Building a Practical Data Quality Management Solution

ABSTRACT

This presentation will describe the components of an approach to identifying and resolving the "bad data" problems that inevitably emerge as hospitals strive to become capable of implementing data driven patient care performance improvement initiatives. Incomplete or inaccurate data can compromise any attempt to motivate clinicians to modify patterns of care as higher levels of quality and efficiency are sought. Hospital leaders need to be certain that the measures they use to manage clinical quality improvement are based upon reliable data. Inaccurate data sent by hospitals to external agencies for benchmarking purposes can seriously compromise the validity of such efforts. Analyzing the business processes behind "data supply chains" provides a starting point to understanding how to identify and fix the root causes of these problems. The Cedars-Sinai team will share the practical approach they have developed to identifying and prioritizing data quality problems for resolution, and then applying the methods and tools of performance improvement to fix them. Presenters will discuss building a data quality culture, implementing a systematic approach to data quality incident reporting and resolution, developing the clinical statistical information initiative to proactively approve data prior to external submission, and the evolution of a data quality dashboard for electronic health record implementation.

BIOGRAPHY

Bruce N. Davidson
Director of Resource and Outcomes Management
Cedars-Sinai Health System

Bruce N. Davidson, Ph.D., M.P.H. is Director of Resource and Outcomes Management for Cedars-Sinai Health System, a position he's held since 1996. He leads a department of 23 in the development and implementation of initiatives to promote cost-effective, high quality medical care. He is also an Adjunct Assistant Professor in the Health Services Department at the UCLA School of Public Health, teaching Quality Improvement and Informatics for the Executive Masters Program. Dr. Davidson has 30 years of hands-on experience in leading, supporting, and evaluating patient care process improvement initiatives, as well as the delivery of patient care services in both inpatient and outpatient settings. He has published in the areas of medical treatment effectiveness, decision-making in health care, and measurement for quality improvement, with a recent focus on information management. His PhD in Health Services Research and his Masters in Public Health are from UCLA and his Bachelors is from MIT.

Alein T. Chun
Manager of the Data Quality Measurement Unit
Cedars-Sinai Health System

Alein T. Chun, Ph.D., M.S.P.H. is the Manager of the Data Quality Management Unit (DQMU) at Cedars-Sinai Health System. He is responsible for the day-to-day operation of the enterprise DQM function. He and his staff of four manage an assortment of activities related to both internal reporting and the release of clinical and administrative data to outside organizations. Essential data quality control activities include creating standard operating procedures for managing high priority data elements, solving critical data problems, validating key data and reports, and assuring quality of data released to outside entities. DQMU also acts as facilitator and change agent in business process improvement across the data supply chain business units. Dr. Chun holds a Ph.D. in Health Services and a Master's degree in Public Health both from UCLA.

Ann Chu
Team Lead, Data Quality Management Unit
Cedars-Sinai Health System

Ann Chu, M.H.A. is the Team Lead of the Data Quality Management Unit (DQMU) at Cedars-Sinai Health System. She works together with her team of analysts and programmers in activities related to improving data quality in the organization. Such activities include managing and resolving data quality incidents, validating major database enhancements and fixes, validating key reports that are submitted to outside agencies, educating users on data quality and the correct use of data, and improving data and reports through process improvement initiatives. Ann has 10 years of experience in IT and data quality management. She holds a Master's degree in Health Administration from the University of Southern California.

Thai Lam
Senior Analyst
Data Quality Management Unit
Cedars-Sinai Medical Center

Thai Lam is currently a Senior Analyst in the Data Quality Management Unit at Cedars-Sinai Medical Center, where he has worked since 1998. He has worked in both business and IT roles focusing on data quality management, business intelligence, reporting, and financial modeling.

