick it on the form and write 'FBC. Looks anaemic.' and its a lot easier than printing out computerised pathology forms - three seconds."

"I find the computer is a two-edged sword. It makes it easier for the demographics, but I find it faster to write 'FBE, ESR, E/LFTS' than to tick checkboxes. If our system didn't even have pathology ordering but just printed the demographics, it would improve my workflow a lot."

They are happy for the pathologist to supply the computerised request form.

"It's bad enough that we have to pay for the modem to get the results. We're not going to pay for the paper as well. Gees."

3.2.4 Pathology Test Ordering

There are many, many factors which influence the decision to order pathology tests. These are grouped and described below.

Clinical Decision-Making Factors

The immediate response by most participants as to why they order pathology tests was to do with clinical decision-making. However, they also highlighted that in general practice, where patient illnesses are poorly defined, there is some intuitive judgement involved.

- clinical situation - differential diagnosis
- medical training and knowledge of current practice

  "Something else that influences ordering is knowledge of the test. If you've got grey hair like me, there's a whole generation of tests underneath that you should have caught up with. It's a constant problem to catch up with new tests on the market coming available."

- nature of practice
- intuitive - "Most of it is intuitive and you hardly know why you do it under any one particular circumstance. I know you get a problem patient who has very vague symptoms and you strongly suspect for example that they have some sort of psychological problem, I think I'd be forced into ordering pathology."
- undifferentiated conditions

Patient Management Factors

Several factors related to the way patients are managed in the health system:

- status of disease - need for monitoring of some diseases or treatments (eg thyroid, anticoagulation)
- follow-up
- screening, prevention, health promotion
- early discharge
- pre-operative workup
- pre-referral workup

  "If you're wanting to send a patient to someone then you're going to order the screen, unless you're not sure."

- specialists requests it - often for patient follow-up

  "Rheumatologists are good at this."

  "There's a little bit of that, so they can have the result on hand when they see the patient."

- opportunistic or piggyback - aligning things you might want to do at some stage anyway
- to buy time

"Delaying tactic - you use that to think about it for a couple of weeks."

- •to save the patient pain - paediatrics
  "Do a whole battery of things because you don't want to have to shove a needle into the kid a week later."

Patient-Driven Factors

In some instances, patients request tests be ordered for various reasons.

- patient request - eg to check on what naturopath says; *"To check I haven't got cancer."; "I haven't had a blood test for 12 months."*
- checkup - *"I need a checkup." "The college recommends annual checkups."*
- consumerism - patient demand *"They're more demanding. They're not asking for advice, they're telling you."*
- patients more demanding - testing to exclude diseases
- patient request/demand *"I'd like to know my blood group doctor." "Doctor, I'm sure there's something wrong with me, just order everything."*
- Niches of activity where patients demand stuff - eg allergy testing *"In fact there is a nurse driven business that does allergy testing and tells them all sorts of things that cause fatigue."*

Style Of Practice Factors

Some participants perceived ordering being to some extent determined by the style of practice. On the one hand, they may order more tests if they spend more time and are being thorough.

"Patients have such a narrow window of visiting the doctor. And you often only capture them ...they've got their list and they really get distressed if they miss something, because they won't see you for another six weeks. So when you see them you to capture them and really need do a thorough investigation of their complaints, when you've got them there. If you have a delay in diagnosis, it's not ever going to be accepted now."

Conversely, there was a perception that doctors who spend less time with patients may order more tests in lieu.

"The ones who have got less time I think will order more tests. The ones who take less of a history will order more tests. That's what I think." "Mmmmm."

One noted that while GPs could use time more than specialists to sort out patient problems, that a more experienced GP may end up with more complex problems and have to order more tests.

"I think what specialists do is different to what GPs do. If you don't do something now, you can always do it later. The role of the specialist is to not miss things, much more than the GPs is." "I'm thinking that that's lessening. I'm thinking that now, people come to see me, maybe I'm actually a fairly old GP, so I kind of, now people come to see me when they've been to see all the young people in the practice or have gone to see all the ... and by the time they've

come to see me they actually I suppose to get to the final answer now. I think your practice changes as you get older."

Business Or Marketing Factors For GP Practices

The request of pathology tests was described to be influenced by the need to maintain patient satisfaction, and that was related to patient perceptions and the ongoing marketing of the practice.

- patient perception - good doctor = ordering pathology

  "You're a professional, they've taken time out of their day to see you. They've come for not just ... you used to be taught that patients come for reassurance. I don't think that any more, I think the patients actually come to have tests. If they're tired and you say, 'I think you look really quite well, your lifestyle....' that's not going to be good enough. You need to do the tests for fatigue. It's testing to exclude stuff. I'm making sure I'm not missing something."

  "Patient perception is that if you order pathology a lot, you're a good doctor." "If you go to a specialist, you can't actually go to a respiratory physician without having a respiratory function test. You can't go to a cardiologist without having an ECG."

- doctor perception that tests are needed in order to compete in the marketplace for medical services

  "Sometimes I think what single test is going to be most useful here, but you always end up ordering more than that."

  "And if you don't somebody else will."

- patients like printed things

  "Patients love to see lovely printed out things - that's my impression of patients."

- keep patients

  "If you don't they'll go somewhere else for it." "Yeah, mmmm..."

- corporatisation

  "I don't know if corporates do over-order pathology, but if they do severance of pathology companies out of corporates. That's pretty drastic action I know." "I think we're being unfair to the doctors who are working for corporates. Doctors are individuals and they maintain their own standards, but what you are saying is that if you were working for a corporate, that the organisation is going to give you a book that says whatever comes in the door, you have got to do an x-ray and a pathology test. That is not the case."

Economic And Health Bureaucracy Factors

The opinion was expressed that doctors and patients are generally unaware of the costs of pathology tests.

"It was one of those things in medical school of course and in the hospital system generally, that we have no concept of what any test costs. In fact in private practice really, we don't understand, we never see the bills. We don't really understand how much a batch of

> *tests or each individual test costs. How much is a PSA worth? How much does a cholesterol cost with or without an HDL. I think certainly the information pathway stops at the pathology lab or the patient. But it's capped anyway, so it's capped at thirty dollars or they're bulk billing, so the patient doesn't really understand the true value of the procedure or the testing that's going on."*

Apparently widespread bulk-billing of pathology tests further reduces the exposure of GPs and patients to the costs of tests.

> *"I presume the pathology companies will generally be asked to bulk bill, whereas the radiology companies tend to run their own show."*

Some believed that the automation of many pathology tests reduced the impact of the costs of what they ordered.

> *"But they're all automated anyway."*
>
> *"My understanding of the pathology that I order is that there are machines that are going and it really doesn't make much difference what I order. The machines are being paid for by volume, whether it takes one day or three days to pay for the overheads, it doesn't matter, the tests have got to be done. Where does that all fit, well the government's said we're only going to pay you a certain amount."*

Episode coning has a variable influence on pathology requesters. Some are not affected, some order less ("*which helps the pathologist"*), some order more ("*which helps the taxpayer"*).

> *"Clearly we're only allowed to order three tests per consultation." "That doesn't influence me." "No, no." "It influences me a lot." "I order whatever I like." "Mmmm."*
>
> *"You reach threshold where you're not going to cost any more, so you may as well bundle up a lot of other stuff because you've hit that coning threshold."*
>
> *"Actually what I find extremely irritating is when a pathology company imposes coning on me and they don't do tests that I order. I don't think it is restricted to companies. I think it is a subtle clever thing that they do but I think they all do it."*

Auditing of pathology request patterns increased ordering in the experience of one doctor.

> *"The HIC sent me a form that said I wasn't doing enough thyroid tests compared with my peers, so I though 'Oh God' I'm missing all these hypothyroid people. Lo and behold, my thyroid function test rate has gone up a lot and I've found lots of borderline thyroid disease that now requires follow-up."*

One expressed some frustration with the divergent goals of medical training and health system cost-cutting.

> *"You're trained at medical school and as a hospital resident to be very comprehensive, to do very comprehensive examinations, to think of everything, to do whole system stuff. Everybody says you're thorough, you're a great doctor. As soon as it comes to*

pathology, you're told 'Don't do this, use your clinical judgement. Don't do this test, don't do that'. It's analogous to saying 'Don't do a PR. Don't look in the fundi. Don't this. Don't that.' That's one of the problems that we've got, its because there's money involved. As soon as there's money involved, you're good if you don't do it. If there's no money involved, except your time in which case it's a cost to you and your time, you're good if you do do it. So you're good if you waste your own money and bad if it's someone else's."

Medicolegal Factors

Opinions differed on the effect of medicolegal factors. Some doctors thought that medicolegal considerations were the biggest change in medical practice in recent years, and that defensive medicine led them to request more tests, because of greater consequences now than in the past for failing to diagnose certain conditions. Others did not think medicolegal considerations affected their ordering at all.

"I don't think medicolegal stuff drive pathology tests much, I think they drive radiology and referrals a lot, but I don't think you want to test a lot just to cover yourself."

"I don't worry about. Honestly, if it's indicated, I'll do if it's not I won't."

One noted that individual patients have a bigger impact on their ordering that the general medicolegal climate.

"There are patient factors in there as well. If you have a patient who is more likely to be a litigant, then that would determine it more."

Other

- pathology company does not do the tests they are asked to do (eg only TSH instead of TFTs as ordered)
- seasonality/fashionable eg meningitis

  "You do a test and it comes back positive for some rare disease, and you're forever doing that test."

- media hype and commercial pressure directed at patients

  "One powerful influence is where there's some media hype. […] Desirability of a certain test might be highlighted in the media." "Health promotion campaigns." (eg meningitis, anthrax) "That occurs in cervical screening - there's a huge amount of push by commercial entrepreneurs on various new technologies that are of very dubious benefit, even on their own studies." "I think that's a very good example."

Impact Of Computer On Pathology Requesting Patterns

Some participants were adamant that their requesting pattern hasn't changed at all with the availability of electronic pathology requests and automated lists or groups.

> *"Being on the computer doesn't influence the tests you order at all."*
>
> *"No, definitely [I don't order more]."*
>
> *"It's certainly a lot easier to request extra things, because you're just clicking away. But I don't think we do, because you're thinking about what you're doing."*
>
> *"No, but we don't have the list of tests [to order automatically], at least if we do I don't know about it."*
>
> *"There's a belief that GPs don't really know what they're doing, that they're intoxicated at the desk and they're just ordering stuff left, right and centre, and I don't believe it." "I don't believe it either."*

One argued that if making ordering harder didn't make him order less, then why would making it easier make him order more.

> *"I don't think to myself 'Oh gee I've got to write a form out, I'll leave the pathology'."*

Other participants are quite sure that they request more using the computer, because of: the ease of requesting individual items using checkboxes; the availability of reminders or cues as to what they should order; the use of automatic lists; and partly out of the positive feedback from using the computer.

> *"Technology has meant I order more."*
>
> *"I think I'm ordering more now that it's electronic and easier to do than I did before. And I don't know if it's because it is easier to do or if times have changed, cause we're talking 15 years ago."*
>
> *"Computers can prompt you more. I mean 'Let's click this one, lets click that one.'" "It's like a video game." "Yeah."*
>
> *"All the demographics are there." "It's like a washing machine .... this technology has taken the drudgery out of it."*
>
> *"Availability of tickboxes on the order form, whether it's hardcopy or electronic, I know that hardcopy tickboxes don't exist any more - they've been outlawed. Medical Director for example has a certain number of tickboxes that you can customise. I've customised them in such a way that I've got my commonest tests there, and what I often do, almost half thinking is, cause I'll go 'tick, tick, tick, tick, tick' without really giving a lot of consideration. ESR is one example of those tests that you can take or leave. What I'd really love actually in Medical Director is more tickboxes, about thirty of them, so then I can put all my main tests that I order."*
>
> *"Where you have a whole screen of tests you might like to do, it is so much easier to order test than before. Just 'click here, click there' playing around with the program."*
>
> *"I must admit I get a positive feeling about doing it electronically, rather than with simple hardcopy cursive writing."*

More circumspect participants admitted they wouldn't know but would be interested to see what their data showed.

> *"We don't know [if there's been a change], because we didn't used to audit."*

> *"I don't believe that I do, but I'm interested to see what the objective audit says what my figures are."*

The experience of those involved in formal or informal audits of their pathology requesting suggests that it may be more likely that a clinical rationale may not have been documented (because of computer system usability problems) than a test to have been ordered "inappropriately".

