Conference report

Achieving benefit for patients in primary care informatics: the report of a international consensus workshop at Medinfo 2007

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ABSTRACT

Background Landmark reports suggest that sharing health data between clinical computer systems should improve patient safety and the quality of care. Enhancing the use of informatics in primary care is usually a key part of these strategies.

Aim To synthesise the learning from the international use of informatics in primary care.

Method The workshop was attended by 21 delegates drawn from all continents. There were presentations from USA, UK and the Netherlands, and informal updates from Australia, Argentina, and Sweden and the Nordic countries. These presentations were discussed in a workshop setting to identify common issues. Key principles were synthesised through a post-workshop analysis and then sorted into themes.

Results Themes emerged about the deployment of informatics which can be applied at health service, practice and individual clinical consultation level:

1 At the health service or provider level, success appeared proportional to the extent of collaboration between a broad range of stakeholders and identification of leaders.

2 Within the practice much is currently being achieved with legacy computer systems and apparently outdated coding systems. This includes prescribing safety alerts, clinical audit and promoting computer data recording and quality.

3 In the consultation the computer is a 'big player' and may make traditional models of the consultation redundant.

Conclusions We should make more efforts to share learning; develop clear internationally acceptable definitions; highlight gaps between pockets of excellence and real-world practice, and most importantly suggest how they might be bridged. Knowledge synthesis from different health systems may provide a greater understanding of how the third actor (the computer) is best used in primary care.

Keywords: computerised, computers, family practice, medical records, SNOMED

Introduction

Landmark reports have suggested that rates of medical errors are unacceptably high and that better sharing of clinical information across health systems can significantly improve patient safety and the quality of care.[1–3] It is widely accepted that the best way to share clinical information is through migration from paper to electronic records.[4] These are optimally held on linked clinical computer systems deployed across a health

system which shares a common patient identifier, coding or classification system and decision support systems, particularly in the area of prescribing.[5,6] Based on this premise, health organisations and health services are planning or implementing strategies to make clinical data sharing possible under the title of what has come to be termed 'interoperability': data recorded in one part of the healthcare system is automatically available in another, without losing any meaning as it travels around the health system – so-called 'semantic interoperability'.[7] An example would be a general practitioner (GP) who records someone as having an adverse reaction to penicillin; this information is then available when they attend an accident and emergency department. Despite the optimism about the benefits of interoperability the evidence base for definite benefit from using electronic records, computerised drug alerts and decision support, and using feedback of computer data for quality improvement, is encouraging in some areas but not, as yet, overwhelming.[8–10]

The working groups of the international health informatics associations aim to develop the evidence base and the practice of primary care informatics. Three of these Primary Care Informatics working groups, those of the International Medical Informatics Association (IMIA),[11] European Federation for Medical Informatics (EFMI)[12] and American Medical Informatics Association (AMIA),[13] came together to co-organise this pre-Medinfo 2007 consensus workshop. Medinfo is a major informatics conference put on every three years by IMIA. This is the second joint event these working groups have organised: it follows our positive experience of working together to organise a pre-Medinfo workshop in 2004.[14] For the 2007 meeting we were also joined by the World Organisation of Family Doctors (WONCA) Informatics Working Party.[15] With primary care informaticians from across the globe coming together to attend Medinfo, we decided to organise a workshop immediately prior to the opening of the conference to share learning about primary care informatics that might support and enhance patient care.

The aim of the workshop was to capture a snapshot of the real-world utilisation of informatics in primary care, to share lessons, and to identify common themes.

Contributions

There was a mixture of formal and *ad hoc* contributions to the workshop. The workshop was a full day and attended by 21 delegates (though six were only able to attend the first half of the day). The contributions are summarised below in the order they were presented in the session.

1 Using the electronic patient record to improve quality, safety and teamworking

The first session of the day was a keynote address from David Bates from Boston. David talked about the electronic patient record (EPR) and how it should be thought of as a tool to improve quality. He proposed that the EPR best improved quality through: linkage to decision support; disease registers; and enabling teamworking.

First we were reminded about the high levels of medical errors highlighted in the Institute of Medicine's landmark reports,[12] and that medical error rates are around 10% in most countries.

Quality is also a system issue: 'Every system is perfectly designed to achieve exactly the results it gets.'[16]

At Partners HealthCare, David's institution, they are introducing a series of high-performance indicators.[17] These harness technology to deliver decision support, consistency of care, and better team care. Their aim is to achieve 75% of computerised physician order entry (CPOE)[18] in a year, and 100% in three years. There are slightly more modest targets for physician adoption of computerised medical records: 55% within a year with 80% in three years.