Cedars-Sinai

Building a Practical Data Quality Management Solution for an Academic Medical Center

Bruce Davidson, PhD, MPH, Director
Alein Chun, PhD, MSPH, Manager
Ann Chu, MHA, Team Lead
Thai Lam, Senior Analyst

Data Quality Management Unit,
Resource & Outcomes Management
July 13, 2011

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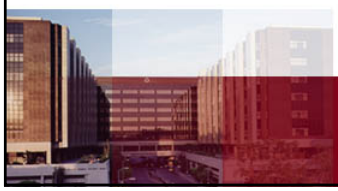
The Context

Cedars-Sinai Medical Center

- Academic Medical Center/Health System
- Largest Non-Profit Hospital in the Western US
- 958 Beds, 10,000 Employees, 2100 MDs
- Basic Annual Statistics
  - 57,000 inpatients
  - 565,000 outpatients
  - 82,000 ER visits
  - 7,000 deliveries



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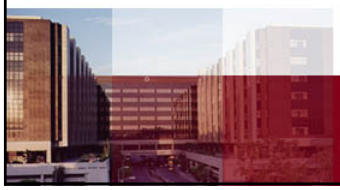
Context: Academic Medical Center
Data Management Implications

- Complex, data-intensive organization
- Distributed oversight responsibilities
- Transactional data systems populated as byproduct of patient care
- Data managed as departmental resource rather than as enterprise resource



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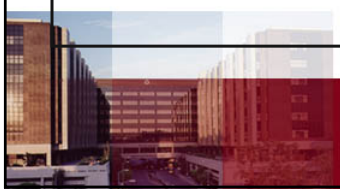
Resources Available to Carry Out Mission

MISSION	RESOURCES
▪ Patient care ▪ Teaching ▪ Research ▪ Community Service	▪ People ▪ Money ▪ Equipment ▪ Data



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Patient Care, Controlling Costs & Quality Improvement

ALL depend on DATA

DATA QUALITY MANAGEMENT

Putting in place the management functions that will proactively assure the availability of data that meets user-defined standards of completeness, accuracy, timeliness, and accessibility

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The Road to Data Quality

- Adopt a customer/consumer perspective
  - High quality data = data that is fit for use
- Manage data as a product
  - Understand the consumer's data needs
  - Manage data as the product of a well-defined production process
- Define Data Quality beyond accuracy
- Adopt and adapt classical PI/QI principles

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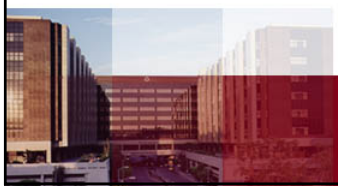
Our Road to Data Quality at Cedar-Sinai

- 1997 - DPG convened by CEO
- 1998 - DQMWG started by DPG with ROM as Chair; IQ Survey #1
- 1999 - DQM Objectives in Annual Plan; IQ Survey #2
- 2000 - DQM Objectives in Annual Plan; OSHPD Submission DQ Improvement Project
- 2001 - DQM Objectives in Annual Plan; DPG & DQMWG Charters renewed; IQ Survey #3
- 2002 - CEO designates ROM as "clearinghouse" to approve all clinical statistics reported out of CSMC
- 2003 - DPG initiates Data Warehouse Improvement Project (DWIP) following no P&Ls for 8 months
- 2004 - DPG funds DQMU in ROM, DWIP implemented; IQ Survey #4
- 2005 - DWIP Objectives in Annual Plan; DQMU staffed and DQM Program formalized; DQ Incident Reporting & Resolution framework established
- 2006 - DQM Objectives in Annual Plan & linked to executive incentive compensation; High Priority Data Element Certification Program initiated
- 2007 - Internal Audit initiates focus on minimizing risk due to defective data; DPG sets "Task Force" model to resolve specific DQ issues, IQ Survey #5
- 2008 - DPG & IA direct DQMU to lead Clinical Statistical Information initiative
- 2009 - 2011 - 438 DQ Incidents logged as of May 2011 of which 401 have been closed; CS Link Implementation presents new challenges



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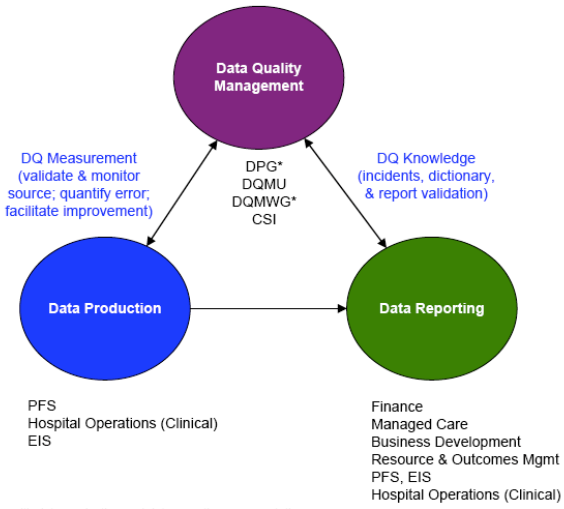
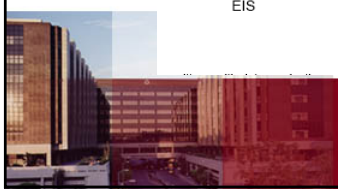
Data Quality Management Business Model





