

International exchange

Electronic patient records: achieving best practice in information transfer between hospital and community providers – an integration success story

Caroline Nicholson MBA GAICD Grad Dip Physiotherapy
Manager

Claire Jackson MBBS MPH CertHEcon Grad Cert Management FRACGP
Associate Professor in General Practice and Director

Mater Centre for Integrated Health Care and General Practice, South Brisbane, Australia

Margaret Tweeddale Dip Physiotherapy
Manager, Domiciliary Allied Health Acute Care and Rehabilitation Team, Mater Adult Hospital, Brisbane, Australia

Dimity Holliday BPhty
Clinical Informatics Manager, Health Information Management Service, Mater Misericordiae Health Services Brisbane Ltd, Brisbane, Australia

‘Once upon a time there was a tertiary teaching hospital which believed it could do much better by including its community in providing continuity of patient care.’

ABSTRACT

Effective healthcare integration is underpinned by clinical information transfer that is timely, legible and relevant. The aim of this study was to describe and evaluate a method for best practice information exchange. This was achieved based on the generic Mater integration methodology. Using this model the Mater Health Services have increased effective community fax discharge from 34% in 1999 to 86% in 2002. These results were predicated on applied information technology excellence involving the development of the Mater Electronic Health Referral Summary and effective change management methodology, which included addressing issues around patient consent, engaging clinicians, provision of timely and appropriate

education and training, executive leadership and commitment and adequate resourcing. The challenge in achieving best practice information transfer is not solely in the technology but also in implementing the change process and engaging clinicians. General practitioners valued the intervention highly. Hospital and community providers now have an inexpensive, effective product for critical information exchange in a timely and relevant manner, enhancing the quality and safety of patient care.

Keywords: clinical information, healthcare integration, information transfer

Background

In 1995, the Quality in Australian Health Care Study (QAHCS) created consternation in Australia by identifying adverse outcomes in 16% of hospital admissions to 28 public and private hospitals in New South Wales and South Australia.¹ Three years later, the National Expert Advisory Group on Safety and Quality in Australian Health Care recommended important changes in the approach to quality and safety in acute healthcare in Australia. This included better managed transitions between health services, the development of clinical and administrative information systems with an all-of-system focus, and high-quality data exchange.

In response to these issues, the Mater Health Services in South Brisbane, Queensland, committed time, resources and expertise to improve hospital/community information exchange as a strategic priority. Their aim was the timely transfer of relevant and legible patient discharge information between hospital and all relevant community providers, predicated on patient consent. This approach was underpinned by enhanced communication generally with community health providers, a focus on building a culture of shared teamwork between the hospital and community, and a commitment to better care planning and care co-ordination upon hospital discharge. The key outcomes sought were improved patient safety and quality of care.

Mater integration methodology 1994–1998

In 1994, the Mater Hospital funded two key community linkage services on site. The Domiciliary Allied Health Acute Care and Rehabilitation Team (DAART) provided timely, high-quality, allied health interventions for patients at pre-admission to and post-discharge from hospital. Much work was undertaken around the collaborative development of tools which informed hospital and community clinicians of the patients' health status at the point of transfer and identified tasks completed and ongoing care needs. The Mater Centre for Integrated Health Care and General Practice (the Centre), an academic primary care centre, was established to research, develop and train around improved models for better integrated care between hospital and community providers. The Centre undertook qualitative research around the interaction between hospital and community health professionals and administrators. This revealed two systems with markedly different cultures, minimal interaction, and little appreciation of

the impact of their lack of alignment on the potential quality and safety of patient care. Issues around privacy and confidentiality, lack of time and resources, and non-inclusion in their roles were barriers to better information transfer between hospital and community and most commonly voiced by hospital providers.²

Following this report, senior hospital clinicians and administrators took a leadership role in establishing improved relations with key community health professionals. Via the Centre they convened regular strategic planning meetings and a number of workgroups to explore issues and barriers, and identify improved approaches to continuity of care between hospital and community. These included working parties involving integrated palliative, diabetes, antenatal and postnatal care; integrated continuing professional development; a patient linkage database; and a General Practice Referral/Discharge Working Party. The aims and outcomes of this working party are shown (see Figure 1) and involved input from local general practitioners (GPs), each of the Mater Hospital's clinician groups, discharge planners and representatives from other hospitals in the area.

