

Refereed papers

How often do GPs use rapid computer access to laboratory results? A description of 18 months' use by 72 practices in Tayside

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ABSTRACT

This paper describes the uptake and usage by a group of general medical practices in Tayside, Scotland of a novel system designed to give rapid access to laboratory results in primary care.

The speed of access to laboratory results from primary care is one factor that determines how laboratory results are both requested and used. Without easy and timely access to laboratory results, general practitioners (GPs) are not able to make the most efficient use of laboratory tests, and this therefore impinges on whether those tests are requested. *Fountain* was designed to provide a front end for GPs to gain rapid and easy access to laboratory results in a manner familiar to them. It was initially made available in primary care in the region to 72 practices, with 272 GP desktops having immediate access to results when they are ready.

The pattern of use and uptake was monitored remotely after the system was introduced, and the first 18 months of use are described here. Initial use varied widely between practices with rates of access varying from 160 hits per 1000 population to none at all. However, the access rate gradually conformed to a more standard rate of around 20 hits per 1000 population per month, regardless of the initial rate of use.

This pattern conforms to that describing the introduction of new technologies in other settings. Continued use in practice and the concordance of usage between practices confirms that rapid and reliable access to laboratory reports from primary care is both useful and used.

Keywords: clinical laboratory information systems, medical informatics, primary care

Introduction

Effective clinicians need access to the results of appropriate investigations.[1] Until recently, the results from investigations have been presented to general practitioners (GPs) in paper formats, though there are a number of schemes that aim to encourage electronic links between primary and secondary care.[2–4] As GPs become more effective, they make increasing use of laboratory services. For example, in Scotland, the number of GP test requests increased by 45% between 1994 and 1999, accounting for 25% of the £125 million spent on laboratory investigations in 1997–98.[5] There is evidence that rapid access to those results is a cost-effective means of improving the appropriateness of the requests for laboratory investigations.[6,7] The Grampian study of a guideline-based open access urological investigation service demonstrated improved patient waiting times when appropriate investigations were ordered and reviewed by GPs.[8] A systematic review by a group in Boston, USA showed that feedback of

results needs to be combined with other tools known to encourage professional behaviour change: educational messages and guidelines.[9]

Fountain is designed to provide a simple front end for patient information that would give hospital clinicians and GPs access to laboratory and x-ray results in a secure manner. Information from laboratories must be available at any time and viewed in a manner familiar to the clinicians. *Fountain* currently makes use of the NHSnet and uses an internet protocol (IP) addressing WAN (wide area network) infrastructure for support. This structure has been subsequently developed.

The goal of *Fountain* is to support and provide information first and data second. It does so by holding all the information in a central repository and by being able to store any type of patient-related information, such as laboratory results, x-ray reports, and referral and discharge letters.

Fountain was introduced in Tayside in December 1995. The software was developed by Saragon Ltd in co-operation with the University of Dundee, and was made available in an increasing number of Scottish hospital wards from December 1995. A concurrent pilot in a general practice setting was set up to meet the need of access by primary care clinicians. The National Health Service (NHS) in Scotland agreed to meet the installation costs of ISDN lines in each practice and also the messaging cost of using the NHSnet centrally.

Fountain was made more widely available for primary care from June 1998, and as each practice in Tayside became networked on the NHSnet, the software was made available on all GP desktops, workstations in nursing rooms and in reception areas. *Fountain* was rolled out gradually over time, with practices gaining access sequentially. As a result, different practices started using it in different months. At the time of data collection, in September 2000, *Fountain* was installed in 72 of 75 GP practices in Tayside, totalling 692 licenses, 272 of which are on GP desktops. There were three non-networked practices in Tayside at that time. A total of 59 of the 72 practices with *Fountain* installed were using it at the time of the survey.

Many health information technology (IT) projects involved with patient management, for example laboratory data, have tended to concentrate on moving data between destinations, that is, copying data from one computer to another. Laboratory reports are generated at the hospital and passed on to different hospital systems and to many different GP systems. For effective processing by the recipient system, these data are moved in a granular format. This exercise is complex due to the nature of the data. The designers of *Fountain* decided to concentrate on disseminating the information rather than the data. Thus reports and documents were captured from different hospital computer systems and stored as documents within a central database which is part of the region's central repository of NHS data. Due to the nature of legacy computer systems, information was captured non-invasively, via Transfer Control Protocol/Internet Protocol (TCP/IP), which meant that reports were captured as part of the normal daily process of the system providing the results. No additional software was required. The server that comprises the regional repository was based at a Dundee hospital. Data were captured from laboratories and radiology departments in all three areas of Tayside. No discharge or referral data were being transmitted electronically at this stage but this is now underway.[10]

The technical architecture in use by *Fountain* during the study period was a traditional client/server set-up. The client was written in Delphi for Microsoft Windows™ that communicated to a NetWare server running the *Fountain* server module (C++); this uses NetWare Btrieve for its database.