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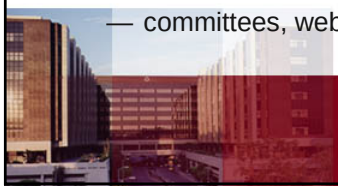
Components of Data Quality Management Program

- Data Governance
  - — Cross-functional committee make-up, structure, policy-setting & problem resolution functions (DPG & DQMWG)
- Data Quality Management Unit
  - — funding and staffing to support the work
- Data Quality Management Unit Activities
  - — putting out fires and pro-actively controlling data flow
- Data Certification
  - — standardization of high priority data elements, stewardship
- Communications
  - — committees, website, training and certification, surveys



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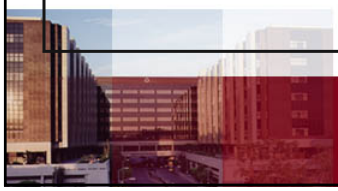
Sponsor for Data Quality Initiative

Data Provider Group

- Convened by CEO as governance group to resolve ongoing data discrepancies
- Executive Sponsors: Senior Vice Presidents
- Cross-functional membership includes Vice Presidents and Directors of all departments that provide data to the organization
- Chair - Resource & Outcomes Management



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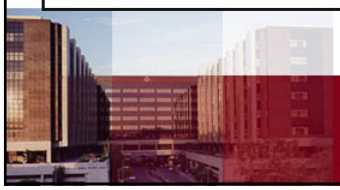
Task Force for Data Quality Issues

Data Quality Management Working Group

- Spun off as middle management task force
- Surfaces data quality issues; recommends solutions; and raises them up for prioritization
- Representation from data producers, data custodians, and data users
- Chair - Resource & Outcomes Management



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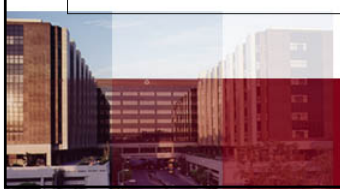
Staff Support for Data Quality Management

The Data Quality Management Unit

- Dedicated staff working with all affected areas to orchestrate necessary solutions
- Staffing Plan: Data Quality Manager, Team Lead, 2 Sr. Data Quality Analysts, and Database Specialist
- Resource & Outcomes Management oversees the DQMU



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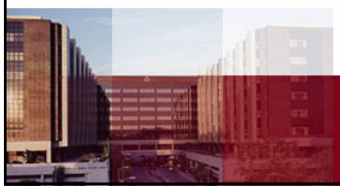
Pieces of the Puzzle

Implementing Corporate Data Quality Management

- Creating core functions
- Creating governance structures
- Creating communication channels



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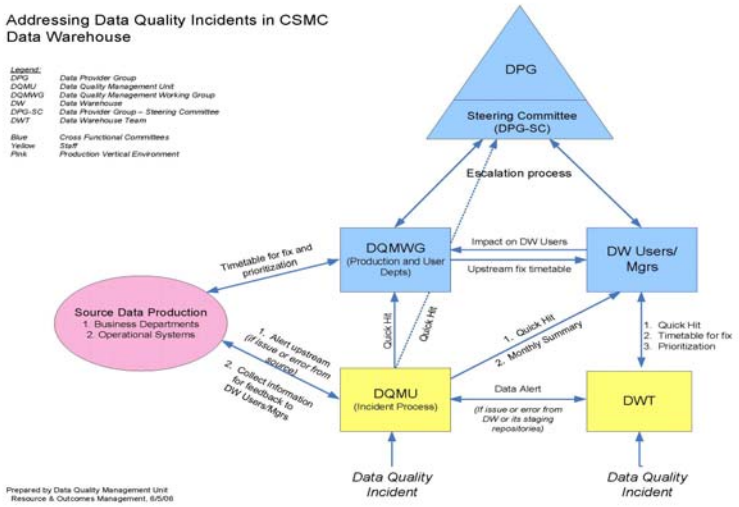
Putting Out Fires



