Data Resource Administration: the Road Ahead

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Background

The electronic medical record, clinical data repositories, data marts, data warehouses, document repositories, laboratory information systems, radiology information systems, patient accounting, general ledger -- the number of systems installed in a healthcare organization these days is dizzying. As systems proliferate, huge organizational and technical challenges arise. How do you manage the data across all of these systems to ensure a consistent, accurate view of the patient? How do you obtain agreement on the definitions of the data across the organization? How do you turn the massive amount of data into information and knowledge that the healthcare enterprise can use for quality improvement, reporting, and strategic planning?

To meet these challenges, professionals with a unique combination of skills will be needed to manage and maximize the use of the organization's data resources-that collection of departmental and enterprise-wide databases from which useful operational or strategic information and knowledge can be derived. Given their blend of industry and clinical knowledge, as well as management and technical skills, health information managers are well positioned to fill that role as data resource administrators (DRAs).

Functioning in a key role in the organization, the data resource administrator will create the information infrastructure required to do health, performance, and process management. Some of the activities involved in building an information infrastructure include:

- planning the migration from paper-based records that document episodes of care to electronic records that document longitudinal care
- identifying useful operational or strategic information and knowledge that can be generated from the data
- identifying ways in which that information and knowledge can then be used to:
    - improve the quality of patient care through clinical process standardization and reduction in the variance in quality of care
    - reengineer processes -- the ability to share data is the most important way to streamline and integrate processes
    - help the enterprise achieve and sustain competitive advantage
    - provide consumers with meaningful health information
- developing institutional standards, policies, and procedures to generate and disseminate information and knowledge
- helping to plan and design integrated databases to produce such information and knowledge
- forecasting how much and what kind of data will be needed, as well as where and when
- optimizing data to ensure enough data will be available without excess or waste

- tracking data to know exactly where it is, how much is available, the status of the data quality, and the points of access
- maintaining the database, including knowledge of the database condition and determination of routine updates and routine data disposal
- assessing organizational resources available to create, manage, and maintain such databases
- performing cost/benefit analysis of data collection, including optimal data collection points, determining data stewards, and prioritizing data needs and access
- creating strategies for populating and implementing such databases
- ensuring data quality and compliance with relevant data standards
- training knowledge workers to access and analyze data from the various resources
- managing staff responsible for supporting the data resources

What Does the DRA Need to Know?

To be effective, the data resource administrator will need knowledge and skills in the following areas:

The Healthcare Data Continuum

Mapping back to the various clinical quality improvement, reporting, and strategic planning needs of the enterprise, the data resource administrator must be able to identify the patient-level data that exists in the enterprise, identify the gaps in such data, justify the reasons for the gaps, and recommend ways to acquire such data. In addition, the data resource administrator must know how to summarize patient-level data into aggregate data (e.g., the number of procedures performed by physician), as well as knowledge-based data (e.g., while two additional days in ICU for AIDS patients with pneumocystotic carinii pneumonia increase the cost of care for this encounter, it reduces readmissions and increases post-discharge quality of life). As a result, managers and clinicians can easily retrieve useful information without extensive analytical processing. Lastly, the data resource administrator must know how to relate primary patient-level data with comparative data, so that knowledge workers can conduct benchmarking studies.

The Evolution of Healthcare Information Systems

The data resource administrator should understand how the evolution of healthcare information systems (IS) over the years has led to the current state of "data chaos." Such understanding will allow the data resource administrator to identify what's really possible in acquiring missing data or integrating existing data, given the organization's current base of installed systems. In brief, the IS infrastructure has grown and evolved. Simple and repetitive functions were the first to be automated-usually in a mainframe environment. Then, automated functions expanded with very little strategic planning, and mini-computers began replacing mainframes. Next, computer-based patient records were planned and client-server applications with PCs slowly replaced dumb terminals. The current state of affairs is the use of distributed systems and a desperate attempt to integrate information from various data sources. As a result of the unstructured IS growth, organizations have an overabundance of data but not enough useful information. The data resource administrator will assist by documenting and organizing data across the enterprise. The DRA will transform legacy systems -- and the data they contain -- into integrated, nonredundant, sharable information resources.