System security was provided by usernames and passwords allocated by the system administrator in each practice. The log-in process also checked the location of the user, ensuring practices could only view results relevant to their practice. This includes reports of hospital-based as well as primary care requests on patients registered with a practice. Users are able to view all results for their patients from 1996.

This paper describes the use made of *Fountain* during the first 18 months of its use by practices.

Method

The *Fountain* server records certain information each time a user logs into *Fountain*: recording who logs in, where they log in from, which patients are being viewed, which reports are being viewed, and the date and time of all transactions. Our analysis uses the total numbers of hits on *Fountain* by the users.

We observed the pattern of access to the system by each practice using these monthly hits totals. We standardised for differences in population size by calculating the number of attempts at accessing results per 1000 of the practice population. Practice population data were obtained from Tayside Health Board. They were unable to provide data for the exact mid-point of the assessment time but for a time point six months into the 18-month period. Very new users, that is, practices that had been using the system for five months or less, were excluded. Data were only used from whole calendar months – any part-month's use was excluded. Data from branch surgeries were combined with the main surgery.

Results

There were initially 59 practices with data. Six practices were excluded from the analysis as they had been using the system for five months or less.

The length of time that the system had been in use varied from six months to 28 months.

The number of times that the database was accessed in the first month varied from 0.4 hits per 1000 population to 160.3 hits per 1000 population, with the average being 34.8 hits per 1000 population. This range is demonstrated in Figure 1.

The average pattern of use over the observation period can be seen in Figure 2. This averaged at 32 hits per 1000 population per month by the 16th month after beginning to use the service, with a range of 52.3–90.8 hits per 1000 population per month.

Because of the large spread of use of the system, the figures were recalculated only with those 13 practices using the system for 18 months or longer. This showed a similar pattern of use to the all-practices group.

A comparison of three users with high, medium or low initial use was performed where high use was the practice that used the system most in the first month (160 hits per 1000 population), low use was the practice that used it least in the first month (0.4 hits per 1000 population), and medium use was the practice closest to the mid-point of these two practices. This can be seen in Figure 3, which demonstrates a similar pattern of initial high use for two months falling to a similar sustained level, and a low level gradually rising for the practice with the lowest initial use. This serves to illustrate that despite initial differences in usage patterns, all practices continued to use *Fountain*, which would indicate that they found it useful.