> *"For some time now, we've been doing internal clinical audit, where we started in 1999 when the computerised records were being started with the new system and it was to make sure that doctors in the practice were doing exactly what you were alluding to not putting enough notes. And when you had to do a Worker's Comp report or a medicolegal report you found that the cupboard was bare - there wasn't any information. So we started doing about three monthly audits - the practice manager and I would check about 10 files per doctor. The thing that came out of it was times when there wasn't enough clinical information in but there was a whole heap of pathology tests in there, and you started to wonder whether these groups of tests were simply ordered. Or even if the doctor had paid enough attention to the clinical side of it, he certainly hadn't recorded it to say well this is my thought process and that's why I ordered a whole series of these things. So we had a bit of a meeting and said we don't think it is good to use this battery test type of situation, but pick and choose your own tests according to the clinical scenario and for God's sake put it down in the notes that this is why you're doing it or this is what your thoughts are. There should be some sort of a correlationship (sic) between what you order and what you've written."*

> *"Our practice's experience. Just looking at the other doctors who don't type their notes in. Sometimes I'm confronted, when I review a patient, by all these tests and there isn't anything. Not much clinical notes other than a diagnosis like tiredness or something, and then I start all over again and ask the history and all that and really I don't feel there's been any significant overprescribing of tests, even though there may be a heap of tests there, to me they seem reasonably appropriate for our practice. Like it may be another issue of the fact that they don't type in the notes because there's a negative time factor there."*

> *"After my HIC audit, I made sure that I put more details in the patient history to remind me as much as anything why I ordered. I don't think I changed very much [what I'd ordered] at all. I honestly from time to time just ordered the test."*

It may be that differences in pathology requesting may result from practitioner factors unrelated to computer usage.

> *"With subsequent audits there was a change, but there was still this tendency to order more tests that sometimes I think is relevant. And not forgetting that we're in general practice, we're not*

> *specialists and that I think basic things are more important to us and clinical presentation should be more important to us and pathology should be used to help us and not ... well I think you get the drift." [Note that this practice has been computerised since the late 1980's and started internal pathology auditing in 1999.]*

Some users wanted to retain their individual professional control over ordering.

> *"I'd be concerned to try to use any reminder of standard groups of tests. I don't think I'd really want to start using something that you put in a symptom problem and it put up a list. I wouldn't mind having a reminder list, but I don't think I'd want to have it automatically coming onto the request form I fear that I would then stop thinking about it and I would no longer be exercising discretion about what should or shouldn't be added to it and I'd come to rely on it. I don't mind having a list up to jog my memory, but I'd still rather have to have a conscious step to transfer that to a list of requests."*

It was pointed out that according to best practice guidelines, that we may not be ordering enough pathology tests at present, so systems which prompt GPs to order things they may have overlooked may help increase ordering.

> *"If you've got checkboxes, you actually remember to do more. I'm certain that I order more now. If you think about it, the number of people who haven't had their cholesterol taken is greater than the number of people who should have had their cholesterol taken."*

> *"I did a consultancy for [company x] and there is a view that if we are to follow guidelines, we are not doing enough. There is this view that if you look at cholesterol testing that there are a vast number of overweight men with beer guts who aren't being tested and aren't being managed, and diabetics that aren't identified and thyroid disease that's not being picked up. Corporates actually supposedly say that they want to do those tests."*

> *"I think pathology is being underused. Just today I have a patient that has all these pains that I haven't been able to diagnose. She's on lithium, so I have to do all these tests - six weekly lithium and UECs, but I haven't done a full blood count have I or an ESR. So I sent her to the rheumatologist who does a full blood count and ESR and diagnoses polymyalgia rheumatica and I feel really shitty about that because I missed it. And not because I don't know about polymyalgia, but because I didn't order this test. I'm still finding patients I'm not doing enough pathology on."*

Explanations For Increased Pathology Requests Per Episode

Of all the factors which influence pathology ordering, the ones identified by the participants as likely to have caused an increase in requests per episode are medicolegal reasons and consumer expectations. GPs are clearly concerned about their medicolegal duty of care and the prospect of missing a diagnosis which might be detected by a simple pathology test.

> *"Medicolegal considerations would have to be the major factor in that."*

> *"I don't think we over order unnecessarily now. And yet we're litigation driven, you know, largely." "There's an element of that, certainly from a pathology point of view." "I don't fear it that much."*

> *"If someone comes in with [...] a history [of ischaemia], and you're ordering their cholesterol, they're on a lowering drug, you do their LFTs so you chuck in an U&Es as well, it's no drama, and you're right there next to the FBE click and you click that as well just to see if they're anaemic. You know, because if they are anaemic and you miss it, well you're not going to look very good."*

> *"I would have thought it would be more driven by consumer expectations."*

Others conceded that to identify a 3% change would be pure speculation.

> *"We wouldn't be in a position to know."*

3.2.5 Characteristics Of An Ideal System For Requesting Pathology

Decision Support

GPs feeling about decision support were mixed. Some thought protocols and guidelines would be useful to aid decision-making. Many identified such decision support as a characteristic of their ideal system.,

> *"When there's a protocol and some guidelines and some evidence that support it, I think that would be useful."*

Others identified the potential difficulty in trying to influence GP requesting behaviour, because of the undifferentiated nature of problems in general practice which may not be amenable to rule-driven decision support guidelines or protocols. Some expressed disdain about having more guidelines *"foisted"* at them.

> *"There aren't guidelines on everything, so you tend to err on the side of caution."*

> *"In general we get in general practice a whole lot of undifferentiated stuff. Pathology suggestions would be more beneficial in the more organic fields of medicine such as consultant physicians, but they probably know more anyway. You know, if we type in a group of tests for 'Can't cope' or 'falling about' or something. I know perfectly well that you get these people coming in and they're tired all the time and you look at them and you can't find anything you can see physically, and you know that 90% of the time all those things you're ordering are going to turn out normal anyway."*

The potential difficulties with supplying enough information to drive a rule-based decision-support system were mentioned. Any decision-support system has to be really efficient if GPs are to bother using it. PROMPTOR-FM was described as hard work, as it was not integrated.

> *"When you've got to fill out all these questions on the form and on the computer you're just not going to do that. And when it's for everything, and you've got to fill out a list of twelve different questions on the screen you're not going to do it. Something that should be quick and part of a lot of other things that you do all of a*

sudden becomes time consuming and you just won't bother doing it. If it's automated then that's OK."

"Decision support should be context sensitive."

"Decision support when you need it, and not when you don't."

"Something about positive predictive values [would be useful]."

"[I want a] Comprehensive clinical support system, rather than guidelines or protocols foisted at us."

It appears that some GPs are moving away from books towards electronic reference sources.

"I don't read, I look it up on the internet. It's easier to type a keyword into a search engine."

A searchable reference database of paper update material was identified as being useful. Searchable information available on demand seemed one way to manage the information and education glut GPs are subject to.

"The age old way is to educate GPs better. And you can do that through the ordinary process of CME, but most GPs really have extremely limited time to educate themselves. One of the most useful things is to make the reference information much more readily available. Having that reference information in the box, for example would be a big plus."

Some wanted a book like the "antibiotic guidelines" for pathology. These participants were unaware of the RCPA "Manual of the use and interpretation of pathology tests". Mixed feelings were expressed about the RCPA Manual by those who had seen it.

"There's a nice little red book about all the pathology tests around. I'd love that red book to be in electronic form and easily accessible from the desktop."

"I've done it, at <quinpath.com.au> it's all there."

"Can't remember it."

"For some things it was good, but for other things it wasn't. But it would be nice to push a button and get help.

"I think I flipped through it when it came and 'not useful in clinical practice' was my impression."

Better communication with the pathology laboratory was identified as potentially useful.

"I don't think there's enough feedback from pathologists to GPs, you know we write our clinical notes but they never write back 'You've forgotten to exclude this'." "Sometimes they do." "Yes they do." "Occasionally...." "Occasionally you get 'atypical lymphocytes, we did a Monospot for you'." "Something a bit more complex than that say."

"We're not using the full power of the pathology laboratory. Basically we're just asking a group of technicians to do a test and we do the interpretation, but in reality we should be integrating our

> *diagnostic processes much more with the pathology laboratory. We should provide a lot more clinical information and we should get a lot more information back."*

But the potential for creating better communication was coloured by previous experience with trying to provide better clinical information for the lab.

> *"I was told once by a pathologist that they didn't read that bit, that they didn't get to see that bit, which I was very surprised about."*

> *"If we were assured that it was going to be considered, then doctors would probably put a lot more in."*

It was also noted that "canned" advice was not as good as the advice of an expert.

> *"If I've got a clinical question, I ring up the pathologist." "Same." "Or a scientist even sometimes, they can be useful too I've found." "That's the quickest way to get your answer, rather than finding it in a book." "When I don't know, they don't know anyway."*

> *"Part of the problem with pathology, the easy tests are easy, you know the electrolytes, liver function, and so on. If you get someone who's had a DVT, and then suddenly you're talking factor V Leiden deficiency, antithrombin III..." "Yeah, which one have you missed..." "To have a list of the stuff to order, is the hard part, and then interpreting it is near impossible and then deciding what to do with the patient...." "And that's where the specialist comes in."*

Standards

Participants recognised that current systems do not automate as much as they could, because of data quality problems. Some could see the need for standard names for tests, so that they matched and automatically reconciled.

> *"Clearly from a national point of view, they need to standardise the ordering. And then the computer can find it much more easily. It's just a joke really. A national standard - everybody's talking about it, it's not news. That will clearly allow the computer system to find the results much more easily and plonk it in the right place. Even when you do a care plan for a diabetic, you have to go and look for their HBA1c, because the computer can't find it."*

Other Wish-List Items

Predicting the future seemed a difficult task to some.

> *"What [a better system] would look like now today would be different from what it looks like in two years."*

One participant was enthusiastic about the potential of near-patient testing.

> *"Realistically speaking, the other thing about pathology that we haven't touched upon is that you can have these machines in big practices it would be very cost-effective, where you only need about 3mL of blood to do all the tests that you want anyway in this day and age, and we take 20mL on average to give to the pathology companies to have all these things done, when we could have a machine that costs probably $100,000 dollars but it needs to be*

> *serviced and we can't service it, but why not just have it in the surgery and all done immediately."*

But views were mixed on whether this was likely to be worthwhile, since the obvious effect of near patient testing would be to increase pathology costs.

> *"You'd do less of it if you weren't getting any benefit from it. But just the simple act of taking the blood to the machine, I think you'd do less."*

> *"Just like we don't look down microscopes any more, [pathology testing] is yet another thing we [don't] have to do."*

Paperless requests did not seem a high priority for the GPs.

> *"I think the patient still needs a bit of paper."*

Futuristic Suggestions

- Finger scan identification/records - "The patients puts their finger in a hole and their records pop up.
- Magic door for cancer that goes beep when you walk through.

How To Improve Value For Money In Pathology Ordering

Some GPs did not seem personally concerned about the "value for money question". This was also mentioned earlier in reference to frustration with the influence of economics on practice.

> *"Whose money? Pathologists' money, consumers' money, cost effectiveness for whom?"*

Some thought that avoidance of repeat ordering was a way to save money, and that even knowing of the existence of previous tests would be useful and avoid the privacy concerns of a large centralised database.

> *"Shared databases to reduce repeat ordering. So you know they've had some tests done somewhere. When I know it has been done, then I can make the enquiries."*

3.3 Key insights

3.3.1 GP Use Of Computerised Practice Management Systems

The development of proficiency in computer usage commonly followed a mentoring model. An early-adopting GP in a practice seemed to take to role of "trailblazer" and "fountain of knowledge" amongst others in the same practice. These trailblazers appear to carry a significant burden for their practices.

Generally, the time taken to develop proficiency was measured in months. GPs, even the early adopters, tended to only learn what they needed to get by, as opposed to becoming intimately familiar with all aspects of the software. GPs learn what they perceive to be immediately useful.

Pathology reporting and requesting featured prominently amongst the most useful functions, after the leading function, prescription writing. Overall satisfaction with pathology functions of their software was high.

3.3.2 Benefits And Deficiencies Of GP Computer Systems

The perceived benefits of general practice computer systems were diverse, covering improvements in doctor efficiency, work satisfaction, patient management, and practice efficiency.

