

GP Gateway Evaluation

"Evaluation is not just for accountability, but for development and knowledge building in order to improve our understanding of the role of information technology in health care and our ability to deliver high quality systems that offer a wide range of clinical and economic benefits." ⁴

Background

The information available to general practitioners concerning the public hospital occasions of service for their clients, is often carried by the client and delivered to the GP at the time of the client's consultation. Other correspondence from the hospital to the GP may be delivered in a variety of formats such as post, telephone, facsimile, e-mail and website, in a format particular to the health professionals or agents concerned. Often the GP will contact the hospital requesting information about inpatient investigations and the hospital will respond with a facsimile of the details. The process takes time and involves many hospital and practice staff to service the request. The IAHS document management system requires the client's record to be stored at the hospital from where the client was discharged. This means there is the potential for the client to have a record at each hospital in the IAHS region.

The GP Gateway project proposed to provide GPs with a single point of reference to client information in a format that was appropriate to every day use by GPs. The objectives of the project included,

- a process of systems analysis and design that would permit GPs to interface directly with hospital data and
- an interface based on web-technology that would enable GPs to access hospital information on clients in their care, with sufficient speed as to make its use feasible in short client consultations.

The project is set out in more detail in the final project report.

GP computerisation in the Illawarra was boosted by the Care Net Coordinated Care Trial that was conducted between 1997-1999. 98 GPs participated, which represented 46% of local GPs at the time of the trial. GPs who became computerised through the Care Net trial have continued with computerisation and other GP associates and partners have computerised over the ensuing 2 years.

Illawarra GPs were in an ideal position in 2000/2001 to take advantage of developments in the use of web-based technologies in GP-hospital communications.

In May 2001, at least 86% of more than 5200 practices nationally, had registered with the Practice Incentive Program (PIP) as having the capacity for transfer of data⁶. Using PIP participation rates⁶, up to 62 Illawarra practices may have had the potential to participate in the project, or more than 50% of practices.

One of the goals of the project was to facilitate at least 50 Illawarra GPs to access the GP Gateway website. From the available statistics^{6,7}, it would appear that the expected participation rates could be achieved using the facilities already available in the computerised GPs surgeries.

The Illawarra region extends from Helensburgh in the north to Gerringong in the south and west to the natural boundary of the escarpment. A wide area network links Illawarra GPs to the Illawarra Area Health Service (IAHS) network within the local telephone region of Wollongong. Since July 1999, the IDGP has provided support to GPs in the use of electronic communications. During 1999/2000, the IDGP conducted computer training sessions for 40 member GPs and practice staff in the use of e-mail and internet browsing. Over this time, 100 GPs applied for an e-mail account with the IAHS and GPs now receive daily DocMail messages (electronic notification of client admission, discharge and booking status at any of the public hospitals in the IAHS).

The IDGP annual GP survey conducted in November 2000, showed that 29 GPs (26% of respondents) were likely to computerise or upgrade their computer systems during 2001 with a further 20% unsure. A survey of computer training requirements in June 2001, indicated that 54% of the 48 respondents were interested in training in the use of e-mail and the operation of computer networks. At the same time, 41 GPs applied to the Health Insurance Commission (HIC) for their digital certificates.

It is evident that Illawarra GPs have shown commitment to the uptake of technology.

Literary Search

Current published literature typically introduces information system evaluation from the point of view of:

- the quality of the system and the information,
- usability,
- user satisfaction with the finished product and
- some measure of impact or benefit to the users².

Each of these measures are relevant to this study and are discussed in more detail below.

Intranet environment

The GP Gateway website was published on the intranet of the Illawarra Area Health Service. For situations where the service is provided using an *intranet* environment, the common internet evaluation techniques are of minimal value. The most suitable method to evaluate the GP Gateway website is described by Li², who indicates that success factors can be shown by the "involvement of top management, the integration of systems and the realisation of user requirements".

Quality of a unique website

The website is unique in its design and character due to the innovative nature of the project. No benchmark was found to compare the quality of the website so the philosophy of Rice⁵ has been used. The measures of success of technology will be assessed in its "value and viability" and its "thorough testing at beta and pilot stages".

Design of a health-related website

GP Gateway website focuses on providing GPs with access to patient information. Assessments of other health-related sites³ on the internet show a similar focus on content rather than on the graphical design of the website. For the purpose of this evaluation, the "timeliness, accuracy and availability of information"² will be used as design measures to show the successful implementation of the website.

The design of the website will be considered from the perspective of usability. The information on the webpage should be legible to the viewer and logical in the order of progression through the webpages. The website will not be evaluated for its visual stimulation to the user nor its artistry.

The following evaluation focuses on the development and implementation of the website including the development lifecycle, stakeholder participation, types of use, user acceptance, productivity gains and effectiveness of delivery.

Methodology

Working Groups

GPs who were members of the IDGP formed the working party for the duration of the project. The working party was established through voluntary participation. An e-mail was distributed to 98 GPs, asking for volunteers to join the project. Articles, asking for participants, were included in the *GP News* (the IDGP monthly GP newsletter) for the first 9 months of the project. The intention was to formulate a group of GPs with an interest in information management and communications and not to preselect a representative sample of GPs for the working party.

Dissemination

All occasions used to promote the project were recorded including presentations, internet publications, IDGP IT Expo, newsletter articles, e-mail correspondence, magazine articles and stakeholder and GP meetings.

Website Development

A preliminary investigation was undertaken to find the available sources of client information recorded electronically at the IAHS. The starting point was the register of hospital data sources compiled as part of the Year 2000 disaster recovery plan at IAHS. Meetings were held with each of the major hospital departments. Discussions included the data recording and distribution processes and the requirements for information to be made available electronically to health providers working outside the IAHS. The results of the meetings and issues raised were documented.

An internet search was conducted to locate websites and projects with comparable outcomes to the scope of the project. Contact was made with three reference sites to discuss the developments that were in progress and the projects that had been completed that related to web technology for GP-hospital communications of health-related information. Feedback from the reference sites was documented.

The GP Working Party discussed the information exchange processes between hospitals and general practice and compiled a priority list of client information that would be required following a client's hospital care. The list became the client information goal for the GP Gateway website for the duration of the project.

Utilisation

Utilisation of the website was recorded using software authentication logs and audit trails available as part of the web software packages.

Training

All GPs with access to the IAHS intranet were offered the opportunity to train in the use of the website. A log was maintained of GPs participating in training and GPs who received the website training manual.

User Acceptance

The overall satisfaction with the product and the usability features were tested using a retrospective survey and observation of the GP working party and IDGP members using the website.

The GP Working Party provided advice on the design of the website. As the website was being developed, the GPs in the working party were surveyed on the usability aspects of the design. A record was maintained of the various stages of development including suggestions for improvements to the design of the webpages and the navigation of the website.

Development Lifecycle

Progress of the project was closely monitored and tracked against the milestones and deliverables. Interim progress reports were prepared and published and the status of the project was disseminated through live presentations and other media.

Stakeholder Participation

A diary was maintained of issues raised by the community, stakeholders, support agencies and others in relation to the display and communication of electronic health information. Meetings with project sponsors and related IM/IT committees were minuted and meetings with project stakeholders and contributors were documented.

Issues papers were prepared and presented to the IAHS Executive and NSW Health Privacy Representative. The papers were in response to uncertainties in the interpretation of the Privacy Act and the draft amendments that were being formulated during 2001. The pathways for resolution of issues were explored and solutions offered.

Results

Working Groups

The GP Working Party was established within three weeks of the start of the project. The aim was to involve 10 GPs in the development of the website. 6 GPs responded by e-mail within 2 days of the initial e-mail invitation and within a week a further 3 GPs had telephoned their request to join the project. During the course of the project, no other GPs offered to participate. The participation rate was 90%. There was no impact to the project by having fewer GP participants than expected.