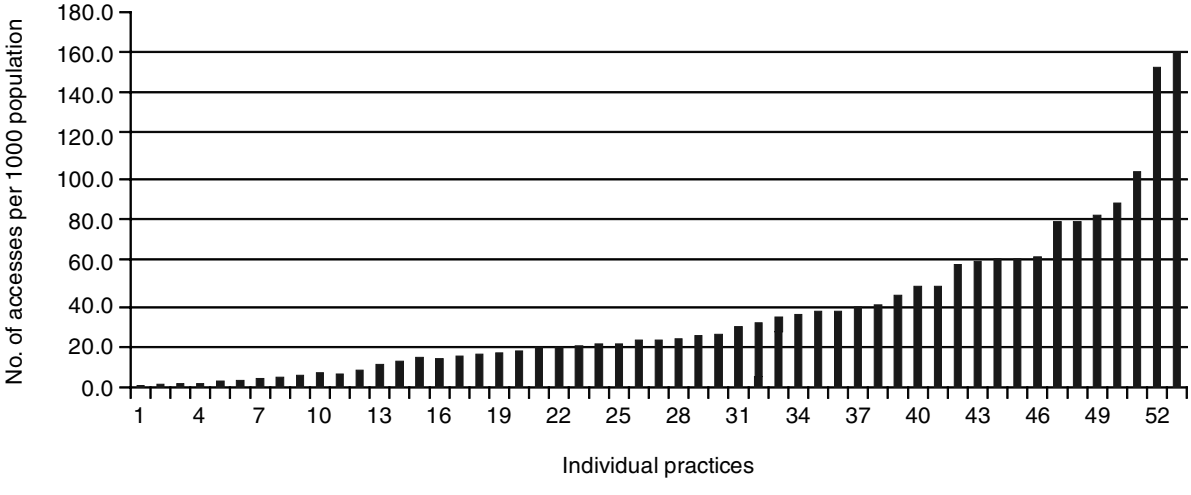

Figure 1 Range of use in month 1 between practices

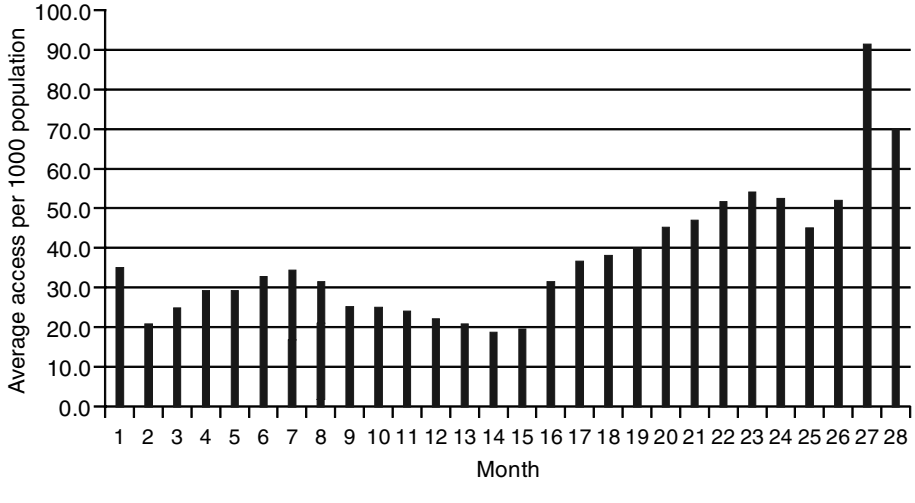

Figure 2 Average pattern of use over 28 months (all practices)

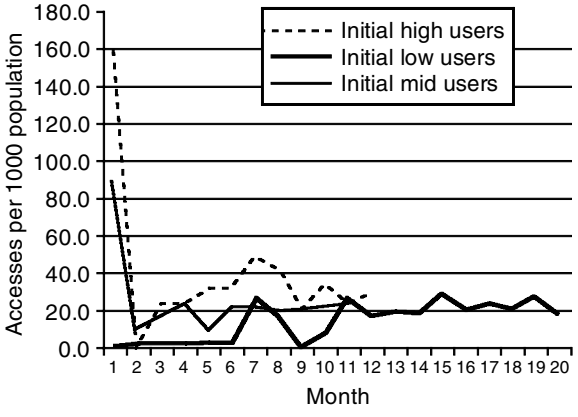

Figure 3 Comparison of use by initial use pattern

Discussion

We have carried out a simple analysis of the number of times a practice logged on to the service. This analysis gave no indication of what the access was wanted for, whether the users' objectives were achieved, or whether it was useful. All we are therefore able to do is to describe what happened; however, despite these limitations there are a number of useful and informative conclusions that can be drawn from these data.

Although we are unable to know what information was gained by the visit to the service, we can assume that the continued use of the service implies that those using it found it useful. The pattern of use we have shown is similar to other new technologies after introduction,[9] and hence implies that this computerised system is as acceptable to users as other technologies.[11] Much has been written about the reluctance of doctors to use new technologies and about how much training may be needed to ensure their IT skills are sufficient to use the new technologies.[12] In this instance, there has been no structured training programme in the region over the time period studied, and yet the continued use demonstrated implies that the personnel in primary care are able to use the system effectively.

It may be that the high initial users were in fact those who had difficulties in using the system at the start; however, we have shown that their use after 12 months is similar to other practices. In fact, the degree of variation after 12 months is very slight and indicates a consistent need for, and usefulness of, rapid access to laboratory reports in primary care. However, the initial variation in use is very great and may be due not only to differences in skills and enthusiasm but also to different work practices. Early installations in some practices were designed with a single workstation, perhaps in the reception area. Additional points of access, for instance in every consulting room, were added later. This has obvious implications for the use of the system. The large range of variation in use with time in the first few months cannot be accounted for by seasonal variation as the practices all started in different months.

Practices continue to receive the paper-based reports and this electronic access is in addition to those paper records. It is therefore likely that *Fountain* mostly provides access to urgent reports and those where results have been misfiled. Clinicians usually wish to know laboratory results when a decision has to be taken, often when a patient is being seen during a consultation. If the paper record were complete and up to date, electronic results would be less important. Moves to paperless records and patient access to results will mean that this is likely to change.[13] However, until electronic records are available, immediate results can be obtained from laboratories over the phone. Unfortunately, local laboratories in Tayside do not keep a record of the number of phone calls from primary care requesting results, so we are unable to say whether this disruption has been reduced since the introduction of *Fountain*.

Although we are left with questions regarding what the service is used for and by whom, this study demonstrates that a new electronic means of accessing laboratory reports quickly is used by all practices after introduction. We could also say that, despite having minimal training, the use across all practices becomes very similar and that it is therefore useful, easy and needed.

Conclusions

Fountain and other commercial systems are being developed to offer services such as electronic referrals and discharge summaries. It is therefore essential to ensure that the uptake and use of these systems is monitored and evaluated fully to ensure that they are being used by the doctors and primary care staff to their full advantage, and are being designed to meet real clinical needs with a view to improving patient care and outcomes.[14–16]

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CONFLICTS OF INTEREST

None.

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