The deficiencies described encompassed inertia in practice business systems, poor computer hardware performance, weaknesses in computer software design, problems with data quality, and knowledge of system capabilities

Many of the deficiencies appear to reflect the developing maturity in the use of computers in general practice and the health system. It is likely that many of these will be resolved with time, since correction requires a combination of maturing hardware, software, users, and information standards.

(While deficiencies for patients were not reported, this is probably attributable to the study design and not because of any absence of deficiencies or GPs unawareness of them.)

3.3.3 General Experience Of Electronic Pathology

Participants seemed broadly happy with electronic pathology reporting and requesting, but many were not yet prepared to forgo paper reports. Electronic reports were often used in an adjunctive manner, to supplement the perceived safety and reliability of the paper reporting system.

Many examples of possible improvements in electronic pathology systems were described. Once again, these seem to depend on general maturation of health informatics in the health system.

3.3.4 Pathology Test Ordering

Pathology test ordering was influenced by many factors, including:

- Clinical decision-making
- Patient management
- Patient demand
- Style of practice
- Business/Marketing considerations
- Economics and health bureaucracy
- Medicolegal considerations
- and others

3.3.5 Impact Of Computer On Pathology Requesting Patterns

Participants opinions on the influence of computerised pathology ordering were mixed. Some thought that they did order more, because it is easier. Some were adamant that the computer did not change their decision-making. Some described that a deficiency in documentation of their rationale for ordering may be explained by difficulties in computerised record keeping, rather than a deficiency of clinical judgement.

3.3.6 Explanations For Increased Pathology Requests Per Episode

Amongst the many factors which influence ordering, the ones which appear to the participants most likely subject to a general trend are patient demands increasing with the rise of consumerism and medicolegal considerations leading to defensive medicine.

3.3.7 Characteristics Of An Ideal System For Requesting Pathology

Decision support was widely desired for an ideal pathology ordering system. However, participants seemed to prefer the availability of help when they desired it, rather than be locked into some automated protocol or guideline. Decision support tools that are useful to GPs must have minimal impact on their current efficiency if they are to bother using them.

Standard terms for pathology requests and results would greatly assist automated reconciliation of tests requested with results received, which does not work well now.

Paperless electronic requests did not seem a high priority, since patients are still thought to need a piece of paper to take away.

3.4 Conclusions from Phase 1

The detailed findings from this qualitative study provide a rich insight into general practice computer usage and pathology requesting.

There is also much that can be learned by developers of software and pathology data standards, designers of decision support tools, educators, and planners of health system interventions.

3.4.1 Impact Of GP Systems On Pathology Ordering

Some focus group participants made unprompted comments that would support the hypothesis that using a GP computer system to order pathology increases the number of pathology tests ordered. This was not necessarily considered by them as negative however, and the value of pathology to General Practice was generally recognised.

Nevertheless while the factors reported influencing pathology ordering, apart from clinical ones, were many and varied, there was general agreement that **the strongest were concern for medico-legal consequences and patient demand.**

3.4.2 Improvement Opportunities

Government And Health Systems Planners

- Standards are desired for request codes and whatever else is required to match what has been ordered with what has been done so that GP systems can report exceptions.
- Standards for alerts for abnormal results are also wanted.
- Standards that would allow for clinical data analysis
- Decision support for ordering and reporting is wanted provided that it can be used by choice and is timely and efficient.

Software Developers

- Software interface design – Information entry must be quick easy and accurate; keyboard entry is preferred by those who can type because it can be done at the same time as interviewing the patient.
- Implementation of systems needs to be phased and led by a local champion and mentor.
- GPs want to do more analysis of their data and are frustrated with their current system's capacity to do this.
- GPs want their systems to do more by way of prompting for action where appropriate

Pathology Profession

- GPs want more patient specific advice and are happy for that to be on pathology reports. For requesting it must be at the time of making the request. Most do not use or indeed know of the RCPA Manual for Pathology Testing.
- GPs generally don't understand the importance of clinical notes for pathology practices and some believe that they are not used by the Practices anyway.

3.4.3 Learnings Relevant To The Subsequent Phases

Recruitment to the first phase of the study was difficult. There will need to be significant support from the Divisions and perhaps directly from the study organisers to get adequate survey numbers.

In addition there were a number of questions that deserve to be addressed. They include:

- What are the relative ranks of the perceived reasons for observed increase in tests ordered per episode?
- Does computer prompting help or hinder good practice in pathology ordering?
- What is the relative value of pathology in GP practice?
- How much testing is ordered and not done?
- How much testing is perceived to be repeated unnecessarily?

4 SURVEY OF THE PREFERENCE, ATTITUDE AND STATED BEHAVIOUR OF GPS AROUND PATHOLOGY ORDERING – (PHASE 2)

Phase 2 was designed to provide a better understanding of the drivers for pathology ordering, how they might be impacted by the use of GP computer systems and to provide demographic and other information to be used in the third phase of this study where time series analysis of Medicare utilisation data is to be undertaken.

4.1 Methodology

4.1.1 Overview

A structured, self-completion questionnaire was used as a survey instrument. The questionnaire also acted as a vehicle to provide an incentive to the GPs included in the sample to provide their consent to release Medicare utilisation data used for time series analysis in Phase 3 of the study. Furthermore the document allowed for the proper recording of that consent.

Questionnaires were returned to IRIS Research via a Freepost envelope provided with the questionnaire.

Data was hand keyed at IRIS Research. Logic tests and a sample-based data audit were used as quality assurance of the captured data.

A copy of the questionnaire is shown at Appendix 2 - Survey Document (Phase 2).

4.1.2 Sampling And Response

The sample population for the survey was defined as all General Practitioners in active practice within Australia.

The sample frame chosen to best reflect this population was the Australian Medical Publishing Company (AMPCo) mail database.

To permit sequential sampling if required, an initial sample of 2500 GPs was drawn from the approximately 22,000 addresses on the AMPCo list and provided to IRIS.

This sample was selected from within the frame using a random start point and ‘nth’ case selection after first sorting all GPS according to the postcode of their practice address.

This yielded an initial frame of 2500 that closely reflected the distribution of GPs by state in the main database.

The first sequence sample of 1500 was selected from within the 2500 using a similar method. This also yielded a sample distributed closely in line with the state by state structure of the AMPCo database.

Based on our preliminary analysis a minimum of 200 responses was estimated to be adequate to detect changes in the ratio of pathology Medicare items per episode. As the first sequence sample yielded almost three times this number of useable responses it was deemed to be unnecessary to conduct further sequential sampling.

Table 3-1 sets out the state by state proportions for the sample frame, first sequence sample and response.

Table 4-1 - Sampling Performance by State

State	All GPs on Database (n=21,632)	Initial Sample Frame (n=2500)	Sequence 1 Sample (n=1500)	Yielded Sample Response (n=613)	Consent Given for HIC Data (n=557)	Implied Weighting Factor
ACT	1.76	1.6	2.1	2.1	2.2	0.84
NSW	35.05	33.4	31.4	31.6	31.6	1.12
NT	0.89	1.1	1.2	1.1	1.3	0.81
QLD	17.90	18.2	20.8	20.7	21.0	0.86
SA	8.48	10.0	8.8	9.0	9.2	0.93
TAS	2.62	3.1	3.1	2.0	1.8	1.31
VIC	24.26	22.3	22.9	22.8	23.2	1.06
WA	9.05	10.3	10.9	10.6	9.9	0.85

A payment of $25 for returning the survey (with an additional $25 for providing consent to the use of practitioner Medicare utilisation data) combined with an authoritative letter from the Royal College of Pathologists, Australasia, provided strong incentive yielding a base response rate of 41% (613/1500) achieved.

Of these 557 or 91% consented to the release of HIC data for the time series analysis. This represented a response rate for examination of HIC data of 37%

In our experience this is a very high response for a mail out survey especially given the fact that no follow up was required and that the distribution by state very closely matches the structure of the sample frame and overall population.

4.2 Descriptive Findings

4.2.1 Experience Level Of Respondents

Q1. "How many years have you been practicing medicine?"

Table 4-2 - Years Practicing Medicine (n-588)

Number of Years	Count	% of Doctors	Cumulative Percent
1-5 Years	11	1.9	1.9
6-10 Years	58	9.8	11.7
11-15 Years	75	12.7	24.3
16-20 Years	109	18.6	43.0
21-25 Years	133	22.6	65.6
26-30 Years	87	14.8	80.4
31-35 Years	43	7.4	87.8
36-40 Years	33	5.7	93.5
41-45 Years	17	2.8	96.3
46-50 Years	14	2.4	98.7
50+ Years	8	1.3	100.0
TOTAL	588	100.0	

Descriptives	
Mean	23 years
Minimum	1 years
Maximum	57 year

Key Findings:

- On average the GPs in the sample had 23 years in practice. Almost one quarter (24%) of doctors, however, have been in practice for fifteen years or less.
- The largest single group of doctors surveyed have been in practice for 21-25 years, comprising 23% of respondents.
- The range in the experience of those surveyed was wide with a minimum of 1 year experience to a maximum of 57 years.

4.2.2 Practice Types

Q2. "Which practice type best describes the situation in which you most frequently deal with pathology reports?"

In this question, respondents were given the choice of six practice types:

- Sole practitioner
- Partnership or Enterprise up to four practitioners
- Larger Private medical centre
- Public Hospital or facility
- Private Hospital or facility
- Nursing home

Table 4-3 - Practice Type (n=592)

Practice Type	Count	% of Doctors
Sole practitioner	109	18.4
Partnership or Enterprise up to four practitioners	288	48.6
Larger private medical centre	184	31.1
Public hospital or facility	5	0.9
Private hospital or facility	6	1.0
TOTAL	592	100.0

Key Findings:

- The most common form of practice amongst those doctors surveyed is a partnership or small enterprise of up to four doctors. This comprises almost half (49%) of all respondents.
- Larger private medical centres accounted for the next most common practice type (31%), followed by sole practitioners (18%).
- General practitioners working in private and public hospitals and facilities comprised less than 2% of respondents, while there was no response from doctors practicing in nursing homes.

4.2.3 Use Of Practice Management Software

Q3. "Do you personally make use of a computerised practice management system to request pathology?"

Table 4-4 - Use Of Practice Management Software (N=609)

Software Usage	Count	% of Doctors
Medical Director	337	55.2
Other Computerised System	66	10.9
Does Not Use Computerised System	207	33.9
TOTAL	609	100.0

Key Findings:

- The survey revealed that more than two-thirds of doctors utilise some form of computerised ordering to request pathology, with over 55% using Medical Director.
- Just over 1 in 10 respondents (10.9%) utilised a computer system other than Medical Director, while one-third of doctors do not use any form of computerised practice management system.

Table 4-5 - Other Practice Management Software Used (N=69)

Other Software	Count	% of responses	% of Doctors
Medical Spectrum	35	50.7	5.7
Med Tech 32	13	18.8	2.1
Genie	10	14.5	1.6
Surgiware	3	4.3	0.4
Prac Soft	1	1.4	0.2
JAM Software	1	1.4	0.2
Locum	1	1.4	0.2
Access GP	1	1.4	0.1
Compudoc	1	1.4	0.1
Synapse	1	1.4	0.1
Total Care	1	1.4	0.1
Ferret	1	1.4	0.1
Total	69	100.0	11.1

Key Findings:

- Of the 10.9% of doctors who utilised a computerised system other than Medical Director, the majority used Medical Spectrum (5.7%).
- Med Tech 32 (2.1%) and Genie (1.6%) were the next most common practice management systems.

4.2.4 Use Of Computerised Systems For Pathology Requesting

Q4." What proportion of the pathology orders you personally generate is done using your computerised system?"

Table 4-6 - Percentage Use Of Computerised Systems For Pathology Testing (N=395)

Percentile	Count	% of Doctors
1-10%	15	3.8
11-20%	5	1.2
21-30%	4	1.1
31-40%	1	0.3
41-50%	11	2.7
61-70%	6	1.6
71-80%	13	3.3
81-90%	24	6.2
91-100%	316	79.9
TOTAL	395	100.0

Key Findings:

- Of those using computers to order their pathology over 90% indicated that computer pathology requesting systems are utilised in their practices between 51-100% of the time. Furthermore, almost 80% of respondents utilise such technology between 91-100% of instances.
- Less than 1 in 10 doctors (9.1%) only use a computer pathology ordering system for less than half of their requests.

4.2.5 Self Assessed Proficiency In Software Use

Q5. "How would you rate your proficiency at using your computerised system for producing pathology requests?"

Table 4-7 - Self Rated Computer Proficiency (N=407)

Proficiency	Count	% of Doctors
Low (1-2)	14	3.4
Medium (3)	22	5.4
High (4-5)	367	90.1
Not applicable	4	1.0
Total	407	100.0

Key Findings:

- An overwhelming majority of doctors (90.1%) rate their proficiency at using a computer management system to request pathology as high.
- Overall, just less than 1 out of 9 respondents felt their computer proficiency is medium to low.

4.2.6 Use Of Software To Create Panels Or Test Groups

Q6. "Do you use your computerised system to generate short-cuts to multiple tests, 'Panels' or 'Test Groups'?"

Table 4-8 - Generation Of 'Panels' Or 'Test Groups' (N=407)

Usage	Count	% of Doctors
Never	201	49.3
Sometimes	63	15.5
On every occasion	133	32.6
Not applicable	10	2.6
Total	407	100.0

Key Findings:

- Almost half of all respondents (49.3%) never use a computerised system to generate Panels or Test Groups. Conversely, almost one-third indicated that panels and test groups were generated on every occasion.
- Only 15.5% of doctors indicated that they sometimes use computers to create short cuts to multiple tests.

4.2.7 Time Of Uptake Of Computerised System

Q7. "When did you first begin using a computerised system (be it the current one or another) to request pathology tests?"

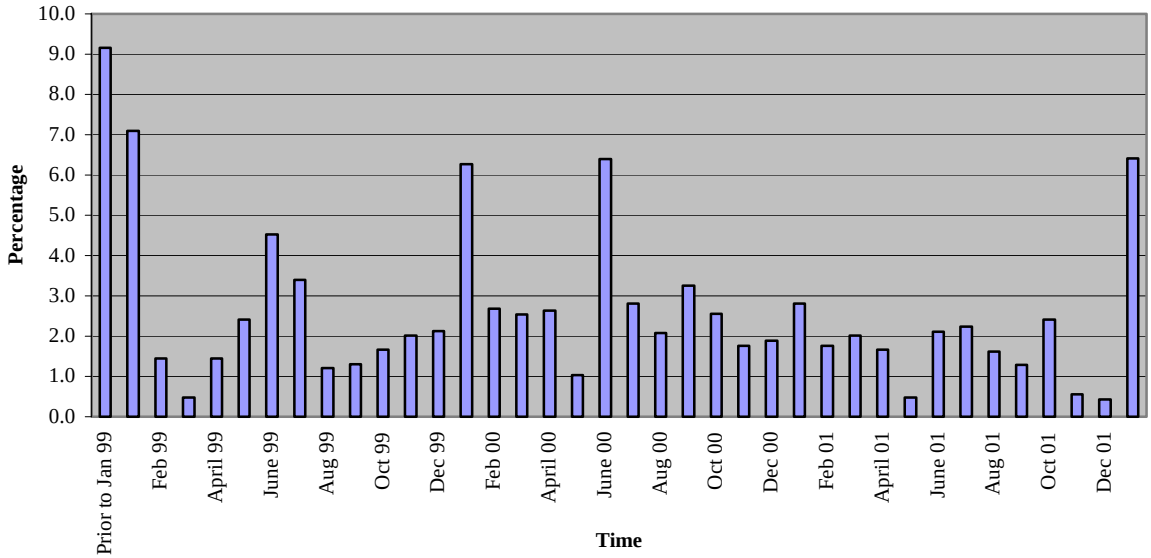

Figure 4-1 - Time Of Uptake Of Computerised System (N=397)

Key Findings:

- The greatest uptake of computerised management systems occurs most commonly at the beginning of the new calendar year and at the end of the financial year.
- Almost 16% of doctors (15.6%) first used a computer to request pathology either before the test period (prior to January 1999) or after (post December 2001).
- The most common months for computer systems to be installed (during the test period) was January 1999 (7.1%), June 2000 (6.4%) followed by January 2000 (6.3%).

4.2.8 Time To Proficiency

Q8. "At what stage did you feel proficient at using your computerised system (be it the current one or another) to request pathology tests?"

Table 4-9 - Time To Proficiency Using Computerised System (N=320)

Time	Count	% of Doctors	Cumulative Percent
Within first month	74	23.1	23.1
1-2 months	116	36.3	59.4
2-3 months	32	9.9	69.3
3-6 months	44	13.6	83.0
More than 6 months	54	17.0	100.0
Total	320	100.0	

Descriptives	
Mean	3.4 months
Median	2 months
Minimum	Within the first month
Maximum	25 months

Note: This table only includes those cases that implemented computerised practice management systems during the test period (between January 1999 and December 2001).

Key Findings:

- The largest single group of doctors (36.3%) felt proficient at using their computerised management system between one to two months after implementation. In saying this however, the average time between implementation and perceived proficiency is about 14 weeks.

- More than 23% of respondents felt proficient within the first month of operation, while for 17.0% of doctors proficiency was attained after six months.

4.2.9 Rated Ease Of Use Of Computerised Systems

Q9. "Compared to using paper requests how would you rate the ease of using your computer based system to generate pathology requests?"

Table 4-10 - Ease Of Computerised Systems For Pathology Requesting (N=408)

Relative Ease	Count	% of Doctors
Much harder	17	4.3
Neither harder or easier	47	11.4
Much Easier	337	82.6
Not applicable	7	1.8
Total	408	100.0

Key Findings:

- A large proportion of doctors (82.6%) appeared to find the use of a computerised management system to be a much easier option, while only 4.3% of respondents believed a computerised pathology requesting system to be much harder than traditional methods of ordering.

4.2.10 Self Assessed Changes In Requesting Volumes

Q10. "Would you say that you now request more or less pathology work using your computerised system?"

Table 4-11 - Frequency Of Ordering With Computerised Ordering System (N=405)

Frequency of Ordering	Count	% of Doctors
Less ordered	14	3.6
Neither more or less ordered	304	75.0
More ordered	70	17.4
Not applicable	17	4.1
Total	405	100.0

Key Findings:

- Despite 82.6% of doctors indicating that the use of computers for pathology requesting is significantly easier than using traditional methods, three-quarters of respondents stated that the use of such computerised methods does not influence the frequency of ordering.

- 17.4% of respondents stated that the use of a computerised requesting system increased the frequency of ordering, while 3.6% of respondents stated the use of a computer system actually decreased the regularity of pathology requests.

4.2.11 Observed Evidence Of Improved Patient Outcomes

Q11. "Have you noted evidence of improved patient management arising from your use of computerised pathology requesting?"

Table 4-12 - Evidence Of Improved Patient Management (N=408)

Evidence	Count	% of Doctors
No evidence noted	111	27.3
Some evidence noted	74	18.2
Significant evidence noted	213	52.2
Not applicable	9	2.2
Total	408	100.0

Key Findings:

- Seven out of ten users indicated that they had noted evidence of improved patient outcomes as a result of using computerised pathology requesting. The greater proportion of these, 52.2% of all doctors surveyed indicated significant benefits.

- Conversely, 27.3% of respondents have not yet noted any evidence to suggest that the use of computerised pathology requesting improve the outcomes of patient treatment.

4.2.12 Stated Impact Of Factors Influencing Pathology Requesting Behaviour

Q12. "Aside from the management of patient health, a number of factors have been hypothesised to have impacts on an individuals GP's approach to pathology requesting. Please rate each of the following as they relate to your requesting behaviour"

*Respondents were asked to rate each factor using a scale of 1 to 5, where 1 is "Very little impact" and 5 is "A great deal of impact".

Table 4-13 - Factors Influencing Requesting Behaviour (N=611)

Factors	***Impact Rating Scale %***					
	1	2	3	4	5	**Avg.**
Medico - legal considerations	12.2	13.9	22.9	30.8	20.2	**3.3**
Patient demand	14.1	22.2	36.6	21.1	6.0	**2.8**
Practice approach	25.2	16.8	24.2	22.6	11.2	**2.8**
Health bureaucracy and administrative requirements	30.6	27.4	22.8	12.9	6.3	**2.4**
Promotion or advice from pathology practices	51.7	22.9	16.5	5.9	3.0	**2.4**
Business and marketing considerations	60.8	18.6	13.6	5.2	1.7	**1.9**
Ease of ordering	38.1	17.2	19.1	14.8	10.8	**1.7**

Key Findings:

- Medico-Legal considerations attracted the highest priority rating of the seven main factors tested (i.e. excluding 'Other factors'). Just over half of all respondents (50.5%) stated this factor had "a great deal of impact" in their approach to pathology requesting.
- Practice Approach (33.4%) and Patient demand (27.0%) were the next factors weighted highly by respondents.
- Business and marketing considerations, health bureaucracy and administrative requirements, ease of ordering and the promotion or advice from pathology practices were found to have the least impact on doctors' requesting behaviour.

4.2.13 Stated Impact Of Other Factors Influencing Pathology Requesting Behaviour

Q12a. "Aside from the management of patient health, a number of factors have been hypothesised to have impacts on an individuals GP's approach to pathology requesting. Please rate each of the following as they relate to your requesting behaviour"

Table 4-14 - Other Factors Influencing Requesting Behaviour (N=39)

Factor	Count	% of those giving other responses n=39
Technological advancement	12	32.0
Preventative Health/Screening	9	23.0
Patient & doctor education	7	18.7
Costs to patients/government	5	10.7
Other misc.	6	15.6
Total	39	100

Key Findings:

- Fewer than 1% of respondents took the opportunity to add to the list of factors that impacted on ordering
- Almost one third of respondents to this question believe the technological advancements associated with computerised ordering (including downloading results, speedy information recall, legibility of requests and having less clutter on desks) to be influential on their patterns of pathology requesting.
- Furthermore, 23% of respondents to this question stated that preventative health and screening activities influenced requesting behaviour, while an additional 18.7% stated that continual patient and doctor education is a factor considered when ordering pathology. These factors may well have been excluded in the minds of most as being part of the management of patient health.

4.3 Relationships between Variables

CHI Square and ANOVA procedures were used to examine relationships between all variables in the survey. A number of relationships were found. Together these relationships suggest that the increase in computer proficiency experienced by GPs is leading to increased use of computerised requesting, the use of test panels or groups and perceived patient outcomes.

These effects appeared to be present uniformly across practice type and overall GP experience levels. It should be noted that weighted fractional results appearing as counts in the following tables have been rounded to the nearest whole number for clarity. Percentages have been rounded to the nearest whole percent.

4.3.1 Self Rated Proficiency Related To Time Since Implementation

The time at which respondents implemented a computerised pathology requesting system is related to their self-rated proficiency in using their system. Those who implemented their system prior to 1999, or during 1999 and 2000 are more likely to regard their proficiency as 'high' than those who have implemented their practice management system more recently.

Table 4-15 - Self Assessed Proficiency By Year Of Implementation

		Year of Implementation					
Self assessed proficiency		**Prior**	**1999**	**2000**	**2001**	**After 2001**	**Total**
Not proficient	Count		1	4	6	4	15
			1%	3%	8%	15%	4%
Neither	Count		6	6	5	5	22
			5%	4%	6%	19%	6%
Proficient	Count	36	109	131	66	17	359
		100%	94%	93%	86%	65%	91%
Total	Count	36	116	141	77	26	396
		100%	100%	100%	100%	100%	100%

Degrees of freedom = 8
Chi-square significance level = 0.000
ANOVA significance = 0.000

Doctors who implemented computerised systems earlier generally rate the ease of using their computer system higher than those who implemented more recently.

4.3.2 Time Since Implementation Related To Use Of Test Panels

Those who installed computerised management systems prior to 1999 indicated that they requested multiple tests, panels and test groups more frequently than those adopting more recently.

This suggests that the generation of test groups and panels requires familiarity and higher proficiency with practice management software and is therefore likely to increase over time.

Table 4-16 - Generation Of Short Cuts By Year Of Implementation

		Year of Implementation					
Generation of panels and test groups		**Prior**	**1999**	**2000**	**2001**	**After 2001**	**Total**
Never	Count	12	52	75	41	17	197
		33%	45%	55%	54%	71%	51%
Sometimes	Count	9	17	18	15	3	62
		25%	15%	13%	20%	13%	16%
On every occasion	Count	15	47	44	20	4	130
		42%	41%	32%	26%	17%	33%
Total	Count	36	116	137	76	24	389
		100%	100%	100%	100%	100%	100%

Degrees of freedom = 16
Chi-square significance level = 0.145
ANOVA significance = 0.007

4.3.3 Years In Practice Not A Factor

Interestingly, the number of years a doctor has remained in practice tended not to influence the length of time taken to become proficient in the use of pathology requesting software, nor does it influence the perceived ease of computer requesting over traditional methods of ordering.

4.3.4 Proficiency Related To Improved Patient Outcomes

Doctors who have not noticed any evidence of improved patient management as a result of computerised pathology requesting also indicated they were likely to be less, or not at all, proficient at using their system compared with those who had noted significant evidence of improved patient outcomes.

All of these factors suggest that ease of use, the generation of short cuts and the perceived evidence of improved patient management will increase over time as doctor's proficiency in practice management software improves.

Table 4-17 - Noted Patient Management Improvements By Self-Rated Computer Proficiency

		Self Rated Proficiency			
Evidence of improved patient management		**Not Proficient**	**Neither**	**Proficient**	**Total**
No evidence noted	Count	8	9	94	111
		73%	43%	26%	28%
Some evidence noted	Count	3	4	66	73
		27%	19%	18%	18%
Significant evidence Noted	Count		8	205	213
			38%	56%	54%
Total	Count	11	21	365	397
		100%	100%	100%	100%

Degrees of freedom = 4
Chi-square significance level = 0.001
ANOVA significance = 0.000

4.3.5 Sole Practitioners More Influenced By Health Bureaucracy

Practice type (whether sole practitioner, partnership, larger private medical centre, or public and private hospital facility) governed the impact of a range of factors relating to pathology requesting behaviour. The impact of practice approach on pathology requesting behaviour is more influential for sole practitioners than for partnerships or larger medical centres. Similarly, the impact that health bureaucracy and administrative requirements has on pathology requesting decreases as practice size becomes larger. This is to say that sole practitioners are influenced by health bureaucracy and practice approach more than partnerships and larger medical centres.

4.3.6 Sole Practitioners Influenced By Pathology Providers

Sole practitioners also indicated that promotion or advice from pathology practices has a high impact on pathology requests.

Table 4-18 - The Impacts Of Practice Approach, Health Bureaucracy And Advice From Pathologists By Practice Type

			Practice Type			
	Impact		**Sole practitioner**	**Partnership**	**Private medical centre**	**Total**
Practice Approach	Low	Count	26	104	86	216
			28%	41%	51%	42%
	Medium	Count	26	64	37	127
			28%	25%	22%	25%
	High	Count	41	84	45	170
			44%	33%	27%	33%

Degrees of freedom = 4
Chi-square significance level = 0.007
ANOVA significance = 0.001

			Practice Type			
	Impact		**Sole practitioner**	**Partnership**	**Private medical centre**	**Total**
Health bureaucracy & administrative requirements	Low	Count	50	172	109	331
			46%	61%	60%	58%
	Medium	Count	27	58	46	131
			25%	20%	25%	23%
	High	Count	31	53	28	112
			29%	19%	15%	20%

Degrees of freedom = 2
Chi-square significance level = 0.029
ANOVA significance = 0.012

			Practice Type			
	Impact		**Sole practitioner**	**Partnership**	**Private medical centre**	**Total**
Promotion or advice from Pathology Practices	Low	Count	69 64%	215 76%	146 80%	430 75%
	Medium	Count	25 23%	43 15%	24 13%	92 16%
	High	Count	13 12%	26 9%	12 7%	51 9%

Degrees of freedom = 2
Chi-square significance level = 0.055
ANOVA significance = 0.021

4.3.7 Larger Practices Establish Proficiency Earlier

Of the five major practice types studied, partnerships and larger private medical centres are more likely to become proficient at using their systems within the first month of implementation.

Table 4-19 - Time Taken To Proficiency By Practice Type

		Practice Type			
Time to proficiency		**Sole practitioner**	**Partnership**	**Larger private medical centre**	**Total**
Within first month	Count	7 19%	43 29%	22 19%	72 24%
1-2 months	Count	6 16%	52 35%	54 46%	112 37%
2-3 months	Count	5 14%	10 7%	14 12%	29 10%
3-6 months	Count	6 16%	27 18%	9 8%	42 14%
More than 6 months	Count	13 35%	18 12%	19 16%	50 16%

Degrees of freedom = 8
Chi-square significance level = 0.000
ANOVA significance = 0.006

4.4 Conclusions from Phase 2

The findings from Phase 2 (the survey) confirmed the focus group outcomes from Phase 1 of the study, enhanced our understanding of the drivers of pathology ordering and provide a good basis to undertake and interpret the time series analysis of Medicare utilisation data.

5 RETROSPECTIVE ANALYSIS OF MEDICARE DATA - (PHASE 3)

Phase 3 examined actual requesting behaviour over time for a sample of General Practitioners drawn from respondents to the previous survey (Phase 2).

5.1 Methodology

5.1.1 Overview

Data pertinent to consenting GPs was supplied by the Australian Department of Health and Ageing. The source of this data was the payment management system utilised by the HIC to pay Medicare benefits for services provided by GPs and Pathologists.

For the purposes of this paper we use 'test' to mean an MBS item for billing a pathology service other than a PEI (Pathology Episode Initiation). The PEI MBS item is used as a marker of a patient episode.

IRIS coordinated the identification of consenting GPs and the subsequent retrieval of data from the Health Insurance Commission via the Department of Health and Ageing.

Professor David Steel, Nick von Sanden and Professor Michael Legg of the Faculty of Informatics at the University of Wollongong conducted an analysis of the data with the goal of assessing the relationships between usage status of computers for pathology requesting and changed rates of requesting per patient episode.

This report incorporates the majority of the paper produced by Drs Steel and von Sanden, with some items from the paper dealing with data cleaning and matching included as Appendix 6 - Preparing the Data Sets for Analysis (Phase 3). Other appendices to the analysis report are included as Appendix 3 - Model Fit Statistics (Phase 3), Appendix 4 - Sensitivity Analysis (Phase 3) and Appendix 5 - Data Items Available in IRIS Survey and HIC Dataset (Phase 3).

5.1.2 Sample - Data Matching And Clean Up

The sample population for the initial survey was defined as all General Practitioners in active practice within Australia.

A highly representative sample was yielded in the initial survey that examined GP attitudes and behaviours as well as seeking consent for release of Medicare data pertinent to the GP.

Table 5-1 below sets out the state by state proportions for the sample frame, first sequence sample and response.

Table 5-1 - Sampling Performance By State

State	All GPs on Database (n=21,632)	Initial Sample Frame (n=2500)	Sequence 1 Sample (n=1500)	Yielded Sample Response (n=613)	Consent Given for HIC Data (n=557)	Implied Weighting Factor
ACT	1.76	1.6	2.1	2.1	2.2	0.84
NSW	35.05	33.4	31.4	31.6	31.6	1.12
NT	0.89	1.1	1.2	1.1	1.3	0.81
QLD	17.90	18.2	20.8	20.7	21.0	0.86
SA	8.48	10.0	8.8	9.0	9.2	0.93
TAS	2.62	3.1	3.1	2.0	1.8	1.31
VIC	24.26	22.3	22.9	22.8	23.2	1.06
WA	9.05	10.3	10.9	10.6	9.9	0.85

A total of 613 GPs responded from and initial sample of 1500. Of these 557 or 91% consented to the release of HIC data for the time series analysis. This represented a response rate for examination of HIC data of 37%.

As this is a retrospective sample drawn to match provider numbers for doctors in the IRIS survey and doctor's provider numbers are location specific, more doctors are captured over time as they settle in the locations (and therefore obtain provider numbers) than can be matched to the IRIS survey.

Following receipt of the HIC data, the database from the survey and the data from the HIC were merged to permit further analysis.

The survey data file contained information on:

- Whether doctors use computers to prescribe pathology
- Their type of practice and experience
- When they computerised
- How much they used their computer for ordering pathology during the period January 1999 to December 2001.
- A number of attitudinal questions on the perceived impact of computerisation and other factors affecting pathology requesting practice. This survey was held between July and September 2002.

The administration data from The Health Insurance Commission contained:

- The total number of patient incidents for which pathology was ordered by each of 532 doctors who were matched from the IRIS survey
- The pathology claiming of those doctors recorded by each practice at which they worked, during each month in the period January 1999 till December 2001.
- The total number of tests ordered in each month, the number of days in a month that tests were ordered
- The total benefits paid for these tests.

A full list of all data items, their description and origins are included as Appendix 5 - Data Items Available in IRIS Survey and HIC Dataset (Phase 3).

A detailed description of how the data was merged, and the basis for discarding a number of cases is set out in Appendix 6 - Preparing the Data Sets for Analysis (Phase 3).

The two data sets were merged by matching each doctor's unique identification number to create a final data set containing the following data items:

Table 5-2 - Structure of Merged Data Set

Data Item	Description
Doctor ID	A unique number identifying each doctor
Practice ID	A number identifying the practice at which the pathology request was tabled
Date	Month and year in which the pathology request took place
Services PEI	There is one PEI (Patient Episode Initiation) per pathology episode where the service is performed by a private practice and claimed on Medicare. The total number of PEIs for the month in which pathology was ordered.
Services Tests	Total number of pathology MBS items (other than PEIs) claimed from pathology requests performed during the month.
Days PEI	Number of days in the month during which PEIs were counted.
Experience	Number of years doctor has been practicing medicine
Computerisation	Item indicating if the doctor; a. Does not use a computer to request pathology b. Uses Medical Director to request pathology c. Uses another computerised system to request pathology
Proportion	The proportion of total pathology requests the doctor believes they order using a computer
Proficiency	Doctor's perceived proficiency at using a computer to order pathology
Multiple tests	Doctor's perceived use of computers to order multiple pathology tests
Date computerised	Date at which the doctor began using a computer system to request pathology
Date proficient	Data at which doctor believed they were proficient at using their computerised system to order pathology
State	State in which doctor works at the time of responding to IRIS survey. Due to the retrospective matching of doctors this will be the same state that the doctor was working in during the period January 1999 to December 2001
Weight	An implied weighting factor given the sampling performance by state

5.1.3 Data Exploration And Issues

In the merged dataset there are 532 unique doctors of whom 70 worked in at least 2 practices between January 1999 and December 2001 while 462 work only at a single practice. Out of these 532 doctors only 8 have been practicing for less than 5 years with the median for all doctors being 22 years practicing medicine.

The 532 doctors in the final file were distributed over the states and territories as shown in Table 5-3.

Table 5-3 - Distribution of Subjects by State

State/Territory	Number of Doctors	Percent of Total	Percent of Total Services in Population
ACT	10	1.9	1.3
NSW	168	31.6	36.2
NT	7	1.3	0.5
QLD	108	20.3	18.3
SA	51	9.6	7.6
TAS	10	1.9	2.2
VIC	125	23.5	25.1
WA	53	10.0	8.7
Total	532	100.0	100.0

The composition of the sample was broadly comparable to the proportion of services ordered by doctors in all states/territories on the HIC database.

Initial examination of the data led to the exclusion of a number of cases.

Eighty four cases were excluded as they appeared to excessively high Test to PE ratios consistent with GPs using public pathology practices.

Twenty two cases were excluded on the basis of returning inconsistent or incomplete responses to the IRIS survey that would have impacted directly on the statistical analysis planned. Appendix 6 - Preparing the Data Sets for Analysis (Phase 3) sets out a full justification for the exclusion of cases from analysis.

5.2 Findings

5.2.1 Descriptive Analysis

The distribution of the response variable, the ratio of MBS items (tests) per patient episode as revealed in the raw data can be seen in Figure 5-1 below.

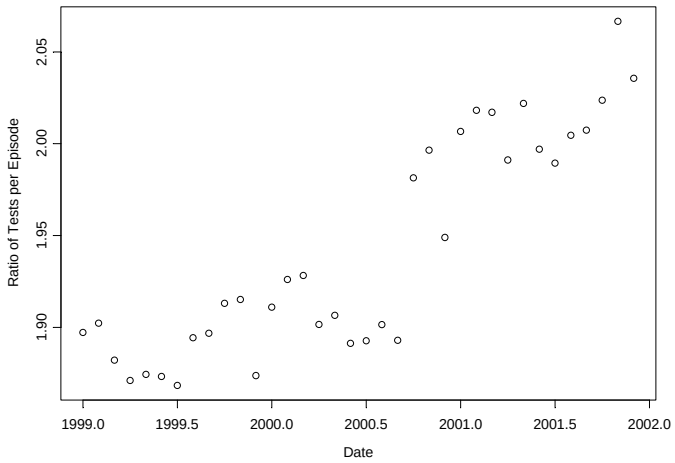

Figure 5-1 - Ratio of Tests per Episode Over Time

It can be seen from Figure 5-1 that there appears to be a break in the series at October 2000. This break coincides with a change in the grant funding of items under the Medicare Benefits Schedule for IMVS (South Australia) and PathCentre (Western Australia) in October 1, 2000.