Study method

In 1998, the Centre, DAART, and Mater Care Management Unit described a generic model for improved integration of care between hospital and community providers. This approach focused on the '3Cs' – 'communication and access', 'cultural change and team work', and 'commitment and incentives to integrate'.⁴ This model was based on the approach successfully applied to the hospital's maternity, neonatal and diabetes community share care programmes. Based on this model, and an opportunity via the National Demonstration Hospitals Programme Phase 3 (NDHP3), the Mater Adult Hospital (MAH), began work on an electronic community discharge notification. A clinical chart audit in November/December 1999 of all discharges over six random work days ($n = 500$) had demonstrated that despite the work undertaken, the proportion of best-practice discharge notification – faxed legible community discharge summary within 24 hours – was 34%. In recognising timely legible information transfer as a key component of quality healthcare, the development of an electronic tool to facilitate this – the Mater Electronic Health Referral Summary (MEHRS) – was commenced.

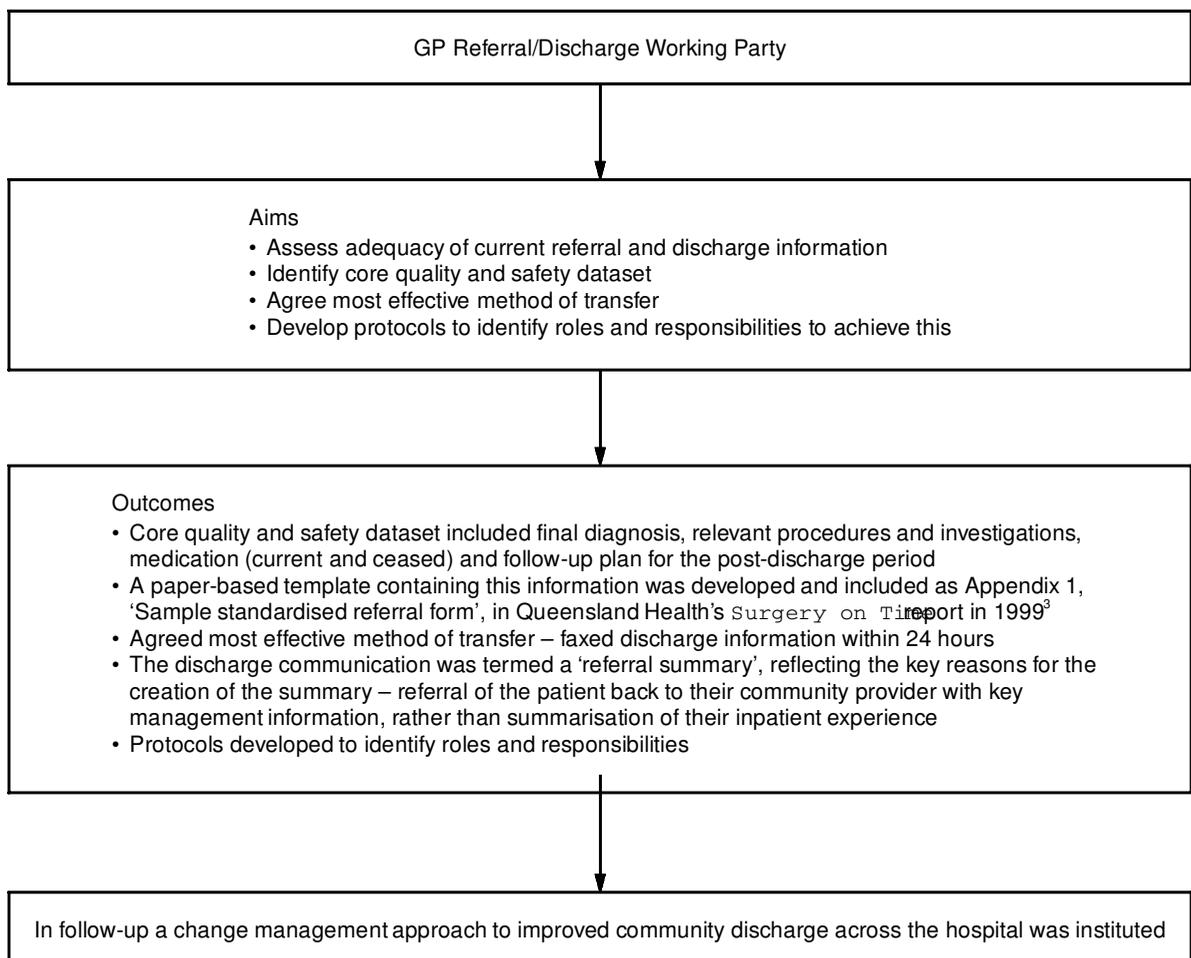


Figure 1 Aims and outcomes of the GP Referral/Discharge Working Party

Technological development of the MEHRS

The model was developed in two phases. First came the development of the Mater Episode of Care Tracking System (MECTS) in Microsoft Access. This was a hospital/community summary of the episode of care for patients on the two NDHP3 clinical service enhancement trials. This system helped ascertain what clinical discharge information required collection during the episode of care. This was a significant step in determining the data and process necessary for transferring information on patient discharge.

The second phase was the development of the MEHRS designed in Microsoft Access, with a web-enabled front end written in active server pages (asp). The database structure takes full advantage of relational database theory using generic SQL [structured query language] statements. The base system comprises the MEHRS software together with the interfaces that allow access to existing hospital repositories, including legacy systems, using open

database connectivity (ODBC) connections or health level-7 (HL-7) messages. The MEHRS has been integrated with the hospital's Patient Master Index (PMI) pharmacy database (Merlin), the allied health database (TIM) and community services provider database. Clinicians are able to easily access essential clinical information, much of which has been pre-collected and exists on isolated databases within the hospital, and combine it as a discharge summary. The MEHRS was designed in collaboration with medical, allied health and nursing clinicians, information systems and admission staff, pharmacy and discharge planners.

The Mater developed a web-based front end for Queensland's state-wide GP contact database which allowed interfacing with the MEHRS and the hospital's PMI. This allowed admission staff to access to up-to-date, reliable and accurate GP contact information. The 'Doctor register' is available on the Mater hospital intranet and is operational across the campus.

The MEHRS allows hospital clinical staff to electronically generate a typed hospital referral/

episode summary and fax it from any networked desktop on campus using simple mail transfer protocol (SMTP)-based faxing infrastructure and MSFax. The summaries generally take seven to ten minutes to complete and up to 20 minutes for complex needs patients. The summary does not need to be completed in one sitting and has become a discharge-planning tool. Clinicians edit the summary throughout the episode, finalising it on the day of discharge and faxing it direct from the closure screen. The GPs and community providers receive the typed hospital summary 24 hours after discharge, representing information from medical, nursing and allied health members of staff. The discharge summary fax is unable to be generated if the patient consent affirmation data has not been entered.

The MEHRS pilot on the medical wards commenced in October 2000, has been operational at the Mater Hospitals since January 2001 and has been expanded to become a normal part of clinical care across the Mater Adult and Children's Hospitals over the past 18 months.

The MEHRS provides a mechanism to accurately measure 'process of care' performance indicators allowing the Mater Health Services to quantify the proportion of hospital separations where a timely, legible and relevant discharge summary was generated and faxed.

Change management methodology

Success factors in achieving a changed approach to information transfer that should be considered are discussed.

Patient consent

Comments around patient consent to the process emerged as an initial key barrier to information transfer with hospital staff. Since 2001, all patients presenting to the Mater hospitals are asked on admission whether they consent to the sharing of clinical information with their community providers and this is documented on the admission sheet. In the calendar year 2002, 99% of all patients presenting to Mater Adult, Mothers' and Children's Hospitals, Brisbane, consented to the sharing of their health information ($n = 7467$). Consent has to be agreed to and checked on the MEHRS to allow the discharge referral to be faxed from the system.

Clinical champions

The challenge faced in creating, implementing and sustaining new ways of doing business, lies not solely in developing the technology, but also in engaging clinicians within the organisation in adopting and embracing cultural change. Whilst an effective

information transfer tool had been developed, it still relied on hospital clinicians to accept and utilise it. A number of senior clinical champions – medical, allied health and nursing – from hospital and community settings were instrumental in highlighting with their staff the importance of improved hospital/community information transfer to improving the quality of patient care and actively supporting the uptake of the electronic discharge summary as normal practice. Such active involvement and support from key clinicians has been vital to the successful implementation and maintenance of the system.

Training

Most importantly, training protocols and strategies were developed and implemented as part of the normal orientation of all staff. Training in the pilot phase was for clinical medical ward staff only on a one-on-one basis. From November 2001, dedicated slots in annual intern training/orientation and the graduate nurse orientation has been provided on the MEHRS and the importance of hospital/community information transfer. Allied health professionals receive training in the allied health system, TIM, as part of their orientation. One-to-one training is conducted on an *ad hoc* basis for new clinical staff.

Executive leadership and commitment

Strategic commitment by the Mater executive has been demonstrated by the commitment of both time and resources to sustaining and further developing the system. The demonstrated leadership and commitment at this level have been imperative in effective change management and sustainability.

Adequate resources

To sustain the information management model, a number of other support issues needed to be reviewed. The availability of PCs at ward level was a significant issue and at least one new PC was needed for each ward. This was preferably placed in the intern or nurse practice co-ordinator (NPC) office, close enough to the clinical area but with some degree of privacy and quiet. A number of existing PCs were upgraded to Internet Explorer 4 to allow access to the MEHRS on the hospital intranet.

Results

Our initial data from November/December 1999 indicated the proportion of best-practice discharge notification – faxed legible community discharge summary within 24 hours from the MAH – was 34%. A random clinical chart audit of all discharges over

six random work days from the MAH in November–December 2000 ($n = 245$), midway through our intervention, demonstrated that 72% of charts had a manually completed discharge summary/referral faxed to community providers. In November 2002, following the completion of the intervention, the average percentage of separations from the MAH that had a MEHRS discharge summary completed for that month ($n = 563$) was 86% (see Table 1). These data exclude day cases and statistical separations.

The Mater Children's Hospital (MCH) campus commenced using the MEHRS in January 2002. In November 2002 the average percentage of separations from the MCH that had a discharge summary completed for the month ($n = 294$) was 75% (see Table 1). These data exclude day cases and statistical separations.

An audit of all MEHRS discharge summaries faxed from the Mater Adult, Mothers' and Children's Hospitals for all patients discharged in January 2003 demonstrated that 65% were completed within 24 hours of patient discharge ($n = 682$).

Quality of the information

Two quality audits have been conducted to review the adequacy of the information provided by hospital staff. Random audits of clinical charts from an acute medical ward at the MAH were completed in November 2001 ($n = 37$) and July 2002 ($n = 30$) as part of quality assurance activities for the medical division. The Director of Medicine reviewed the summaries and assessed information with respect to diagnosis, other problems, allergies/adverse reactions, procedures, hospital management, follow-up plans/instructions and medications. These audits

Table 1 Faxed discharge summary data (excluding day cases and statistical separations)

Location	Date	<i>n</i>	Charts with a completed discharge summary (%)
MAH	Nov–Dec 1999	500	34
MAH	Nov–Dec 2000	245	72
MAH	Nov 2002	563	86
MCH	Nov 2002	294	75

demonstrated 95% and 90% respectively of summaries were adequate with respect to the articulated key clinical parameters of diagnosis, ancillary problems, procedures/investigations, inpatient management, post-discharge instructions and discharge medications. The main gaps identified by the Director of Medicine in the information communicated to the GPs included absence of information about allergies and/or medications.⁵ A number of strategies have since been implemented to address this.

Qualitative comments have been collated from two surveys, one conducted in July 2001 ($n = 30$) and the other in November and December 2002 ($n = 55$). Respondents were invited to make suggestions to improve the system. This resulted in improved pharmacy integration, GP details coming directly from the PMI and decreased duplication regarding information to the clinical coders. The best features of the system include direct faxing from the PC, ease of access and ease of use, legibility and the ability to complete the referral summary across the entire hospital admission.

General practice

All electronically generated discharge referrals faxed from the MAH in February 2002 ($n = 124$) and November 2002 ($n = 196$) included a fax back evaluation form for the GP. The return rate was 24% and 28% respectively and the results are shown in Table 2.

Comments from the GPs include:^{5,6}

- 'better than I've had before'
- 'highly useful'
- 'best discharge summary I've seen in a long time, excellent'
- 'fabulous, received so promptly'
- 'great to get information when a patient presents and is admitted'
- 'thank you for sending a detailed summary. I find it very useful for feedback and to ensure correct follow-up'
- 'a terrific idea and one to be encouraged, has the relevant information for ongoing GP care'
- 'appreciated the fax and knowing what happened to the patient'
- 'more information on test results done in hospital'
- 'love the legibility'
- 'nursing info not relevant unless we need to forward to community nursing'

Domiciliary agencies/community health

In November 2002, 52 referrals were sent to domiciliary agencies/community health with a fax

Table 2 GP evaluation of the MEHRS discharge referral

	Feb 2002 (%)	Nov 2002 (%)
Agreed that the summary was useful	96	97
Agreed that the summary was relevant	98	98
Agreed that the summary arrived in a timely manner	96	93
Want to continue to receive summary	99	99
Agreed that there was sufficient information to continue care of the patient	Not asked	94
Agreed that the information in 'other conditions/complications' was relevant	Not asked	69
Agreed that the comments in 'follow-up plans' meet their needs	Not asked	91
Thought that a field containing information about the presenting problem would be useful	Not asked	73
Found the nursing/allied health information relevant	Not asked	60

back evaluation form. The response rate was 25% and the results are shown in Table 3.

Discussion

The MEHRS is a practical demonstration of how acute care facilities can meet the needs of primary care and share relevant clinical information. It involved a combined approach of applied information technology excellence and effective change management based on the Mater '3Cs' model for improved hospital/community care integration, developed on-site in 1998. This focuses on: 'communication and access', 'cultural change and team work', and 'commitment and incentives to integrate' – all essential underpinnings to effective integration outcomes.⁴

The outcomes described in this paper owe their success to this approach. Opening up strategic communication channels between hospital and community with clinical and information management workgroups identified gaps in service delivery and the importance of integrated information transfer to quality clinical care across the continuum. They also allowed the development of individual roles and responsibilities in effective information flow and the development of effective processes for moving information across the interface.

Initiating strategies for an awareness of the

differing community and hospital cultures, exploiting the strengths and addressing the weaknesses, and the development of a shared approach to managing information transfer problems, allowed a new focus on continuity of care management in both settings. The focus progressively became on the best long-term clinical support for the patient/client, rather than on the parcel of care occurring at the hospital.

Hospital and community providers provided organisational commitment and leadership to the infrastructure and processes required to implement an integrated information transfer system. This included consent procedures, computer hardware and software, shared databases, and training down time and supervision, and involved both clinical and administrative staff.