Partners HealthCare is using sophisticated decision support to increase drug safety.[19] These tools are either 'interruptive' for more serious interactions which have to be cancelled by the physician, or 'non-interruptive' – advisory only; 67% of 'interruptive' alerts have been accepted. Partners are also closely monitoring whether patients on disease registers can have their care improved through the use of computerised clinical reminders, though time remains the greatest barrier to their use. Computer data are also used to give feedback at the individual physician level about the quality of care using a graphical interface. The organisation has adopted a low level of performance-related pay for clinical quality – typically 1–2%. Finally, they are working with other providers to pilot how to integrate health records across a wider community.

In summary this talk provided a clear strategic framework for implementing a service-wide EPR system, focusing on decision support in prescribing and quality of chronic disease management measured and fed back to teams and individuals. The EPR is also starting to be used as a tool to enable better teamwork within organisations, and eventually sharing medical information between them.

2 Legacy systems in general practice can deliver effective care

Pieter Houwink, a GP from the Netherlands, led this section; he presented an update on how Dutch primary care computing based on legacy systems is effective. The number of suppliers is likely to reduce to around six.

Most GPs in the Netherlands are salaried, and only a small proportion, around 30%, work in groups of four or more. There has been a growth in advanced nursing, with nurses taking over more and more of traditional GP work. GPs are administered in geographical areas of 100–300 GPs. Much of the technology used would be regarded as 'legacy'; however, it is a pragmatic system which works. There is electronic exchange of data with the out-of-hours service.

Primary care in the Netherlands has used computers for many years, but there remains scope for improvement. There are dilemmas about the ownership of data. Generally the patient is considered the owner of the data and the GP its custodian. This has created problems with secondary use of data.

The Dutch College of GPs has created standards for medical record summaries. They recommend the use of the International Classification of Primary Care (ICPC)[20] and a standard set of instructions for printing prescriptions (so-called Form 25).

Although plans exist to move to create a national 'spine' connecting EPRs, there is little progress as yet. If this is to be done, there may need to be a new health service number or agreement that social security numbers can be used as unique identifiers. Likewise electronic transfer of data between practices is yet to be implemented.

3 Sharing clinical data across the NHS: the complexities of the summary care record and solving electronic transfer of records between GPs

John Williams, a GP from England, presented the complexities of the summary care record[21] and its strengths and weaknesses; he also discussed how a sensible, pragmatic approach to electronic transfer of records between GPs (GP2GP)[22] will solve a long-term problem for UK general practice.

Patients in the UK register with a single general practice. Traditionally these practices, like their colleagues in the Netherlands, hold patient records on a computer located within the practice building (although the UK is moving towards hosted systems). Currently, when a patient moves between practices their records cannot be sent electronically: instead they have to be printed and then re-entered by the next practice. This

is inefficient and prone to errors. Similarly practice systems have not routinely shared the clinical content of their records across the health service. The NHS now plans summary care records so that vital information about a patient is available should they require care elsewhere.

The NHS Summary Care Record

The summary care record will have an 'opt-out' option – that is, patients' records are included unless they opt out. Patient and clinician should both be able to control what is uploaded. There is a system of data quality accreditation to ensure data standards.[23] The summary care record uses SNOMED-CT, whereas the source system is Read Code or Read Clinical Terms version 3 (CTv3). The use of local codes within GP computer systems further increases heterogeneity of the source data. The summary is 'read-only' as it only in exists coded SNOMED-CT, making it impossible for primary care clinicians using the Read classification to edit it. There are practical considerations when using this record – as it is based on the latest update. Practices will have to be careful to ensure they do not upload data until they have a full medical record or new patients' summary care records may be empty. The summary care record is a useful concept; however, it is being implemented without defining exactly what a summary is, or solving (a) how to create it from heterogeneous source data, (b) whose information will have precedence, and (c) not giving attribution to the source of each item.

GP2GP transfer of computerised medical records

GP2GP transfer provides an example of how to achieve results through wide stakeholder involvement including front-line clinician users; choosing clear standards and processes to ensure safety; and the practical benefits of not trying simultaneously to build in upgrades, introduce new ways of working or solve other long-term problems.

The technical solution adopted by GP2GP is simple and fit for purpose. In summary, an HL7 standard message[24] has been created, which extracts data from the GP computer system into HL7 standard elements. The receiving system recreates appropriate EPR elements. The whole message stays within the Read Code system. The only use of SNOMED-CT has been in the transfer of drug information.