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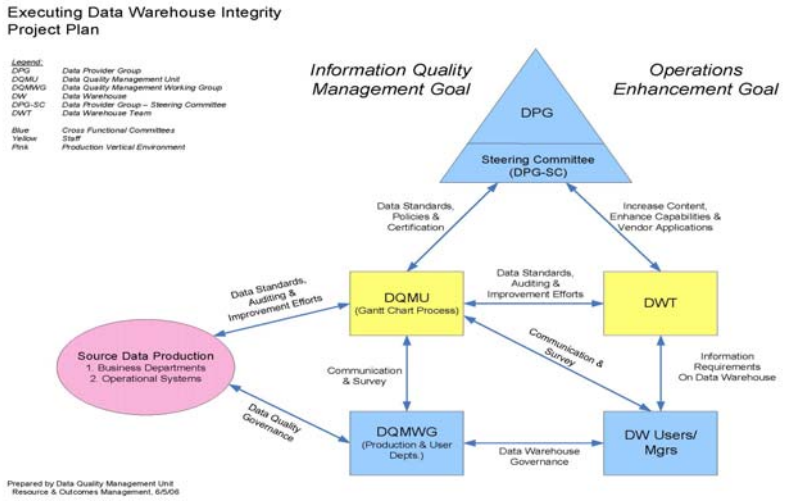
Laying Data Quality Foundation



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Expanding Core Functions

- External Data Risk Mitigation Function
  - Regulate release of clinical statistical information
  - Conduct clinical data quality audit
- Proactive Quality Assurance Function
  - Monitoring data in corporate data warehouse
  - Validating data corrections in data warehouse
  - Validating management reports
  - Performing user acceptance testing on new applications

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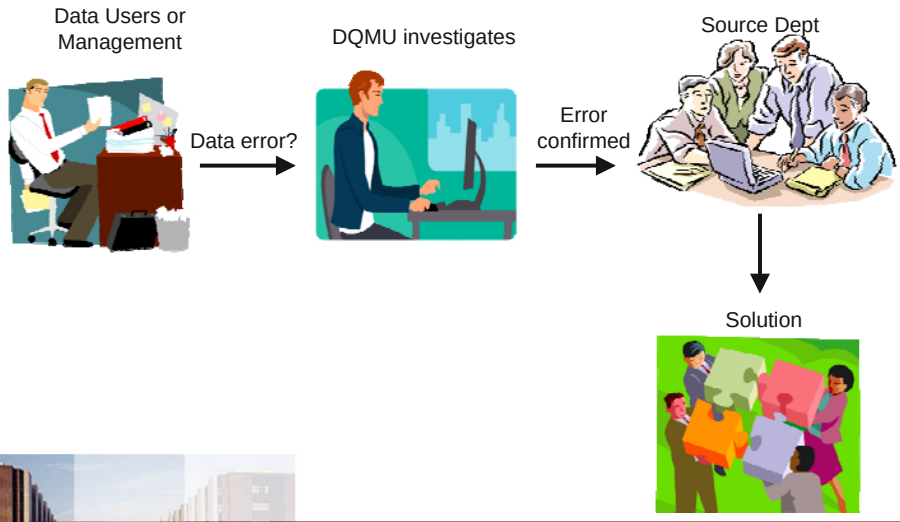
Data Quality Incident Reporting



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Data Quality Incident Reporting

Standard Operating Procedure

- Aims to standardize approach to reporting, handling, and addressing data quality issues
- 12-step process: from incident investigation, reporting & resolution, to monitoring
- 400+ incidents since DQMU inception in 2005
- Cross disciplines and departments
- Multiple ways to report

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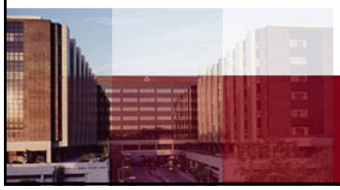
Data Quality Incident Reporting

Monitoring

- Started Nov 2010
- More proactive approach to deal with recurring data quality issues
- About 15 monitoring routines in place
- Errors sent directly to source department on a regular basis for resolution



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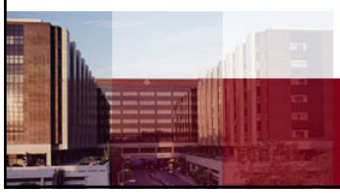
Data Quality Incident Reporting

What We Track

- Incident name/description
- Data category
- Reported by
- Error source department, error type
- Assigned to, status
- Number of affected records
- Table and fields affected
- Plus more…