A steering committee was required to oversee the progress of the project. The committee established for the implementation of the DocMail project during 1999/2000, agreed to become the steering committee for the GP Gateway project. Two additional members were invited to attend: the IAHS privacy representative and the Shoalhaven Division of General Practice. The IT Projects committee, as it came to be known, later became a sub-committee of the IAHS IT Clinical Committee. The IT Projects committee was able to provide the necessary leadership because of the experience in overseeing IT projects in the Illawarra and the alignment with the move to greater computerisation of GP-hospital communications. The steering committee was able to assist with all managerial implementation issues associated with the project and was an asset to the project.

Dissemination

Progress of the project was disseminated to a wide audience through:

- 10 newsletter articles in the GP News (the IDGP monthly newsletter) from September 2000 - August 2001,
- one major article in ANSWD Reverb magazine in December 2000,
- 1 article in the IAHS Information Services Newsletter in December 2000,
- a comment by the IDGP Board Chair in the *Docmail links GPs to hospitals* article in Australian Doctor 11 May 2001,
- presentations at the Electronic Health Records 2001 Conference and the RACGP 11th Computer Conference,
- e-mail to the GP Working Party, IDGP members and stakeholders,
- a demonstration of the system published to the IDGP internet website, www.idgp.org.au.
- presentations to 16 hospital departments and the Area Health Service executives, Illawarra Business Chamber, IDGP Consumer Consultative Committee, Minister and Director General of NSW Health, IDGP staff.

The magazine and newsletter articles led to three inquiries, all from NSW Division staff. The topics raised included,

- the steps taken to improve GP-Community Health communications,
- suitability of the system to be implemented by another Division,
- the conceptual design of the webpages for GP access to hospital-based information.

In response to the presentations, seven IAHS departments are working on proformas and procedures for electronic recording of clinical documents to integration of the documents onto the intranet. One local private hospital is interested in pursuing a similar framework for their GP communications.

Promotion of the website through presentations was extremely effective in raising awareness of the possibilities for productivity gains in health care delivery through access to electronic patient records.

Website Development

The GP Gateway website was setup to provide GPs with information about their clients *inpatient* services. The list of information about client interventions requested by the GP working party is given below. The list was used as a reference during the development phases of the project. From the list below, 30% of the requested information has been made available on the GP Gateway website. This figure was less than the 50% anticipated at the start of the project.

Of the information currently available, radiology reports and the GP's inpatient list were cited as the most important features of the website.

Priority	Information requested by GPs	Information available in August 2001
1	List of discharge medications and medication plan including the drugs prescribed and dispensed by the hospital and the drugs brought to the hospital by the client.	<i>Not achieved.</i> The medication list is available in a paper-based record. The list would need to be scanned, the electronic document forwarded to a hospital attending medical officer for checking then forwarded to the client's nominated GP. The software utilised by the hospital pharmacy does not record the medications dispensed at the ward level.
2	Discharge diagnosis	<i>Partly achieved.</i> GPs requested that the discharge diagnosis be available within 5 days of discharge. The newly discharged client will most often visit their GP within 5 days to review their discharge medications. The coding of discharge is actioned up to 4 weeks after the client's discharge. The discharge diagnosis would not be available in the timeframe required by the GP. The discharge referral includes the discharge diagnosis and is available 2-6 weeks after discharge.
3	Pathology test results	<i>Partly achieved.</i> Pathology results were available to GPs up to 24 February 2001. The computer system changed and the results were unavailable from the new system. A

		contract is outstanding with the software vendor to include functionality for GP real time access to test results. It is hoped that by 4 th quarter 2001, GP access will be realised.
4	Imaging reports	<i>Achieved.</i> Reports for radiology and nuclear medicine are available within 24 hours of the final report being prepared. GPs will often consult with the client within 36 hours of the results being available.
5	History of previous interventions	<i>Achieved.</i> A list of previous hospital inpatient services is available where the client has nominated the GP and granted consent at the time of admission.
6	Surgery performed, surgeon, final diagnosis, complications and results	<i>Partly achieved.</i> A list of previous surgical interventions is available with details of the surgeon/s, anaesthetist and pathology samples sent for testing. Final diagnosis and complications are recorded in a paper-based surgical record.
7	Results of outpatient services ie diabetes, oncology, physiotherapy, renal, rehabilitation, respiratory	<i>Partly achieved.</i> Bookings for oncology and antenatal services are available. Changes to document management processes are underway that will facilitate consultation letters and bookings for all departments to be available during the 4 th quarter 2001.
8	Surgery waiting times	GPs have been directed to the NSW Health website that provides information on surgery waiting times throughout NSW.
9	Pathology results from all local pathology service providers	<i>Not achieved.</i> The protocols are not yet in place to provide seamless access to client information for hospitals, GPs and pathology companies.

The development progressed in stages and tended to follow the three stages as suggested by Murray³.

1. *"The content was moved from the old medium to the new while still resembling the old media it was replacing"*. This was particularly evident in the imaging and nuclear medicine reports and the discharge summaries where each electronic document resembled the paper-based reports.

2. *"People start to exploit the unique features of the new technology where marked improvement and innovation occurs"*. The introduction of web-based referral forms and implicit e-mail communications identified this stage. GPs were able to complete on-line referral forms for Community Health and the Emergency Department and e-mail the referrals to the respective health service providers.
3. *"New directions and uses grow out of the technology"*. A prototype has been developed for the GP to acknowledge client consent electronically at the time of consultation. The GP would then be able to proceed to view the patient's health information on the website. The developments could be directly attributed to the understanding of the new environment.

After three months of investigation, it became apparent from GPs feedback at working party meetings and comments from other local GPs that it was information about *outpatient* services in Emergency Departments that needed to be available in a timely manner to GPs in the surgery. A common occurrence is when the client visits the emergency department for a problem on a weekend. The hospital doctor requests the client to visit their GP at the start of the following week for a review. The GP consults with the client who has not brought the hospital referral letter with them and the GP has to request the hospital to forward the client's relevant test results. A more expedient process would have been to use the website as the source of the required information.

Assessment of the emergency department computer system showed it to be a proprietary product that could not be interfaced directly to the web using common commercially available interface tools. It was decided not to proceed with a contract for the necessary enhancements because there was a high risk associated with the delivery of the enhancements during the timeframe of the project. This was unfortunate because the Wollongong Emergency Department indicated that approximately 66% of the 40,000 patient services per year *did not* result in the patient becoming an inpatient.

With the planned enhancements to the website in the 4th quarter 2001, including the introduction of real time pathology results and access to data for outpatient consultations, the website will reach an acceptable level of availability of patient information.

Utilisation

The log of use of the website showed the utilisation to be at an average of 8 GPs per working week, viewing at least one client information webpage.

As a means of understanding the relevance of the usage rate, consider that on any one day, Illawarra GPs typically have between 0-10 inpatients at IAHS hospitals. The majority of GPs have less than 500 clients who have been in hospital and granted consent to their GP having access to their hospital information over the last 3 years. For a GP with 10,000 client records in their surgery, this represents less than 5% of their client base. It is feasible to expect that for a GP who sees 40 patients per day, there

would possibly be 0-2 of those patients who would have had a recent hospital stay with hospital records accessible to their GP.

A more appropriate discussion is the provision of client information to the GP at the time it is required³. A radiology report may be required by the GP during the client consultation. The website has the capacity to provide access to this information within 24 hours of the report being finalised by the radiologist. This timeframe is suitable to GPs who most often see the patient within 1-5 days of the patient's hospital intervention.

To date, the utilisation of the website by GPs can be grouped into four typical scenarios. A brief explanation of each scenario is given below.

1. DocMail received

The GP receives a DocMail message by e-mail indicating that a client has delivered a baby in the last 24 hours. On the bottom of the e-mail is a link to the GP Gateway website where the GP is able to view information about the surgery and the birth of the baby. The GP considers the website is a useful source of information about the status of their client.

