Information systems in the new world: an emerging national approach

Heather Grain

AUSTRALIA IS ONE OF MANY countries around the world wanting to take advantage of clinical decision support systems to reduce misadventure, improve quality of care and enhance health outcomes. Policy and infrastructure developments that could remove many of the barriers to the implementation of these systems are being considered by the Australian Health Ministers' Advisory Council (AHMAC) over the next few months.

These initiatives include processes for national identification of health care recipients; common approaches to consent to information sharing and access control in the electronic health care environment; secure messaging infrastructure; a national medicines directory and agreement on national terminology.[1] These considerations are taking place in a context of jurisdictional cost sharing, with mutual benefits being sought. Detailed business cases have been developed, and supporting policy and practical pathways forward are actively sought. This joint policy and infrastructure development approach will seek to build consistent, shared formats and risk management, as well as shared financial responsibility. This approach is seen as more likely to lead to system change and implementation, where previously almost every advancement has succeeded in identifying more obstacles.

The kind of objectives outlined above are a major underpinning of HealthConnect and state-based health information system initiatives across the country. These initiatives are extremely expensive, require significant infrastructure investment to achieve the benefits they promise, and none can be successfully implemented solely by information technology or information system professionals. It is vital that health care managers at all levels and domains of health care appreciate the success factors when making decisions about the introduction and management of these systems.

The information world itself is changing for us all. These changes don't just affect the information managers or the information technology (IT) enthusiasts found in many clinical areas of our health care organisations. As in other areas of our lives, IT has invasive effects on the clinical workplace, administration and government offices. Managers in health care are often frustrated by what is seen as a failure of IT to deliver on its promise of better decision support systems, sharing of clinical information between organisations and faster access to patient information and clinical knowledge. Nevertheless, these systems are already changing the method of collecting and using clinical information in the workplace, and are having an impact on the skills needed by all health professionals, including the health administrator.

Today's situation

The Australian health care system has begun the slow but incessant introduction of electronic health record systems. These systems are already operational in many general practice and pharmacy environments, and most states are introducing, or supporting the introduction of, these systems to public health care services in one form or another.

Australian health care has used computer systems in the administrative environment for many years. The information in these systems has been

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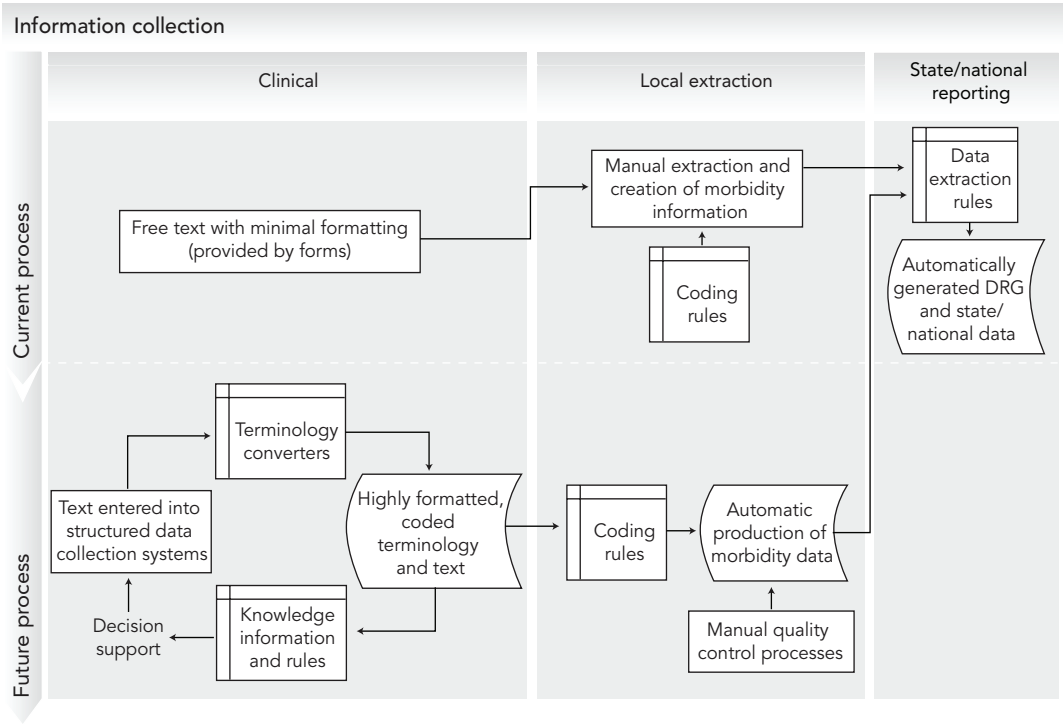
collected by administrative staff and used to support their day-to-day activities and to report to management and government agencies. The systems have required limited infrastructure, and little standardisation of functionality, though data have been comparatively standard for many years. When introducing one of these systems there were initial costs for infrastructure such as cables, computers, software and ongoing costs for maintenance and training of staff. The cost of the system was usually comparatively easy to define, with yearly training and ongoing maintenance costs of about 30% to 40% of the initial set-up costs. IT professionals were required to manage the systems. Most of these systems provided limited functionality within a well established scope, such as inpatient admission and discharge systems or pathology reporting.