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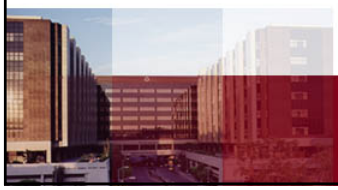
Data Quality Incident Reporting

Metrics

- Number of new incidents
- Number of open incidents
- Number of closed incidents
  - By month
  - By category
  - By error source department
  - New/recurring



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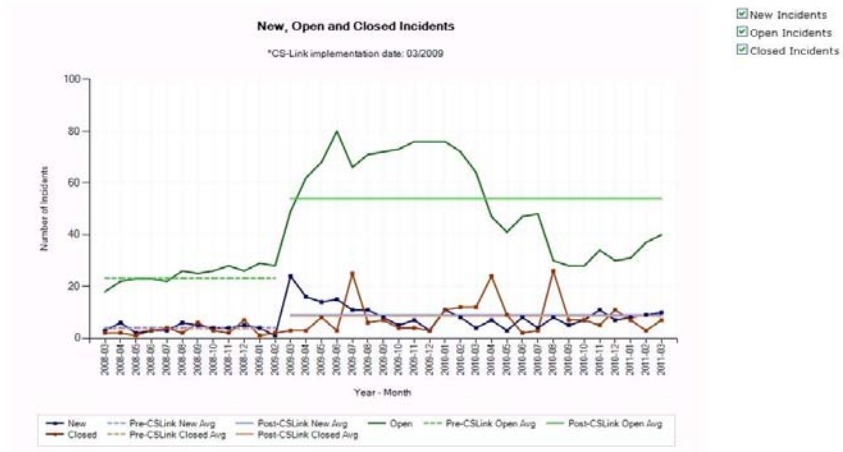
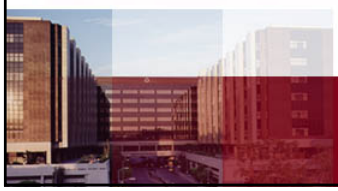
Data Quality Incident Reporting





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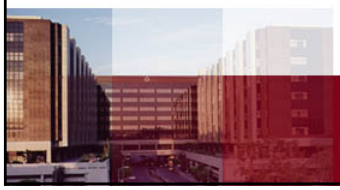
Data Quality Incident Reporting

The Technical Details

- Started with MS Access database in 2005, converted to Oracle in 2009
- Kept MS Access front-end
- About 10 tables



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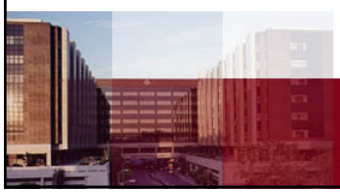
The DQMU Info Center

Purpose

- Provide a platform to keep data users informed on data quality
- Provide knowledge tools to report writers and management to help them become proficient in using the data
- Allow users to conveniently report new data quality incidents



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The DQMU Info Center

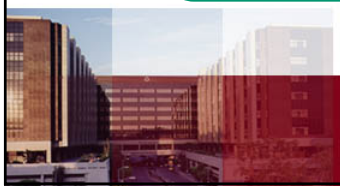
Information Products

Incidents
Data quality issues reported by data users

Data Dictionary
Information about data such as meaning, origin, usage, and format

Reporting Tips
Hints for accurate report writing

Crosswalks
Information on mapping of values between systems



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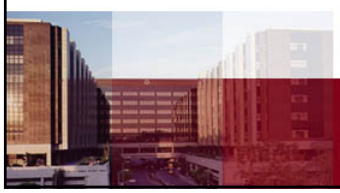
The DQMU Info Center

Evolution: Before

- Incidents - data quality issues already being tracked in a local database; new incidents published monthly via email
- Data Dictionary and Crosswalks - available on intranet site
- Report new incident - via email



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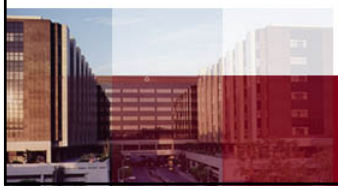
The DQMU Info Center

Evolution: After

- "One Stop Shop" - all information products available in one location
- Web-based - accessible to anyone
- Searchable
- Ability to view incident status and findings
- New component - Reporting Tips
- Report New Incident - available online
- New Incident Alert



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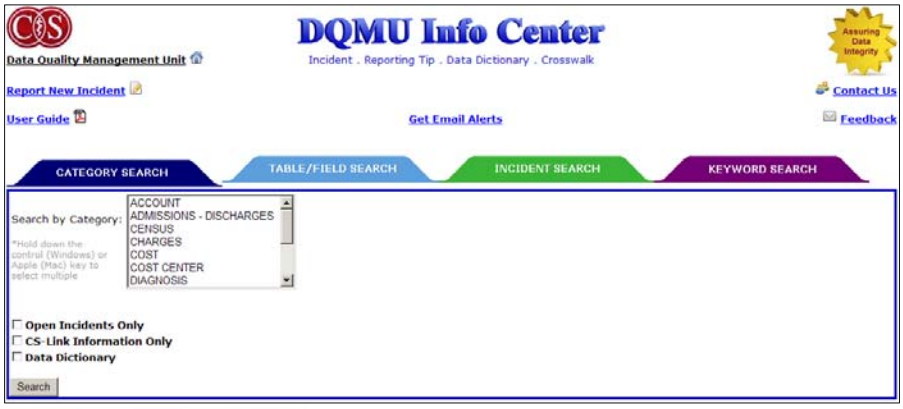
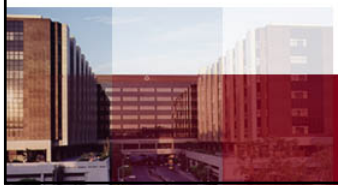
The DQMU Info Center

Info Center Main Screen





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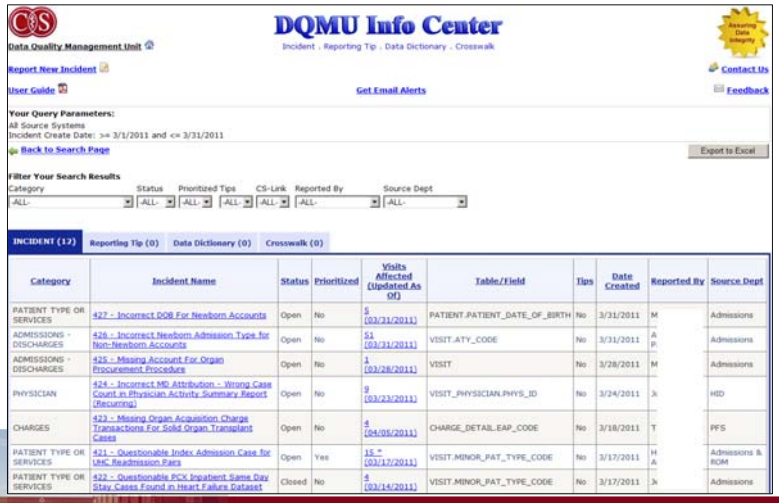
The DQMU Info Center

Info Center Search Results - Incidents



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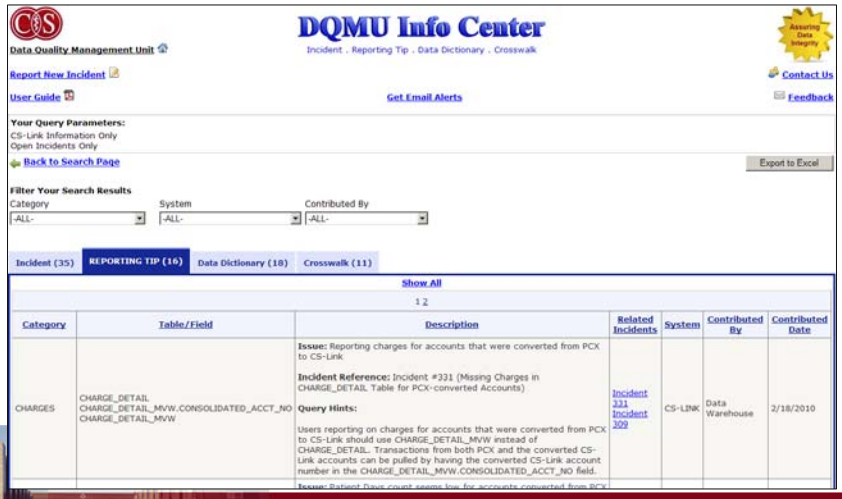
Info Center Search Results – Reporting Tips