The IEC 61508 standard[25] was chosen to help ensure the safety of the project, as its general use is in safety-critical software. This involved identifying hazards, mitigating risks and demonstrating those mitigating actions have been applied.

Finally, this project was clear about what was beyond its scope: it did not try to implement SNOMED-CT; nor produce a taxonomy for the documents within the GP record; nor deal with the legacy paper record; nor consider how to deal with the continuing influx of incoming data on paper.

4 Co-ordination, incentives and standards to improve the uptake and use of computerised medical records in the USA

David Bates led a second session at the workshop about efforts to improve the uptake of EPR systems in the USA. Only around 24% of doctors in the USA are using EPRs, and only around 15% of hospitals have CPOE systems. There is much speculation as to the barriers to wider EPR adoption. Lack of standards, getting locked into one system, little interoperability and few financial incentives all contribute to this low penetration. An Office for the National Co-ordination of Health IT, standards and certification bodies and financial incentives are being used to try to improve EPR adoption.

Robert Kolodner heads the Office for the National Co-ordination of Health IT (ONCHIT), with a mission to improve the uptake of EPR systems through incentives, reducing risk of adoption, and fostering regional collaboration.[26] ONCHIT is also promoting standards at a national level while encouraging data exchange at regional level through new regional health information organisations (RHIOs).

The Certification Commission for Health IT (CCHIT) has been set up and has certified 87 products as suitable for ambulatory care in a single year. Seventeen percent of these vendors have an annual revenue of under $1 million and 27% under $10 million.

The Physicians Quality Reporting Initiative[27] is an example of how providers are being incentivised through small payments to improve data quality and quality of care.

It remains to be demonstrated whether these facilitating moves: national standards; encouraging regional data exchange and moves towards regional interoperability; and incentive payments will lead to more widespread adoption of EPR.

5 International contributions

Australia has still to standardise its coding system and lacks a patient identifier

In Australia there is a Medicare subsidy of AU$25 per consultation with a variable charge on top. The Government also subsidises medication in a very structured way. Prescribing and patient records are increasingly computerised in primary care. Pathology and radiology reports mainly come back electronically. The principal problems are that specialists in the private sector and public hospitals are not computerised.

GPs are looking at using routine data for audit and quality improvement. GPs are also paid an incentive to set up email communication which is secure and encrypted (even if there is nobody to talk to). They are nationally funded to have broadband.

There is a national project: Health Connect[28] to share records. Like the UK system it will work on an opt-out basis. The first step is to share prescribing data. Additionally, a National eHealth Transitional Authority (NEHTA) has been established to promote eHealth and telemedicine.[29]

Issues to be resolved are: there is currently no unique patient identifier, though there are plans to introduce one. There are at least eight different GP suppliers, which lack a uniform coding system. Around 50% of systems use DOCLE, a system where codes are built up using links rather like an internet address,[30] for example, chest@pain = chest pain. NEHTA supports the use of SNOMED-CT and the Royal Australian College of GPs supports ICPC. The computer is increasingly recognised as a 'big player' in the consultation – how can we best integrate its functionality whilst minimising its impact?

Nordic countries remain uncertain about SNOMED-CT and data linkage

Sweden and the Nordic countries have developing national strategies to make better use of IT in health care. Sweden has a unique identifier which would enable records to be linked, but this cannot be done by law. There will possibly be new laws about this which will allow health and social care data to be linked.

Adoption of EHRs is widespread. In Sweden probably 95% of primary care and 69–75% of hospitals use EHRs. Probably over half of prescriptions are electronic.

The Nordic countries collaborate to produce health statistics through the Nordic Medico-Statistical Committee (NOMESCO).[31]

There is a four-year project in Sweden to move from ICD-10 to SNOMED-CT. Making this transition may be much more complex than originally envisaged.

Argentina is developing primary care informatics but needs vendors willing to supply at an affordable price

Primary care is less well developed in Argentina, and EPRs are only likely to be found in academic centres. There are pockets of activity but no real diffusion.

Costs of large vendor systems are too high for the country and they feel that vendors should have to work at around a third of their usual price. Similar situations pertain in other South and Central American countries.

Discussion

Principal lessons

There were themes that ran across all the discussions, many of which have not been widely articulated within the literature.