Our study design was open to some potential bias:

- The generic templates of the MEHRS were developed to meet the needs of local hospital and community clinicians. As these match the needs documented in interstate papers however, we are comfortable that they are widely generalisable.
- Chart audits to evaluate completeness, legibility and timeliness of MEHRS transfer to the community, were conducted by hospital employees. As they came from separate departments from the clinicians and administrative staff being audited, we are comfortable that their results are valid and without bias.
- The response rate from our GP and community

Table 3 Responses from domiciliary and community health agencies

	Nov 2002 (%)
Agreed that the summary was useful	100
Agreed that the summary was relevant	85
Agreed that there was sufficient information to continue care of the patient	92
Agreed that the information in 'other conditions/complications' was relevant	54
Agreed that the comments in 'follow-up plans' meet their needs	85
Thought that a field containing information about the presenting problem would be useful	69
Found the nursing/allied health information relevant	77
Agreed that the summary arrived in a timely manner	92
Want to continue to receive summary	100

agency's evaluation fax was disappointing at 24–28%, although commensurate with the response rate of other community studies on the complex. Corroborative evidence from informal feedback from community groups such as divisions of general practice, DAART and community health, has also however been universally positive. Most advocate strongly for similar systems to be developed in neighbouring hospitals.

Our approach is applicable to any acute care setting prepared to engage its community in an information transfer partnership, and prepared to invest the resources necessary to engage and train key clinical and administrative personnel.

Conclusion

A key objective of the Mater Health Services is the provision of safe and high-quality patient care. This is not cocooned within one setting – community or hospital – but a function of co-operation between both, in achieving ongoing excellence in care delivery. The linkage of the Mater Health Services with its community providers is seen as vital to this objective and has played a key role in sustaining this system beyond the life of the initial programme. A focus on capturing a minimum quality and safety dataset, effective clinician involvement, and effective systems to collect information and minimise duplication

underlie the programme's success, and the key to implementation and sustainability in other sites.

ACKNOWLEDGEMENTS

The authors would like to acknowledge the valuable support of the Mater Health Services Executive and Ms Inge de Jong. We would also like to acknowledge the valuable assistance of Dr Simon Bowler, Mr Kalvin Ernst, Mrs Julie Hunt and the Information Systems Department, Mater Health Services in the development of the MEHRS. The Commonwealth Department of Health and Ageing under the National Demonstration Hospital Programme provided initial funding for the commencement of the MEHRS.

REFERENCES

- 1 Wilson R, Runciman W, Gibberd R, Harrison B, Newby L and Hamilton J (1995) The Quality in Australian Health Care Study. *Medical Journal of Australia* **163** (9): 458–71.
- 2 Mater University of Queensland Centre for General Practice Annual Report, 1995. Internal hospital document.
- 3 Queensland Health Surgical Access Team (1999) *Guidelines for the Management of Specialist Outpatient Clinic Waiting Lists*. Queensland Health: Brisbane.
- 4 Jackson C and de Jong I (2000) *Achieving Effective Health Care Integration – the essential guide*. McPherson's Printing Group: Brisbane.
- 5 Schollay D, Hunt J, Bowler S, Nicholson C and Ernst K (2002) The Mater Electronic Health Referral Summary; a

practical example of giving clinicians access to clinical information. *HIC Proceedings*, 4–6 August 2002.

- 6 Holliday D, Hunt J, Bowler S, Nicholson C and Ernst K (2003) The Mater Electronic Health Referral Summary. Discharge Summaries: from paper to PC a quantum leap? *ARCHI Proceedings*, 28 March 2003.

ADDRESS FOR CORRESPONDENCE

Ms Caroline Nicholson, Manager, Brisbane South Centre for Health Service Integration, Level 2, Community Services Building, Raymond Terrace, South Brisbane, Queensland 4101, Australia. Tel: +61 7 3840 1970; fax: 61 7 3840 1969; email: caroline_nicholson@mater.org.au

Accepted June 2003