2. Inpatient List

The GP accesses the GP Gateway website from an icon on the IDGP intranet homepage. A link to the GP's inpatient list exists on the GP Gateway homepage. The GP is able to see that the client referred to the hospital late yesterday has been admitted and another client has been transferred between local hospitals for their post-surgery rehabilitation. The GP considers the website valuable for keeping "up-to-date" with the condition of their clients.

3. Client in a consultation

A client is in the surgery and the GP wants to view the client's latest radiology report before deciding if a follow up x-ray is required. The GP proceeds to the website, enters the client's hospital medical record number and proceeds to view the investigation results for the client. The GP considers the website useful as a reference for past investigation results.

4. Referring a client to hospital services

A client is in need of an ultrasound and the GP wants to refer the client to the local hospital to conduct the test. The GP proceeds to the website, enters the client's hospital medical record number and proceeds to complete an Emergency Department (ED) referral form. The form is sent by e-mail to the ED who retrieve the client's file ready for the arrival of the client. The GP considers the website useful as an expedient way of sending the appropriate information about the client's condition to the ED.

Investigation of hospital data indicated that approximately 40% of inpatients nominated a GP and granted consent at the time of admission. Suggestion has been made that a signed patient consent form, and brochures and posters, providing information to patients about informed consent, may improve the rate of patient consent. Without the patient's consent, the patient's nominated GP does not have access to the patient's

hospital records. From analysis of hospital data, the GPs lack of access to patient information is often because:

- the GP's name is not recorded,
- the GP's name is not recorded correctly,
- the patient may have nominated a medical practice instead of their GP,
- the patient may not have granted consent,
- the patient's consent may not have been recorded.

Training programs have been provided to data entry staff at hospital admissions departments on the correct recording procedure for GP and consent. With the high turn over of data entry staff, the training programs did not keep pace with staff changes. The GPs were consulted about providing their patient with their name, such as on a business card, but there was no agreed plan of action. Suggestion was made that if signed patient consent was introduced at the point of hospital admission, that GPs would be able to assist the patient to complete the authorisation form. This step would help with the correct identification of the patient's GP.

Training

Most GP users declined the offer of training. The GP working party considered that a large proportion of local GPs would already be familiar with web browsing techniques suitable for use on the GP Gateway website. The GP working party recommended that a website *User Guide* be developed for GPs, with one-to-one training available for GPs who required skills in web browsing. 5 user guides were distributed and 3 GPs requested web browser training.

At the IT Expo in June 2001, 15 GPs took the opportunity to browse the website. In all cases, the GPs who had no prior experience with using the website, but had previous experience with web browsing, were able to navigate around the website within 10 minutes. The first webpage activated by all GPs was the inpatient list followed by the investigation results for each of the patients on the inpatient list.

User Acceptance

The user survey, completed by the GP Working Party at the August 2001 meeting, showed that all GPs considered that they would make use of the website in the future.

GPs used the website at varying times of day. Most indicated that they did not use the website during a consultation and all used the website before the start of the session.

All GPs considered that there was sufficient training in the use of the website. Between 5 mins and 1 hour of practice was needed to become familiar with using the website.

The most frequently accessed feature of the website was the inpatient list and referrals were the least frequently used. Clinical information including radiology, pathology, surgery and history were accessed most of the time. The GPs indicated that the website was relevant for 5 - 15 consultations per week.

Most GPs indicated that on the last visit to the website they did not find the information that they required. Specific examples were given:

"Pathology and Xrays on some patients" were not available.

"A patient in coronary care for the past 7 days - zero information"

"A patient with broken neck of femur 5 days ? surgery yet - no information"

"A patient admitted with acute abdo last week and sent home without a letter - no data"

Factors that would assist GPs to make greater use of the system included "the hospital end putting in data" and "faster access from the surgery".

Final comments from the participating GPs showed that there was support for continuing the implementation of the website. "Important to continue gateway development and expand the concept", "This is the end of the beginning" and "GP Gateway development must continue" were disclosed in the GPs meeting reports.