- Team working between technologists, clinicians and managers appeared to be the best formula for success.
- A unique identifier for each patient is vital if we are to move to health system-wide EPR systems. However, this issue has both technical as well as legal and governance dimensions. Those who lacked such an identifier were looking for it; but those who had it might not be able to use it because of legal constraints.
- 'Opt-out' appears to be the commonest way that patients are asked permission to share their data. In the short term, this could provide momentum to establish interoperable health information systems, but most delegates appeared to be uneasy about this. It remains to be seen if this is a sustainable solution.
- Heterogeneity of coding systems and of system vendors is a problem across nearly all health systems. Adding migration to a more complex clinical coding system – in most cases SNOMED-CT – on top of other reforms seems unwise. It would appear that if the UK's summary record system were populated using the relevant parts of the GP2GP HL7 message that it could be more readily edited and updated. Markets which have large numbers of vendors appear to have greater variance in system and more lock-in to those suppliers.
- It should not be taken for granted that IT will be used. Overcoming the barriers to using information systems in health is complex. Incentive payments seem to be more and more widely used to promote the implementation of EPR systems: these are either for making structural changes (such as installing hardware) or for participation in a process (for instance, providing quality data online).

Implications of the findings

We have reported the implications of our findings at the level of the health system, practice, and individual consulting clinician.

Health system level – to achieve linkage + integration

- There needs to be collaboration at health system level between managers, politicians, clinicians, technologists and funders.
- Safety, quality and efficiency need to be an important part of the agenda. End-user peer review at every stage is essential.
- We need to have systems that identify individuals in a health system, whether through a unique health ID number or some other method.
- Standardisation of coding systems is desirable – but we must avoid trying to develop new functionality at the same time as introducing a new coding system.
- Legislative and governance frameworks are increasingly a greater obstacle than technical ones. They need to be put in place from the start. This may need to include asking patients to 'opt in'.
- Both token and large financial incentives can be used to promote adoption of EPR systems.

Practice level: getting the EPR used

- Primary care quality can be improved at the practice level by using an EPR even if it is a legacy system.
- Getting the system used should never be taken for granted. There are usage and data quality gaps in all systems.
- There is scope to improve quality of care. Prescribing safety can be improved at the practice level by the addition of appropriate tools. Computer data are readily searchable to provide feedback about the quality of care.

In the consultation

- The computer is a 'big player' in the consultation.
- We need to highlight its influence on the consultation and identify the common lessons about time and other barriers to its use.
- There needs to be much less variation in archetypes used to record common observations in the consultation (such as BP recording) or to perform common tasks (such as prescribing).

Comparison with the literature

There is a lack of literature within this domain. Primary care is under-represented in the literature and this includes primary care informatics.[32] Some have suggested that primary care research may be of poor quality;[33] others have argued that the context of primary care research means that traditional research methods are inappropriate and new ones are required instead.[34] Compared with other disciplines, there are a smaller number of primary care journals including primary care informatics. Maybe this is because the implementations and use of information systems is not readily testable through randomised controlled trials or other methods. A search of the 2007 International Medical Informatics Association (IMIA) Yearbook revealed only one paper[35] with the terms 'primary care', 'family practice', 'general practice' or derivatives in their title. To date this journal, *Informatics in Primary Care*,[36] is the only informatics journal for our subspecialty.

Recommendations for further research and joint learning

1 Share our learning about what is needed at the system level to achieve change
   - Clinician involvement in collaboration with service managers, funders
   - Defining some of the things that remain undefined:
   - What is a: 'Summary', 'Common care record', 'Problem', and so on
   - Explore the pros and cons of 'opt-in' or 'opt-out' policies for record sharing
2 Highlight gaps (chasm) between pockets of excellence and real-world practice and suggest how to bridge them (maybe defining new theoretical frameworks)
   - How to overcome the barriers to SNOMED-CT implementation
   - Sharing GP records between heterogeneous systems often using different coding systems is challenging.
   - We need to explore whether there is a wider role for HL7 messages in primary care
   - Learning the lessons about migration between coding and classification systems
3 Develop an understanding through international comparison of how the computer – 'the big player' – interacts in the consultation
   - Develop archetypes for common tasks in the consultation – BP, prescribing instructions, adverse reactions/allergy coding

Conclusions

There are common themes to be shared and lessons to be learnt in primary care informatics. This workshop provided a forum to explore these themes. The hypotheses generated at this workshop need to be tested by more rigorous research, perhaps within the context of generating a core theoretical framework for informatics.

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CONFLICTS OF INTEREST

None.

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