Healthcare Informatics: Data Quality, Warehousing and Mining Applications

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Presentation Outline

- Architecture
- Model
- Standards
- Integration
- Integrity
- Items
- Warehouse
- Customers
- Use

Architecture and Model

- Result of our history and business consolidation
- Limit of technology at time capital/systems were acquired
- Changing Market and Strategic drivers
- Separate Member Organization and corporate silos
- (Non) Optimized relationships with customers and sponsors
  - Business domain sponsorship (Finance and Operations)
  - Corporate Office customers
  - Member Organization customers

Data Flow

DSS requirements can be stratified into local, shared, and corporate. Differences between member organizations are based on geographic location, size, strategies, and product lines.

- Local
  - Local requirements are focused on integrating operational information and monitoring on a daily basis

- Shared System-Wide
  - Shared requirements are focused on establishing standards that enable summarization for monitoring the 'State of the System' as well as providing internal and external benchmark information

- Corporate
  - Corporate requirements are focused on monitoring the 'State of the System' and is a summary of monthly or quarterly local and shared information

Users and Processes:
DRGs, ICD-9 Codes, Revenue Codes, Departmental Codes to 3 digits, Patient Encounter Codes, Readmits [Order Item Codes, Severity Measures]

Standard Measures:
- General or Consolidated Management Systems
- Source Systems
- Tools
- Data Standards
**Building on the Basics**

- **Health System and external measure standards**
- **MO Customer Measure Standards**
- **Methods Standards**
- **Timing Control**
- **Data Standards**

**Standards**

- Need to solve 'we get different answers depending on where we look'
- Work on realigning the source data so that ALL downstream and dependant administrative, financial and clinical processes say the same thing
- The code cannot be 'reused' or meaning changed
- Business or Knowledge Domain manages process flow, methods, measures across systems
- The end domain controls the standard and the source system enforces the standard
- Data is controlled at the source (journal entries are bad)
- Computer Systems don’t solve integration, they enable

**Principles**

- Mathematically, a unit is an integer, and can not be divided.
- Consequently, the ordered item number has a unit value of one, meaning that each item is a unity of one:
  - Changes to or modifications of the meaning, results in the coded number losing integrity.
- Thus divide the meaning (e.g., dosage), the item can no longer be counted, you can only sum and extrapolate.
- (Another example, you will not find a family with 2.3 children, only Solomon was willing to do that).

**Standards Applied**

Usability vs. Maintainability

- Creation of summary tables
- Need for decode tables
- Prevention of meaningless joins
- Application of business logic
- Amount of training required

**Integration**

Integration is accomplished by standardizing functions, data and business processes and is critical to achieving customer priorities

Integration is critical to achieve customer priorities for a new Information Model and integrity through standard function, data, and business process are critical to achieve integration
Decision Support Integration

- The following slides represent the integration of financial and administrative decision support:
  - Integration of the data, measures, and results of the two DSS domains provide a consistent presentation of information for measure, analysis, and management
  - Integration of the domains leaves the source of data at the source without duplication. For example, do not duplicate the GL in another DSS reporting environment
  - Integration of the data using a single or standard workload statistic computes a consistent outcome for all management measures; e.g.,
    - GL data
    - Item level unit Costs
    - Departmental work load unit cost
    - Departmental productivity units
    - Departmental volume adjusted earned and budget costs
    - Provider, product, payer, performance

Summary of Key Points...

- Streamline the summarization and aggregation of information. Summarized and shared information should be a by-product of the operational process, not an added step.
- The new information model needs to provide efficient methods to:
  - Integrate ERP and patient administrative data with clinical data
  - Integrate within a Member Organization and across the system
  - Provide access to customized information in one location
  - Provide proactive and actionable information at the time of decision-making.
- Data, business process, and core function standards are necessary to provide integrated information and to aggregate information across the system: Guidelines and standards need to determine what is core and what is optional to each member organization.
- Plan for some component of variability in implementing standards across the system; secondary systems will be necessary to map non-standard data to standards for shared and summarized reporting