What Users Do with Data

Probably the data resource administrator's most important talent is understanding what users do with enterprise data. This talent demonstrates to the user that the data resource administrator "understands your business." Moreover, by understanding everyone's business, the data resource administrator is in an excellent position to take an umbrella-and therefore strategic-view

of enterprise data, information, and knowledge. To this end, the data resource administrator should be familiar with the following uses of data:

- support for point-of-care processes
- quality improvement, outcomes measurement, performance measurement
- basic and applied clinical research
- external reporting (e.g., ORYX, HEDIS, HCFA)
- strategic planning, competitive strategy, and market trend analysis
- health services, management, and clinical decision support
- process reengineering
- outreach to patients, professionals, and other consumers

The Tools Used to Analyze or Report Data

In addition to knowing what users do with data, it is equally important to understand the functionality and differences among the tools used to analyze or report the data. By being familiar with the various tools, the data resource administrator can help the user identify the best possible way to generate the sought-after information and knowledge. The DRA can help users through the development of tool selection grids, which will allow them to assess the merits of tools marketed by different vendors. The data resource administrator should then be familiar with the functionality, costs, and differences between the various classes of analytical and reporting tools:

- reporting functions included in major packaged software (e.g., the laboratory information system)
- database query tools (e.g., query by example, structured query language)
- report writers
- statistical analysis tools
- online analytical processing (OLAP) tools
- data mining and knowledge discovery tools and techniques

Technical Foundations of Systems Analysis and Database Design

To help plan and design the integration of enterprise data, the data resource administrator should have a strong foundation in system analysis and design as well as in database design. Of all the aspects of the role, this one may be most foreign to those wishing to be data resource administrators. However, with proper training, these skills can and must be picked up since they are vital to the role. (A number of educational resources are listed in the bibliography to help you get started.) The data resource administrator should be equipped with a comprehension of the following:

- entity-relationship diagramming (identifying the true relationships between individual data elements and how data elements should be grouped with other data elements). Data entities are shared and acted upon by many business functions and users. Multiple users should be able to access the same data entities. A large part of the DRA's job is determining the sequence of entity development subject to user requirements

- normalizing data (ensuring that there is "controlled redundancy")
- granularity of the data (identifying the lowest level of data that should be collected so that other data elements can be derived from it; for example, age group can be determined from age, but exact age cannot be determined from age group)
- process flow diagramming (documenting the work flow of processes such as coding and abstracting) o data flow diagramming (charting the flow of data from one process to another)
- data cleansing (the process of transforming data, handling missing data, etc., before integrating data from various sources)
- data dictionaries/metadata repositories (data about data-the source of the data elements, its definition, its synonym in other systems) o data security, protection, and integrity mechanisms
- guaranteeing concurrent data access to multiple users without system performance impact
- user-oriented data query, manipulation, and reporting capabilities

The Various Sources of Data

The data resource administrator must know the existence of and differences between:

- operational information systems (OIS) which, as the name implies, support departmental operations
- departmental databases that are not part of a packaged OIS product
- clinical data repositories that act as the database for electronic medical record software, supporting direct patient care
- data warehouses that store enterprise data either for decision support or for feeding other databases
- data marts (data extracted from the data warehouse about a specific topic and stored in a smaller decision support systems)
- primary research data (collected by a researcher through direct measurement of the patient)
- secondary data (either patient level or aggregated data collected by another researcher or organization and obtained by a knowledge worker for his or her use)
- document repositories (stored images of a document; excellent for viewing an entire report or progress note, but data elements cannot be extracted from it and manipulated)
- document-centric objects (a set of electronically stored text and discrete data elements which, when assembled, gives the appearance of a complete document; assembled document allows clinicians to view reports and notes naturally, while the electronically stored text and discrete data elements can be manipulated and analyzed)
- other media (voice, images)

The Data Resource Administrator's Role in the Organization

Information is a strategic resource for all healthcare enterprises. Therefore, the technology that delivers it is a strategic asset. But while the technology may be rapidly advancing, the organization's ability to do something meaningful with the information and knowledge is not as advanced. The data resource administrator will be a key player in helping the enterprise use information and knowledge for both strategic and operational purposes. The data resource administrator is familiar with the

evolution of an organization's IS infrastructure, understands the healthcare continuum, and communicates with users about their information needs. Armed with the proper tools, such as structured query language and data mining techniques, the data resource administrator can assist the enterprise by converting chaotic data into strategic information.

Related AHIMA Practice Briefs

- Data Quality Management Model(June 1998)
- Designing a Data Collection Process (May 1998)
- A Checklist to Assess Data Quality Management Efforts(March 1998)
- Maintenance of Master Patient (Person) Index (MPI) -- Single Site or Enterprise (October 1997)
- Merging Master Patient (Person) Indexes (MPI) (September 1997)
- Master Patient (Person) Index (MPI) -- Recommended Core Data Elements (July 1997)
- Developing Information Capture Tools (March 1997)

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