A full explanation of how this break in series has been dealt with, and of how some mismatched data led to the exclusion of a number of cases is set out in Appendix 6 - Preparing the Data Sets for Analysis (Phase 3).

The data adjustment described in the Appendix has led to the total number of cases dealt with falling from 532 cases to 426 cases. After completing the adjustments described in Appendix 6, the final dataset contains 426 doctors. The following table shows the breakdown of these doctors by state and whether they computerised their pathology ordering systems during the period of January 1999 to December 2001

Table 5-4 - Breakdown by State and Computerisation Status

State or Territory	Did not Computerise	Computerised before Jan 99	Computerised Jan 99 – Dec 01	Total Doctors
ACT	3	1	4	8
NSW	61	9	63	133
NT	4	0	0	4
QLD	27	16	52	95
SA	9	5	15	29
TAS	6	0	2	8
VIC	29	9	65	103
WA	23	3	20	46
Total	**162**	**43**	**221**	**426**

In summary approximately 20% of the doctors from the initial dataset were excluded. South Australia had the most exclusions, as a percentage, with 43% of the doctors in this state removed while Queensland had the least with only 12% of doctors excluded.

The ratio of tests per episode aggregated over all doctors ordering one or more pathology test for each month in the period January 1999 to December 2001 based on the reduced sample of 426 doctors can be seen in Figure 5-2 below:

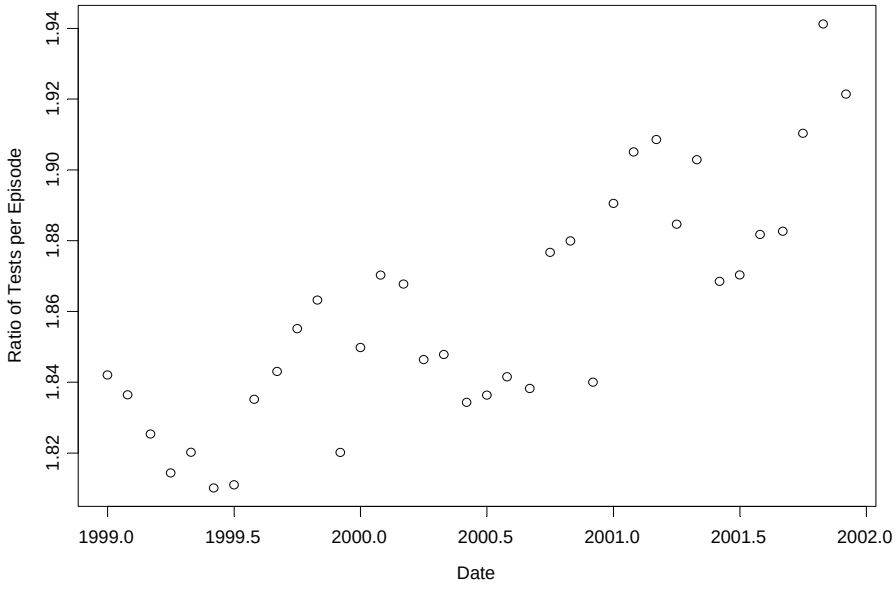

Figure 5-2 - Ratio of Tests per Episode over Time after Adjustment

It can be seen in Figure 5-2 that the adjustments have mostly removed the break in the series at October 2000. After the adjustments the overall ratio of tests per episode increased by 6.6% (or 2.1% per annum) over the 3-year period of interest, a reduction from the 9.0% (or 2.9% per annum) increase we saw before the data was cleaned.

5.2.2 Data Modelling

The distribution of the response variable, the ratio of tests per patient incident, can be seen (for example Figure 3 in Appendix 6 for the distribution before the data was cleaned) to be a mixture of three distributions,

- A distribution describing the integer category heaping in the data
- A uni-modal and symmetric distribution describing the majority of the data, and
- A long tailed distribution reflecting the doctors that order pathology tests from public sector laboratories.

The third of these distributions reflects nuisance data that has, by-and-large, been excluded, while the remaining distributions are mixed with the second distribution dominating. Hence, although it would appear that the Normal distribution should describe the data reasonably well, Logarithmic and Poisson links may also be considered.

In this section regression methods are applied to analyse the ratio of pathology tests ordered to patient incidents in each month over the period January 1999 to December 2001. The effects of state, time and computerisation of pathology ordering systems are considered in this analysis. The effect of computerisation is modelled by analysing the change in individual doctor's pathology ordering habits after they computerise their ordering systems and also by comparing the pathology ordering patterns of doctors who do and do not use a computerised ordering system.

To consider the effect of computerisation on the pathology ordering habits of individual doctors an intervention variable was included in the analysis to reflect whether doctors' pathology ordering habits systematically change after the date of computerisation. Three alternative intervention variables were constructed to reflect the effect of computerisation on the ratio of tests per patient incidents, reflecting whether:

a. Doctors immediately change their pathology ordering habits after they computerised their pathology ordering systems (i.e. after the date of intervention)

b. Doctors only change their pathology ordering habits when they feel proficient at using their computerised system and do not change their ordering habits until they feel proficient at using this system.

c. Doctors gradually change their pathology ordering habits as they become more proficient at using their computerised pathology ordering system.

These intervention variables have been incorporated into the model by including, respectively, the following intervention variables in the model:

a. An intervention of 0 before the individual doctor began using a computer to order pathology and 1 after the doctor computerised.

b. An intervention of 0 before the individual doctor felt proficient at using a computer to order pathology and 1 after the doctor felt proficient.

c. A phased in intervention of 0 before the individual doctor began using a computer to order pathology and 1 after the doctor felt proficient at using the computer to order pathology. A linear extrapolation was used during the period in which the doctor was becoming proficient at using the computerised pathology ordering system.

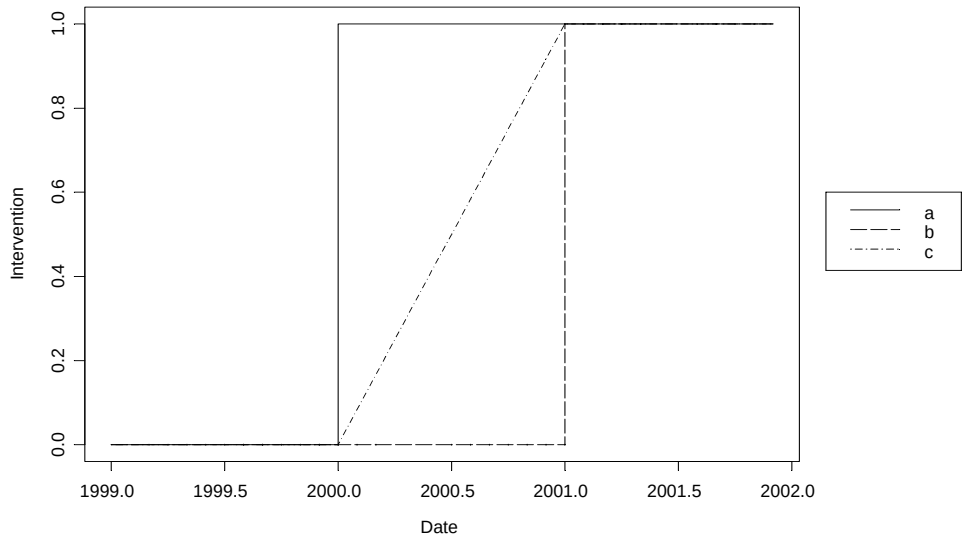

Figure 5-3 - Comparison of Three Intervention Variables

Now let each of these intervention variables be Int1, Int2 and Int3 respectively. Let j be an index for each doctor in each month t during the period January 1999 to December 2001, with each doctor's identification initially considered to be a fixed effect. Then adopting a model search approach in which the full model is initially fitted and subsequent models are determined through discarding the least descriptive (based on a type 3 sum of squares criterion) variables, the most appropriate model to describe the data is

$$Ratio_{jt} = \beta_{1j} + \beta_2.Time + \beta_{3j}.Time + \beta_{4j}.Int_1 + \beta_{5j}Time.Int_1 + \varepsilon_{jt} \qquad (1)$$

Note that only one intervention variable is considered at a time, and the explanatory power of the model, as measured by the adjusted R-Square can be used to indicate which intervention variable explains more of the variation in the data. Model (1) tells us that the most appropriate way to model the ratio of pathology tests per patient episode is to consider that some doctors have a different overall level of the ratio of pathology tests they order per patient and that some doctor's pathology ordering habits have been changing over time. The overall level of ordering for some doctors change when they computerise their pathology ordering systems and also the rate of change of some doctor's pathology ordering habits also changes over time after they computerised their pathology ordering systems.

This is modelled through a unique intercept for each doctor, an individual slope over time for each doctor and a different slope and intercept for each doctor from the date they computerised their pathology ordering systems. When fitted to the data this model (1) has an R-squared value of 0.66 and an adjusted R-square of 0.63. Note that there is some remaining structure in the residual plots, however due to the dominance of the Normal distribution in the mixture, transformation of the response variable does not improve the model fit, see Figure A1 in Appendix 3 - Model Fit Statistics (Phase 3) for more information.

Recognising that integer heaping in the data will generally relate to months in which the doctors had a small number of patients we can weight the observations by the number of patient incidents. This weighting scheme can be used to reflect the increased monthly stability of rates that are based on more patient incidents. When a weighted analysis is performed the R-square is increased to 0.80 and the adjusted R-square to 0.78 under model (1). Note that a phased-in intervention effect may be marginally preferred under a weighted analysis. Further details on the model fit statistics can be found in Appendix 3.

Although an intervention effect is statistically significant under model (1), due to the specificity of the model, it tells us only that the pathology ordering habits of different doctors have generally been different during the period of January 1999 to December 2001. In other words the significance of the intervention effect only tells us that some doctors appeared to change their pathology ordering habits when they computerised their pathology ordering systems. Model (1) does not tell us whether doctors increased their rate of ordering pathology; some increased while others decreased.

If we want to consider more closely the *overall* effect of computerisation on the change in the ratio of ordering pathology tests per patient incident over time, we can assume the rate of change in this ratio over time is constant for all doctors within a particular state or territory. This is equivalent to constraining the parameters β_{4j} and β_{5j} in model (1) to be fixed over all doctors, j within a single state or territory s. When this constraint is applied a number of competing models can be specified with similar explanatory power, as measured by the adjusted R-Square. Of these competing models, model (2) is presented below as it allows direct comparison of the state level results with the national level model discussed later in this report.

$$Ratio_{jt} = \beta_{1j} + \beta_2.Time + \beta_{3s}.Time + \beta_{4sc}.Time + \varepsilon_{jt} \quad (2)$$

Here c is a shorthand notation for an index for the computerisation variable and s is a shorthand notation for an index for the state or territory in which the doctor practices. For example, with β_{3s} we would estimate 8 different parameters for the various states and territories, where β_{31} would be the estimated time effect parameter in state 1, which we could define to be New South Wales, and β_{32} would be the estimated time effect parameter in state 2, which could be Victoria. Model (2) tells us that when we consider the rate of change over time of doctor's testing to be the same for all doctors within a particular state or territory we can model each doctor's ratio by an individual level for each doctor and a rate of change in this level over time specific to each state and doctor's computerisation status. When fitted, using a weighted analysis, to the data the R-squared for this model is 0.76 and the adjusted R-Square is 0.75, suggesting the explanatory power of model (2) is somewhat inferior to model (1).

This reduction occurred because some of the variability that was previous explained by the individual slope attributed to each doctors is now included in the error term. Given the constraint we have applied, we can see that in at least one state or territory there is a significant difference in the habits of the three groups of doctors when ordering multiple pathology tests.

Table 5-5 presents the state level parameter estimates by the computerisation status of doctors, based on model (2). Given the standard errors associated with these parameter estimates (see Appendix 3) it can be seen that there is a significant difference in the rate of change of ordering multiple pathology tests between January 1999 and December 2001, in all states and territories. The following table summarises the estimated annual percentage rate of change in the ordering of pathology tests per patient incident in the larger states and at the national level, based on the results of model (2).