Options

- Use of Item Type in the code
  - Procedure
  - Supply
  - Drug
  - Statistic
  - Other
- CPT code with the modifier
- Straight number sequence
- Use ‘Consultant best practice’ as standard
- Combine department and item as item
- One to one relationship Order, ancillary, supply and CDM
- Change warehouse (DSS) to capture Order and Ancillary Detail

To the Warehouse

- Order - the clinical item code
  - Clinical item (CBC)
  - The sub-type: pathology, chemistry... for lab, or drug type, etc.
  - The status: complete, cancel, expired, resulted
  - The result: code and value
  - Clinical order item utilization (Location)
  - Clinician
- Charge - The financial item code
  - Revenue Department - GL
  - Expense Department - where the expense was incurred
  - Site - GL
  - Item Utilization (Location)
  - Financial Class
Key Data Subject Areas - The Customers View of Data

**Operational**
- Payers, Contracts
- Facility, Department
- Resources

**Clinical**
- Service Items
- Location
- Resource Cost

**Outcomes**
- Clinical/Financial
- Satisfaction

**Persons**
- Patients
- Practitioner

**Encounters**
- Diags, Procs
- Service Items
- Severity

**Benchmarks**
- Resources
- Outcomes
- Performance

**User-Defined**
- Groupings
- Data Elements

**DSS Activities**
- Database administration
- System acquisition, enhancement, maintenance, and operation
- Software conversion
- User training
- Decision-maker training
- User support
- Project Leadership
- Accessibility and report design and production
- Data collection
- ROI measurement
- System, data, and application audits
- Application project sponsorship
- Direction and management of field responsibilities

**DSS Performance Measures**
- Audit Results (accuracy, timeliness, relevance)
- ROI
  - Clinical Outcomes
  - Consumption
  - Cost
  - Quality
  - Competitive position
  - Satisfaction
  - Variances

**Purpose of Severity Measurement**
- Primarily used for equitable measurement and reimbursement
- Improving resource utilization
  - Reduce variation
  - Benchmarking
  - Target improvements
- Physicians to see other physician practice patterns
- Comparing outcomes across practitioners, providers
- Negotiations with Third-party Payors
- Improving Competitive Positioning

**Underlying Causes of Clinical Quality Problems (After Chassin)**
- Overuse [inappropriate or unnecessary services or where providing a service when its risk of harm exceeds its potential benefit].
- Underuse [failure to provide a service when it would have produced favorable outcomes].
- Misuse [avoidable complications of appropriate care].

**Identification of Undesired Variation**
- Multiple successive sieve drilldown
- Descriptive statistics for identification of baseline
- Drills and data mining for patterns
- Misuse identification
- Opportunities, performance and change management
Proceedings of the Seventh International Conference on Information Quality (ICIQ-02)

Statistically Driven Drilldown Approaches to Variation Analysis
Multiple Succession Tree Methodology

- Identify Patterns of Patient Outcomes
- Define Critical Information Flows
- Classify a Variance in a Cautious Manner
- Define Associated Characteristics
- With Medically Defined Variables
- Using Specific Resources
- Which can be further analyzed
- For Desired Outcomes/Variables
- Using a Plan for Trials

Department till Hx Replacement with No CC

<table>
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<tr>
<th>DEPARTMENT</th>
<th>SM TYPE</th>
<th>Adjusted</th>
<th>No. Obs</th>
<th>Total Cost</th>
<th>Mortality</th>
<th>Length of Stay</th>
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</thead>
<tbody>
<tr>
<td>Blood Services</td>
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<tr>
<td>Operating Room</td>
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<tr>
<td>Pharmacy</td>
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<td></td>
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<tr>
<td>Respiratory Care</td>
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</table>

For Inpatient Cases CY 2000 w/o Complications (after lessons)

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<thead>
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<th>Cost Unit</th>
<th>Cases</th>
<th>Mortality</th>
<th>Length of Stay</th>
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<tbody>
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<td>EXP_READ</td>
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Bibliography:


