The pharmacy management information system at the Department of Veterans’ Affairs

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Abstract

This article describes the pharmacy management information systems environment currently being implemented at the Australian Department of Veterans’ Affairs (DVA), and focuses on the objectives and design of the medication management program’s management of information. As the system is new, it is too early to predict the difference that it will make to the operations and policy initiatives within the Medication Management section. The anticipated benefits are discussed. The user reaction, and the uses of these management data, are part of an ongoing benefits realisation study and the subject of a future article.

Background

The Department of Veterans’ Affairs (DVA) contracts with health service providers to deliver health care services to veterans and their eligible dependents. In order to ensure that appropriate, good quality, cost-effective services are delivered to meet the needs of the veteran population, there is a need for ready access to management information. In the mid to late 1990s it became apparent that in order to support contract management and veteran health status evaluation, a system which would provide an integrated view of the Department’s business across the various health programs would be necessary. In response to this need, the Department has invested in a Departmental Management Information System (DMIS). DMIS is an innovative data warehouse system which has been designed to provide staff with easy access to quality information.

Departmental Management Information System (DMIS) project

The DMIS technology enables the conversion of large and disparate data stores into integrated business views or data marts. This is achieved by ‘warehousing’ data from various source systems, both internal and external, into an integrated platform for analysis. The data are organised and presented to users according to health programs and various cross-business views. The implementation of the business views or data marts is being phased in across the programs such as hospital care, community nursing, home care, medication management and mental health. As the implementation of data marts progresses, DMIS allows departmental managers to:

- Integrate information across departmental activities and programs
- Obtain and analyse management information quickly without technical assistance
- Access client, provider and activity profiles
- Access departmental reporting data simply and easily (Department of Veterans’ Affairs, 2000).

DMIS uses data warehousing architecture that has been designed from the outset to have the capability to provide for all the future decision support requirements of DVA. This includes the protection of personal data that are aggregated for management statistics under the guideline of the Department’s Privacy Code of Conduct. Access to these data needs to be authorised by the data custodian and is protected with appropriate levels of security and audit logs.

In common with most sophisticated data warehouses, DMIS has an ‘architecture’ (see Boxes 1 and 2), for example a sequence of processes that:

- Captures data from disparate operational systems and external sources (such as Repatriation Pharmaceutical Benefits Scheme [RPBS] claims from the Health Insurance Commission [HIC]) into a basic repository known as the Generic Data Store (GDS)
- Extracts the relevant data from the GDS and applies a sequence of purifying, cleansing and transformation processes
- Enforces relational integrity to the data (ie, every table of data is linked, through appropriate common data ‘keys’, to other tables of data)
- Loads the data into an Enterprise Data Warehouse (EDW)
- Utilises business rules to create and derive additional data elements (eg, the calculation of a length of time between dates, aggregations of specific treatment costs)
- Progresses selected data from the EDW to a data mart (eg, DVA clients with prescription claims over the past five and a half years to the pharmacy data mart) (Department of Veterans’ Affairs, 2000).

Data marts

DMIS data are delivered through various data marts, comprising a subset of data extracted from the EDW. End-user access to the data mart data is via an ad hoc query tool such as ‘Cognos Impromptu’. These data are specifically structured for analysis by particular subject matter and/or a group of business users. Specific data constructs also may be created to meet specific business needs. The derivation of a polypharmacy event is one such requirement for medication management (Department of Veterans’ Affairs, 2000).

Data cubes

Data from the data marts are extracted and summarised into more specific data ‘cubes’ which structure the data in predefined dimensions and measures and
are accessed by an on-line analytical processing (OLAP) tool such as 'Cognos Powerplay'. Cubes are particularly effective for answering routine or common queries and exploring data trends; they have been designed to satisfy at least 80% of business management information needs. In relation to DMIS, data cubes enable users at any business or technical skill level to explore and report on large volumes of summarised data reliably and in a timely manner. The vision for DMIS is to move DVA from its historic use of IT-driven systems, with little or no integration across programs, to use of systems that are driven by business information requirements (Department of Veterans' Affairs, 2000).

Medication management’s information requirements
Veterans who are eligible for the RPBS receive subsidised medications. The cost of the prescriptions is claimed by the dispensing pharmacy via the HIC in the same way as for the Pharmaceutical Benefits Scheme (PBS) prescriptions, but paid for by the DVA. In common with the PBS, the cost of the RPBS is increasing. In 2000–2001 the overall cost of the scheme increased by 19.4%, the number of pharmaceutical items dispensed increased by 8.7%, and the average number of pharmaceutical items dispensed per veteran increased by 15% (DVA 2001). In the year 2002, a total of 15,050,263 pharmaceutical items were supplied under the RPBS, and approximately 72.5 million items have been supplied over the last six years.

The main business problem to be addressed by the project is the provision of a reliable source of pharmacy data, which must:
- model and promote policies that contain expenditure
- provide evidence for fact-based decision making
- target atypical medication profiles and promote initiatives to ensure the quality use of medicines.