Table 5-5 - Computerisation Status of GPs in Sample

State or Territory	Did not Computerise	Computerised before Jan 99	Computerised Jan 99 – Dec 01
NSW	3.20	-0.23*	1.06
QLD	1.85	3.03	0.23
VIC	1.04	4.85*	3.05
WA	5.66	3.79*	1.75
SA	1.29*	6.45*	5.03
Australia	**2.86**	**1.17**	**3.28**

*Indicates less stable estimate in cell containing less than 10 doctors

Looking at the states in more detail we can see that even though there is a significant difference in the rate of change in the ratio of tests to patient incidents for the three groups of doctors in the individual states, the direction of this difference is not consistent across all of the states. For example in New South

Wales and Western Australia it can be seen that the rate of change is greatest for doctors who did not use a computer to order pathology between January 1999 and December 2001, while in Queensland, Victoria and South Australia the rate of change was greatest for those doctors who computerised their pathology ordering systems during this period.

At the national level the differences in the individual states cancel out and hence we cannot make conclusive statements regarding the *overall* effect that computerisation of pathology ordering systems has had on the ordering of pathology tests per patient incident. In summary we can see that the effect on the ordering of pathology per patient incident has been different in different states and this suggests that there may be systematic differences in the way doctors are ordering pathology tests in the various states and territories.

Given that computerisation of pathology ordering systems occurred concurrently in all states and territories, we can assess the overall effect of computerisation on the numbers of pathology tests per patient episode over time by considering the data at the national level. This is equivalent to constraining the slope parameters β3s and β4sc in model (2) to be fixed across each state and territory. Based on a model search criterion the most appropriate model to describe the data now becomes

$$Ratio_{jt} = \beta_{1j} + \beta_2 .Time + \beta_{3c} Time + \varepsilon_{jt} \qquad (3)$$

Model (3) tells us that when we are looking at the national effect of computerisation we can describe the pathology ordering habits of doctors by an individual level for each doctor and the rate of change over time in this level will be different depending on the computerisation status of the doctor. In this case there is a significant difference in the rate of change over time between doctors who computerised during the period, those that always use a computer to order pathology and those that never use a computer.

A plot of the aggregate ratios of tests to patient episodes for each month and its estimated increase over time for each of the three groups of doctors can be seen in Figure 5-4 below.

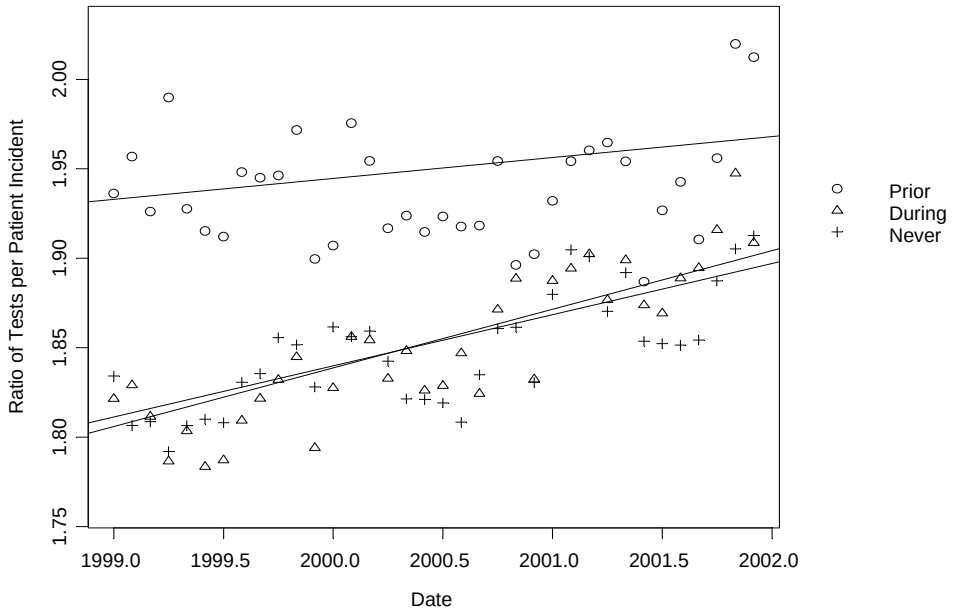

Figure 5-4 - Ratio of Tests per Patient Episode – Three Groups

It can be seen in Figure 5-4 that the rate of increase over time in the ordering of tests per patient episodes is similar for both doctors who computerised between January 1999 and December 2001 and those doctors who never computerised their pathology ordering systems. The actual parameter estimates for model (3) can be found in Appendix 3 and these show that there is no statistically significant difference in the rate of change of ordering of pathology tests per patient incident for these two groups. In comparison the rate of change for doctors who computerised their pathology ordering systems prior to January 1999 is significantly lower and it is this difference that has caused the parameter β3c to be significant in model (3).

Consequently, despite a number of data issues, there appears to be little evidence that the computerisation of doctors pathology ordering systems has directly led to an increase in the ratio of pathology tests ordered per patient incident over the period January 1999 to December 2001

5.3 Conclusions from Phase 3

There has been an overall increase, at the national level, in the ordering of pathology tests between January 1999 and December 2001.

There has also been an increase in the ratio of pathology tests ordered per patient incident between 1999 and 2001 and it has been suggested that the computerisation of pathology requesting systems may have been a contributing factor for this increase. This report has combined Health Insurance Commission (HIC) data with an Illawarra Regional Information Service (IRIS) survey to test whether the increase in ordering of pathology per patient, over this period, for computer users is greater than for those who do not use computers.

In summary it was found that there was little evidence that the computerisation of doctors' pathology ordering systems has led to an increase in the numbers of pathology tests ordered per patient incident. It was found that the direction of the effect of computerisation on the rate of ordering of pathology tests per patient incident was inconsistent in different states and territories. At the national level there was no statistically significant difference in this rate of change between doctors that did not use a computerised system to order pathology and those that computerised their pathology ordering systems between January 1999 and December 2001.

The findings from the retrospective study do not support the views expressed by GPs in both focus group and paper survey phases. That is, we could not demonstrate any strong support for a relationship between increased use of computerisation and increased ordering of pathology, either at the overall level or in terms of increased numbers of tests per patient episode.

It is possible that the observed increase in services per episode is caused by some change in the reporting system such as how the data on services associated with an episode is constructed, or there has been a change in medical practice over this period or there has been a change to the population being tested such as its relative ageing.

6 DESIGN OF A PROSPECTIVE STUDY AROUND GP COMPUTER SYSTEMS AND PATHOLOGY REQUESTING - (PHASE 4)

6.1 Introduction

Decision support in pathology ordering was identified in the focus group work from Phase 1 of this study as a desirable attribute for any electronic ordering system. It was however on the proviso that it was not obtrusive and its behaviour could be controlled by the GP.

There is some evidence that computer systems used for ordering can assist with bringing evidence based guidelines for requesting pathology into effect[8].

Previous studies into electronic requesting and reporting of pathology (PaGSIP Project) have identified that there is a barrier to the implementation of electronic requesting because there is no obvious business case for it either from the point of view of the GPs or the pathology practices[9]. This is considered something of a 'chicken and egg' problem. Until there are reasons to use electronic ordering it will not be used, but for those benefits to arise electronic ordering has to be in use.

The Australian Government Department of Health and Ageing (DoHA) recently conducted a Electronic Decision Support Strategy Meeting[10] following on from the National Electronic Decision Support Taskforce report[11]. Decision support around prescribing was the seen as the highest priority but this was closely followed in the GP context with support for requesting diagnostic services in particular pathology.

Soon after the DoHA Strategy Meeting, HL7 Australia convened a conference with its central theme as Decision Support[12]. A Technical Committee was established. This committee has drawn together a consortium to develop a project aimed at presenting the knowledge from a number of sources in a relevant context to the patient and their management. Again this work has been primarily focused on medication management but pathology was considered and a presentation on New Zealand work in this area was made[13].

[8] See Section 2
[9] The Pathology and General Practice Software Integration Project (PaGSIP) An evaluation of the implementation of HL7 messages for pathology requesting and reporting. Conducted on behalf of the Australian Government Department of Health and Ageing (DoHA). Reports available from DoHA contact John Bacon john.bacon@health.gov.au
[10] 3 July 2003
[11] National Electronic Decision Support Taskforce www.healthonline.gov.au
[12] Presentations available at www.hl7.org.au
[13] Martin Entwistle, Enigma Systems. Presentation available at www.hl7.org.au

There have been steps made toward electronic decision support for pathology requesting with DoHA funding the RCPA to update and convert their Pathology Manual to a database more suitable for interaction with computers[14].

The NHMRC Guidelines Group are now beginning to investigate the application of standards for the representation of clinical guidelines in a computable form. There is recognition that the current method for development and implementation is not meeting the needs of the sector.

Most pertinent to the study design that follows is the DoHA Division of Primary Care Integrated Care Project (ICP2)[15]. In this project, active guidelines for the management of asthma have been developed and packaged into a software module that sits unobtrusively over the top of the GPs practice management system[16]. It provides advice and produces an asthma management plan. The software draws what data it can from the desktop system and prompts for other relevant data. Considerable effort has been put into the interface design to ensure that presentation fits GP work practices and its use has the incentive of aiding the financial claiming from Government for improved asthma management. The project has adopted a standards based approach and an extensible design that allows it to be readily used for other clinical decision support.

The study design presented here takes a similar approach to that adopted in ICP2. The study is aimed at investigating the value and operational practicality of providing electronic decision support for the requesting of pathology and answering some of the questions raised by the "Impact of GP Systems on Pathology Reporting Study".

[14] Manual available at www.rcpa.edu.au

[15] Presentation by John Johnson, Brett Esler and Tarkan Shahho (Pen Computer Systems) to HL7 3rd Australian Conference, Sydney August 13-14, 2003 on there implementation of the Integrated Care Project available at www.hl7.org.au

[16] Typically HCN's Medical Director

6.2 Research Questions and Evaluation Framework

The research questions fall into two groups, those that explore decision support for pathology requesting and those around understanding utilisation data.

6.2.1 Decision Support For Pathology Requesting

1. **Can you influence the requesting of pathology by the provision of context sensitive, tailored, electronic decision support at the time of generating a request using a practice management system already familiar to the GP?**
   a. Data on requesting from project software
   b. Data on usage of electronic decision support from project software
   c. Survey of preference, attitude and stated behaviour
2. **Can it be done in a manner that is considered valuable and unobtrusive such that the function would continue to be used and have effect after the research project?**
   a. Data on requesting from project software
   b. Data on usage of electronic decision support from project software
   c. Survey of preference, attitude and stated behaviour
3. **What are appropriate standards for the representation of relevant knowledge in pathology requesting?**
   a. Software design specification
   b. Issues log
4. **What are appropriate standards for the presentation of advice to GPs in relation to pathology requesting?**
   a. Focus group outcomes
   b. Software design specification
   c. Issues log

6.2.2 Understanding Pathology Utilisation Data

5. **Is the observed increase in services per episode related to the way that an episode is counted in Medicare data?**
   a. Comparison of Medicare data with requesting data
6. **What is the correlation between what is requested and what is billed? What is the extent of pathology coning?**
   a. Comparison of Medicare data with requesting data
7. **What is the extent of patient non-compliance to pathology requesting?**
   a. Comparison of reporting data with requesting data

6.3 Statistical Frame and Trial Recruitment

6.3.1 Frame

200 GPs would be drawn from the participants in phase 2 & 3 of this trial.

Only GPs who use their practice management system to generate more than 80% of their pathology requests and who are on-line would be included in the study[17].

The participants would be randomly allocated to two groups after pair matching based on State, geography[18] and size of practice[19] in a manner where the investigator and the GP would be blinded to the allocation.

All patients having pathology requested would be eligible for recruitment but would be free to refuse consent to participate in the study.

There are approximately 25,000[20] GPs in Australia and they request around 70% of the 50,000,000 non PEI pathology services in a year[21]. The study then would expect to have requests for more than 500 services for each GP (and 50,000 for each arm of the study) in each 3 month data capture period.

The sample frame specified gives adequate statistical power to answer the research questions with reasonable confidence.

6.3.2 Recruitment

Initial recruitment of GPs to the study would be made by the project manager using an authoritative but personal letter together with a copy of the summary of this report (and web-based access to the full report). The letter would clearly link the second study to the first indicating that the invitation is a consequence of their participation in the first study and its findings.