Development Lifecycle

Overall, the GPs in the working party felt that they had enough opportunity to participate in the developments of the project. The website progressed through four stages of development. At each stage, GPs indicated that the website was intuitive to use and was suited to the workflow of a patient consultation. Suggested improvements to the website were focused on:

- navigational aides to reduce time to find information
- alerts for deceased patients and casualty admissions
- investigation results for all interventions
- notification of the timeliness of information being presented
- referral forms for allied health, antenatal shared care and emergency department
- generic discharge referral for use by all departments in the hospital

At the completion of each stage of development, the information presented on the website was thoroughly tested to ensure data integrity. The website was always presented to the data custodians prior to it being available to GPs. Any issues relating to the quality of the data on the website were forwarded to the respective data custodians for resolution prior to the website being published for use by GPs. In all cases, the information on the published website was presented with data integrity.

Stakeholder Participation

Of the 16 IAHS departments who participated in the project, information from 50% of the departments was published on the website. The remaining 50% are working on some or all of the following issues prior to publication:

- implementation of policies and procedures for documented patient consent,
- procedures, resources and work practice changes for recording and receiving clinical information electronically,

- implementation of new computer systems and
- recording of unique GP identifiers.

For departments with data already accessible electronically, the turnaround time for the publication of data on the GP Gateway website was at least three months for each department. For departments developing referral forms and setting up procedures to receive e-mail referrals from GPs, the timeframe was six to nine months. In light of the long lead times for publication of data on the website, a period of 18 months would have been a more appropriate timeframe for the project.

The level of change management required was, and continues to be, extensive. For many hospital departments, this is the first time that a review had been conducted of the electronic data being recorded in their department. Initially, the response from data custodians was guarded. Issues such as the protection of the privacy of client information and the limited data quality control processes were cited as reasons for non-participation. Following the presentation of the demonstration website and meetings with each of the departments, participation in the project was forthcoming from each department.

Conclusion

The project was a successful implementation of a web-based portal for GPs to access hospital-based patient information from their surgery. The project had the support and participation of GPs, IDGP management, IAHS executive, hospital department staff and NSW Health.

The website was easy for GPs to use and provided patient health information in a timeframe suitable for use in daily general practice situations.

Currently 30% of patient information requested by GPs is available on the website. GPs have suggested that with further development, the website has the potential to be an efficient and effective way of communicating patient information required for ongoing patient care.

The project provided the opportunity to develop the concept of the electronic patient record, establish data linkages between GPs and hospitals and resolve issues surrounding patient privacy and consent.

The timeframe of 12 months for completion of the project was ambitious. An 18 month timeframe would have been more appropriate.

Similar projects would be recommended in any region where GP-hospital communications have been established and where there is a moderate level of GP computer literacy.

¹ Symons, V. and Walsham, G. **The Evaluation of Information Systems: A Critique** *Journal of Applied Systems Analysis Volume 15 1988 pp119-130*

² Li, E.Y. **Perceived importance of information system success factors: A meta analysis of group differences** *Information & Management 32 (1997) 15-28*

³ Murray, P. and Rizzolo, M.A. **Reviewing and evaluating Web site - some suggested guidelines** *Nursing Online Standard Volume 11 Number 45/1997*

⁴ Heathfield, H., Pitty, D., Hanka, R. **Evaluating information technology in health care: barriers and challenges** *BMJ Volume 316 27 June 1998*

⁵ Rice, M.T. **Finding out What Works: Learning from Evaluations of Information Technologies in Teaching and Learning** *Ascilite '97 conference paper*

⁶ HIC Statistics on Practice Participation November 2000 - May 2001

<http://www.hic.gov.au/CA2568D90003F3AF/page/PIP-Statistics-Participation?OpenDocument&1=45-PIP~&2=53-Statistics~&3=15-Participation~>

⁷ Australian Childhood Immunisation Register (ACIR) May 2001