There are two existing primary sources of management information:
- A mainframe system storing five years’ history of pharmacy claims data. This provides aggregated reports and a printed summary of a veteran’s prescription history. It has limitations in relation to the history of data that can be retrieved, the number of requests a user can make in a month, and when the report may be run (ie, overnight).
- An ad hoc query system, built in 1997, giving access to aggregated prescription history and prior approval authority data. In this system there is no link to any details about the individual veteran or to common personal characteristics. The formulation of a query is more flexible and easier to use than the mainframe system, but response times may vary from between 10 minutes to one day.

The main reason for the lengthy development time has been the large volume of data. Setting up procedures to load and process the data from the source to the data mart has challenged the DMIS architecture. The building of cubes with a 5-year pharmacy claims history also has been a challenge to the business intelligence environment and has meant that the cubes have been redesigned; the more tightly focused the requirements, the more manageable and responsive the data cubes need to be.

The solution
The medication management or pharmacy data mart project began in May 2001, and in February 2003 we were finalising the implementation of the first release. The objectives of the pharmacy data mart project are:
- to develop a capability providing reliable, integrated pharmacy data and the tools needed to access and analyse these data
- to integrate data from disparate transaction processing systems to form an integrated, comprehensive view of veterans’ medication usage and their interaction with health services across settings over time
- to reduce the time taken to produce routine management information, especially for the Repatriation Pharmaceutical Review Committee.

The project commenced with the gathering of user requirements and understanding the business and the need for information. A detailed analysis of the existing data sources followed. Sixteen data sources were identified as being required to meet the pharmacy policy’s management information needs. The number of sources was later reduced to 12 main sources that met the core pharmacy information requirement. The remaining sources are to be integrated with the core at a later stage in the project. The data discovery phase quantified a number of aspects about the data in each source, such as the quality, integrity, currency, availability, granularity, volume, and length of history held at DVA.

The design
The data views or cubes are designed to focus on the main aspects of the medication management business. These are:
- Supplied pharmaceutical items expenditure and usage; analysis of expenditure and usage trends over five years. The focus is on paid pharmaceutical items, and the event is the claim payment date.
- Current medications; analysis of the occurrence of polypharmacy. The focus is on clients who are dis-
pensed the same drug more than once in a given quarter and who, concurrently, have received 10 or more medications in the same period.

- Clients reaching safety net; analysis of the effect on expenditure and medication usage for clients and their families who reach the safety net threshold.
- Prescribers; monitoring of prescribing trends from the point of view of the clinician, by speciality. The focus is the prescribing patterns of clinicians, by prescription date.
- Pharmacies; monitoring the dispensing, claim and expenditure trends from the point of view of community pharmacies. The focus is pharmacies, the event is the supply date.
- Medication review and management; monitoring the effect of medication review on the medication management of clients. Twenty-five months of history will be available, focusing on items dispensed to clients with medication reviews. The time period is 25 months, to enable monitoring of items supplied 12 months both pre- and post- the month in which a medication review took place.
- Prior approval authority applications; analysis of the applications received and related issues, including the cost of claims arising from the different prescribing restrictions. The focus is on prior approval applications, and the event is the application lodgement date.

To allow trend analysis, the history for the past five-year period is available in most of the cubes, with the exception of medication review (a recently established program), and polypharmacy, which has two years’ data history.

### The anticipated benefits

Once the pharmacy data mart and cubes are up and running it is anticipated that the Department will benefit because of:

- routine monitoring of RPBS expenditure against budget
- resource savings by reducing the time taken to provide management information.

### Definitions

**Data architecture**: a set of rules or structures providing a framework for the overall design of a system or product (Poe 1996).

**Data architecture for a data warehouse**: a framework identifying how the data will move throughout the system and will be used within a corporation (Poe 1996).

**Data mart**: a set of data designed and constructed for optimal end-user decision support access. Data marts may either be sourced from a data warehouse or legacy systems (Marco 2000).

**Data warehouse**: an enterprise-wide collection of data that is subject oriented, integrated, non-volatile, time variant; organised for end user access and use (Marco 2000).

**Metadata**: data about data.

The system will:

- give information about initiatives to improve health status of the veteran community; for example, decreasing the incidence of hospital stays related to adverse drug reaction and adverse drug events
- assess the effectiveness of pharmacy-related initiatives such as medication reviews
- facilitate the ability to forecast demand and expenditure related to changes in the RPBS and the veteran community
- facilitate monitoring of:
  - trends in drug usage and expenditure
  - trends in prescribing
  - trends in dispensing
  - health service encounters
  - service use across settings over time
  - service use by age, location and eligibility.

### Conclusion

The pharmacy data mart provides users with an integrated, five-year view of DVA clients’ receipt of prescriptions, their prescribers, and the dispensing pharmacies. It is anticipated that these consolidated data will become a trusted and preferred source of
reliable and timely pharmacy management information. In a short time all officers in the program will understand these data and be able to use this knowledge in better managing the program initiatives to promote the quality use of medicines in the veteran population.

References

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