Patient recruitment would be undertaken by the GP as for ICP2 and would require appropriate patient consent that would be recorded using the project software.

[17] Based on the experience of the first study this frame seems achievable without having to include GPs who did not participate in the first trial but these could be called on if uptake is low. DoHA initiatives currently underway are likely to assure high levels of connectivity. The GPs selected have previously agreed to use HIC data and would be likely to again.
[18] 3 geographic regions would be used (a) Urban (Rural, Remote and Metropolitan Areas (RRMA) category 1 and/or 2) (b).Rural (RRMA category 3 and/or 4) and (c) Remote (RRMA categories 5 and/or 6 and/or 7)
[19] As classified in Phase 2 of this study
[20] Source: Australian Government Department of Health and Ageing
[21] Source: Medicare Statistics 2002-03 available at www.hic.gov.au

6.4 Methodology

6.4.1 Trial Design

A blinded cross over trial design is proposed providing level II evidence using the NHMRC scale shown in Table 6-1 .

Table 6-1 - Designations of level of evidence

I	Evidence obtained from a systematic review of all relevant randomised controlled trials.
II	Evidence obtained from at least one properly designed randomised controlled trial.
III-1	Evidence obtained from well-designed pseudo-randomised controlled trials (alternate allocation or some other method).
III-2	Evidence obtained from comparative studies with concurrent controls and allocation not randomised (cohort studies), case–control studies or interrupted time series with a control group.
III-3	III-3 Evidence obtained from comparative studies with historical control, two or more single-arm studies or interrupted time series without a parallel control group.
IV	IV Evidence obtained from case-series, either post-test or pre-test and post-test.

Source: NHMRC 1999

The two matched groups would each have baseline data collected for 3 months then be exposed to different interventions. At the end of 3 months the groups would crossover and be exposed to the other intervention for 3 months.

The investigators would not know the group allocation of a GP until completion of the data collection. Activities involved in the study are shown in Table 6-2 and their timeline is shown in Table 6-3.

Table 6-2 - Activities to be undertaken for the prospective study

Activity	*Notes*
Detailed Study Design and Clearances	Includes identification of the appropriate tests or conditions[22] (frequent and understood) to have the advice or other actions developed in the knowledge base development phase; allocation of knowledge domains to interventions; more detailed project plan and clearance through Ethics Committee
Knowledgebase Development	Development and trialling of knowledge used to influence requesting behaviour
Use Case Development and Interface Design	Includes focus group work, prototyping of presentation of advice to GP and detailed design specification for presentation
Software Build	Specification of design including: implementation of appropriate standards, interaction with practice management system to provide decision support around pathology requesting and to collect data for the evaluation of the study; manufacture and deployment of software
Pilot testing	Trialling of software and study design elements in a small number of practices in preparation for full roll out of project
Develop survey of preference, attitude and stated behaviour design and conduct the surveys	Design and test a GP survey of preference, attitude and stated behaviour for on-line administration at the end of phase 4, 5 and 6 aimed at measuring success of the project and identifying opportunities for improvement or knowledge development; conduct the surveys and analyse the survey results; includes Statistical Clearing House clearance
Recruitment	Recruit GPs to the study design; develop training materials and train GPs in study protocol
Data Capture and Analysis	Establish database; collect data daily; assure data quality and analyse 3 monthly to the level possible while maintaining blinding
Reporting	Prepare a final report and presentation detailing the outcomes around requesting and those around health informatics; provide interim reports after each phase
Project Management	Coordinate project; Manage incentive payments; Report on progress

[22] See Section 6.4.3

6.4.2 Timeline

A proposed timeline for the study is shown in Table 6-3.

Table 6-3 - Timeline for Prospective Study

No	***Phase***	***Months***
1	Tendering	2
2	Detailed study design, recruitment and development of knowledge base & software	6
3	Deployment of software and training in trial protocol	3
4	Base-line requesting data collection	3
5	Group 1 receive Intervention 1 Group 2 receive Intervention 2	3
6	Group 1 receive Intervention 2 Group 2 receive Intervention 1	3
7	Analysis and reporting	4
	TOTAL	**24**

There are to be three data collection phases each 3 months long.

Surveys would be conducted after each data collection phase (ie at the end of phases 4, 5 and 6).

With the time taken to set up and close down the study and taking account the required analysis and write-up it is expected that the trial will last at least two years.

6.4.3 Test or Condition Selection and Knowledge Base Development

The study requires that tests or conditions are identified and allocated to two groups prior to the development of the knowledge for the two interventions.

For selection the tests or conditions would need to be frequently seen or used in general practice, have good evidence around them, and would need to be sufficiently complex for electronic decision support to be appreciated by the GP.

Knowledge base development[23] would take into account work that has been commissioned by QUPC to a develop a process for guideline development.

It may be that Intervention 1 focuses on providing advice for conditions (eg Hepatitis) while intervention 2 takes a test based approach (eg Thyroxine)

[23] The materials that would be presented to the GP

6.4.4 Software Design, Informatics Standards and Development

An iterative approach to the software design should be adopted because that has been shown to be both effective and efficient in this area previously. The approach is shown diagrammatically in Figure 2-1.

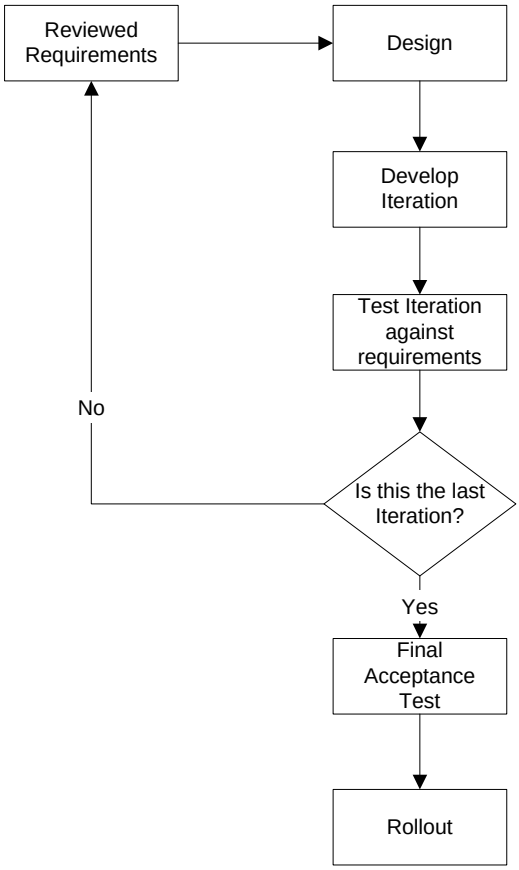

Figure 6-1 - The Iterative Approach to Software Development

An extensible standards based design would be required. Software Development would include the following phases:

1. Use case development
2. Interface design
3. A review of relevant Standards and assessment of applicability (which may include where appropriate some trialling) including messaging, terminology, decision logic and guideline representation
4. Software build
5. Pilot testing

6.4.5 Survey Design and Conduct

An appropriate survey of preference, attitude and stated behaviour is to be designed for web-based administration and conducted on-line. The survey would be run 3 times at the completion of each of the experimental phases.

6.5 Data Collection, Analysis and Reporting

The following data is to be collected and used:

1. Deidentified request data for all pathology requests from participating patients grouped by episode provided daily in a secure manner on-line to the project manger
2. Data around use of electronic decision support provided daily in a secure manner on-line to the project manger
3. Count of refusals to participate
4. Issues log maintained by the project manager and populated from input from all involved in the development and management and the participating GPs
5. HIC Medicare data for pathology for 15 months from commencement of baseline data capture

6.6 Privacy and Ethics

The study is at all times to be conducted in accordance with accepted practice as defined by the NHMRC National Statement on Ethical Conduct in Research Involving Humans[24] and the relevant jurisdictional legislation relating to privacy and medical records. Particular attention is drawn to NHMRC Guidelines approved under Section 95A of the Privacy Act 1988. Also relevant is the Privacy Amendment (Private Sector) Act 2000 and the associated Guidelines on Privacy in the Private Health Sector.

In relation to informed consent for the trial the following NHMRC statements are relevant:

NHMRC – National Statement 1.9 – Where consent to participate is required, research must be so designed that each participant's consent is clearly established, whether by a signed form, return of a survey, recorded agreement for interview or other sufficient means.

NHMRC – National Statement 1.19 – Where personal information about research participants or a collectivity is collected, stored, accessed, used, or disposed of, a researcher must strive to ensure that the privacy, confidentiality and cultural sensitivities of the participants and/or the collectivity are respected. Any specific agreements made with the participants or the collectivity are to be fulfilled.

NHMRC – National Statement 1.20 – Where the records and results of research contain information of clinical significance it is the responsibility of both the researcher and the institution or organisation to maintain the security and storage of records and results so as to enable any necessary follow-up studies to be carried out.

[24] NHMRC 1999b (National Health and Medical Research Council. National Statement on Ethical Conduct in Research Involving Humans. AusInfo, Canberra.
http://www.health.gov.au/nhmrc/publications/humans/contents.htm

This design is intended to meet the requirement of NHMRC – National Statement 1.13 – Every research proposal must demonstrate that the research is justifiable in terms of its potential contribution to knowledge and is based on a thorough study of current literature as well as prior observation, approved previous studies, and where relevant, laboratory and animal studies.

In accordance with NHMRC – National Statement 1.16 - Research projects involving humans must be reviewed by a Human Research Ethics Committee (HREC) and must not be undertaken or funded unless and until approval has been granted review of this design will be sought from the Commonwealth Department of Health Ethics Committee prior to commencement of the trial.

NHMRC – National Statement 1.18 - The results of research (whether publicly or privately funded) and the methods used should normally be published in ways which permit scrutiny and contribute to public knowledge. Normally, research results should be made available to research participants.

6.7 Project Governance

It is recommended that there be:

A Steering Committee whose role would be to

1. Oversee the trial
2. To act with the Department as the Tender Review Committee (although the Committee may also co-opt members to provide technical expertise)
3. To act in an advisory capacity and to help resolve issues that may arise in the conduct of the trial
4. To receive and review regular reports from the Trial Manager
5. Support and promote the Trial

and is responsible to

1. QUPC or its replacement

A Study Project Manager whose role would be to

1. To develop and implement a detailed project plan which is consistent with the trial design
2. To make recommendations to the Steering Committee in relation to the implementation and management of the trial.
3. To manage the budget and funds and to report on expenditure to the Steering Committee and DoHA Secretariat.
4. To report on progress to the PoCT Trial Steering Committee and PoCT Secretariat
5. To liaise and work with related sub-contractors as appropriate.
6. To develop and implement a communication strategy to ensure stakeholders are informed of progress and are able to discuss issues as they arise.

and is responsible to

1. Steering Committee

2. DoHA – Project Officer

An Evaluator[25] whose role would be to

1. To develop survey instrument and conduct the survey
2. To collect and analyse data, and evaluate and report on the study

and is responsible to

1. Steering Committee
2. DoHA – Project Officer

The Department would have the following roles

1. Manage the Governance and probity
2. Fund the project
3. Administer Tenders

and is responsible to

1. the Minister

Given the nature of this project and the related project activity it is recommended that consultation be undertaken with the following:

1. AHIC Decision Support Steering Committee
2. NHMRC Guidelines Committee
3. DoHA Primary Care Division
4. DoHA Information Division
5. National Infostructure Office
6. HL7 Australia

6.8 Conclusions from Phase 4

A blinded cross-over study design is provided to investigate how GP computer systems might influence pathology requesting toward best practice. This draws on the work of the studies described here and on recent work done in electronic decision support for asthma management. The study design gives the opportunity to further investigate pathology utilisation data and to shed more light on the observed trend to increased services per pathology episode.

[25] It may be that the size of the trial would not warrant separation of the evaluation and management functions and that it would be more efficient to do this through the co-ordination of the Study Project Manager however the activities would need to be undertaken.

7 CONCLUSION

Pathology requesting and reporting are considered important functions of GP practice management systems.

GPs find using their computer to request pathology easier than writing and believe that this improves the care of their patient.

The observed (and continuing) increase in the number of Medicare items billed per episode is not, however, explained by GPs growing use of computers to produce pathology requests.

Electronic decision support for pathology requesting was identified as desirable.

A study design is provided to investigate how GP computer systems might influence pathology requesting toward best practice.

APPENDICES