The emerging IT world

The new world is a world where data collection is a clinical rather than administrative activity. It is all-pervasive, rather than limited to the clerical desk, and is vast in quantity and diversity. The information collected must be both secure and accessible whenever required in combination with authenticated clinical knowledge in order to improve clinical decision making. This extension of purpose significantly affects the costs of these systems. Discussions with two of the common software providers in this new world have indicated that the purchase cost of these systems may represent as little as 30% of the total cost of implementing the system in a health care organisation.

Information collection current and future process



DRG = diagnosis-related group

The reason for the vast difference in cost structure can be seen when considering the differences in complexity of the systems. The traditional systems collect clinical data in paper-based records in free text. The top half of the Figure (see Box) shows the data collection process for inpatient morbidity reporting in the current systems where initial data are in free text, and are extracted manually; where coding rules are applied manually; and then computer systems automatically apply data extraction rules to produce diagnosis-related groups and state or national morbidity data collections.

The bottom half of the Figure shows the future process, where text may be entered into computer systems that are able to convert and store this text (highly formatted) in standardised terminology systems. These systems can apply codes and knowledge rules to provide decision support to the clinician at the time of data entry, and to automate the production and reporting of morbidity data. This process offers both improved decision support, with anticipated improvement in health outcomes, and the reduction of manual processes in the extraction and production of morbidity data.

But it won't happen for ages . . .

This future world has been talked of for many years and there is a widely held belief that it is still a long way away. This is no longer the case — it is coming and, like ATM machines, it will "just be there" when we turn around. There are a range of changes in the computer world that are speeding up the ability to change health care:

- Computers are able to store and compute ever more complex and larger volumes of data at decreasing cost.
- There has been a dramatic increase in the understanding of how to make computers do what we want them to do.
- Data collection and information use are becoming the same thing. In manual systems a form used to collect information usually had only one purpose. This new world allows information collected for one purpose to be available for use for many other purposes (the "collect once use many" principle).
- The cost of introducing these systems is so large that there is a political and practical imperative to gain maximum value from them.

The potential benefits are being calculated around the world. For example, US commentators report that moving to standardised interoperable systems would deliver $77.8 billion in annual savings in the United States.[2]

Why do these systems cost so much?

Unfortunately, health care is a much more complex information and knowledge environment than many other business environments. To gain the long-anticipated benefits from information systems it is necessary to have a standard approach to patient identification, information and clinical knowledge, among other things. One essential, and deceptively complex, element of the required infrastructure is standardised health terminology. Each individual user of the system will have terms that make sense to them. Standardised reference terminology identifies the linkages between the concept (eg, myocardial infarction), the body, and the disease processes and gives a structure that would allow computers to identify all heart conditions (without having to list them all separately) and to apply standard knowledge rules to those conditions.

Terminologies are used to constrain the information and support consistent representation of that information when sharing occurs between different providers in different environments; to allow the application of rules to aggregate information and support decision making at all levels of health care, including administration; and to support best clinical practice. The systems require not only standardised terminology, used here as an example of the complexity of the underlying systems, but also consistent structure of information as it is collected and represented, and authenticated knowledge.

Those who consider that these changes are years away often believe that it is an all or nothing situation. The truth is that these changes are likely to occur piecemeal. For example, where a hospital introduces an electronic health record for the endocrine department or obstetric department, it is estimated from early investigation that between 60% and 80% of inpatient cases would be able to have their complete morbidity data produced automatically. Complete automation of processes such as coding will take many years, but the 80/20 rule will apply — major benefits can be gained from some simple system changes and they need not take years to introduce or implement.

Standardisation is a business imperative

The advantages of the new electronic health record systems cannot be achieved without semantic interoperability. The success of activities such as Healthelink, HealthSmart, and HealthConnect are dependent upon infrastructure being resolved in a standard manner. Common sense indicates that national standardisation is likely to be much less expensive and easier to manage and maintain than it would be for each individual state or project to undertake these tasks alone. National standardisation is essential to avoid the risk of "rail gauge" problems defeating information sharing initiatives across state borders.

Some of the specific anticipated savings include reductions in medication and diagnostic service replication, as well as medication misadventure, and reduction of costs of activities such as manual coding of morbidity data.

Australia is very active in, and in many cases leading, initiatives, of international standardisation in an effort to secure a leading position, to ensure that systems purchased from overseas will meet our needs, to build skills and to take advantage of international knowledge. For example, Australia plays leading roles in activities commissioned by the Health Informatics Technical Committee of the International Organization for Standardization (ISO).

Australia has invested in these developments, and recent initiatives, such as the establishment of the multijurisdictional National e-Health Transition Authority to provide direction and impetus to infrastructure development, may result in infrastructure availability sooner rather than later. Once the infrastructure is there, the systems will come. Consumers demand them for safety, clinicians demand them for safety, and the financial savings mean that administrators and politicians will demand them too.

Impact on public health and health administration

Electronic collection and use of information in the active care of the patient is likely to improve the quality of that information, particularly when compared with the collection of information only for administrative purposes. These systems will also dramatically increase the amount of information available for automated extraction and the ability to develop and apply a range of data extraction protocols to suit specific situations or needs. This information availability will need to be achieved within strict protections for individual privacy, but will provide significant value to those planning health services and trying to improve the health of Australians. The issue of the potential for cost shifting/sharing between the state and national bodies will be an area for significant political discussion, and may require new and creative approaches.

What do we need if we are to take advantage of these systems in our health care environment?

There is an international shortage in skilled health informatics professionals capable of implementing, training, and maintaining both the individual systems and the infrastructure required to support these systems. It should be noted that health informaticians aren't the same as IT professionals — they are the link between the technical

expert and the clinical expert, with understanding of both worlds. Health administrators need to recognise this gap and demand these skills in their staff, both clinical and administrative.

Managers need new skills too. They must understand how to evaluate the different functional capabilities of the information systems they buy — all systems are *not* the same. There is also a need to understand the skills required of employees to implement and maintain these information systems. There is an increasing need for management and implementation planning skills in the introduction and ongoing maintenance of these systems. These skills are business–clinical skills in an IT environment, but without them all evidence shows that the likelihood of system failure is significantly increased. Managers need to consider methods for development of these skills. For example, contribution to electronic health record standards activities can be seen as one method of building skills, as can health informatics formal education.

And finally, managers live on data for their decision making. It is essential to develop an understanding of how to assess the quality of the data you use and to be able to identify which elements of the data available from these complex systems will give the most effective information to support management decisions.

So there are choices to be made. Systems can and will fail, but there are things that can be done to increase the chances of success. There is only one thing that is sure: these systems and changes will come.

Competing interests

None identified.

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2 Healthcare information exchange and interoperability. Boston, MA: Centre for Information Technology Leadership, 2003. Available at: <http://www.citl.org/research/HIEI.htm> (accessed Mar 2005). □