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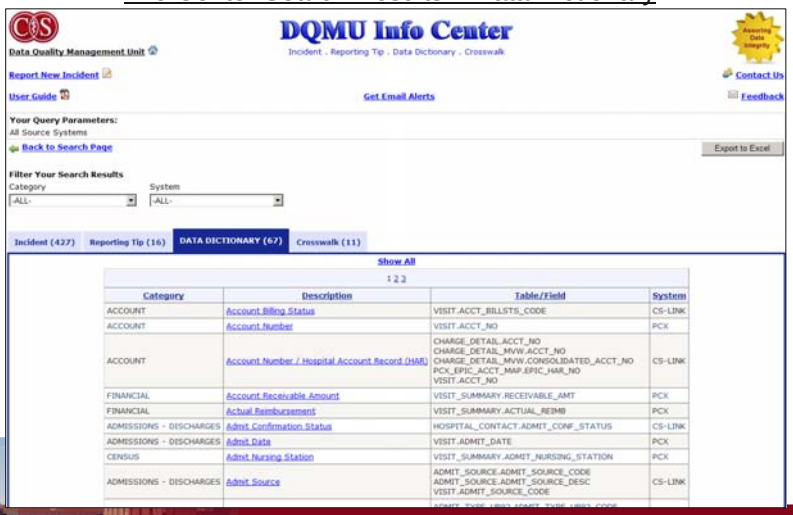
Info Center Search Results – Data Dictionary



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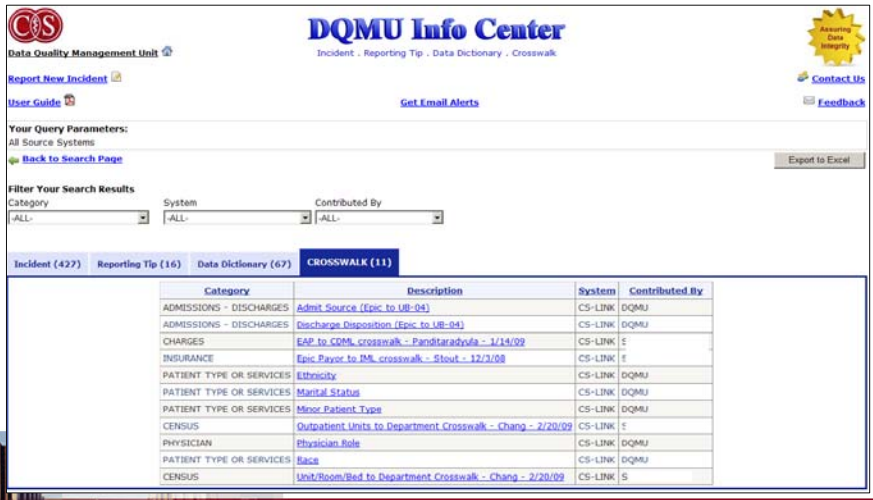
Info Center Search Results – Crosswalk



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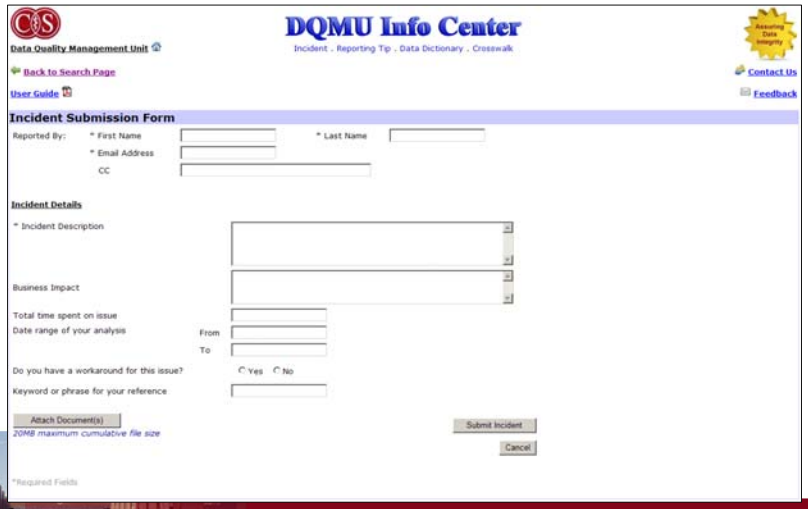
Info Center Report New Incident



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Info Center New Incident Alert

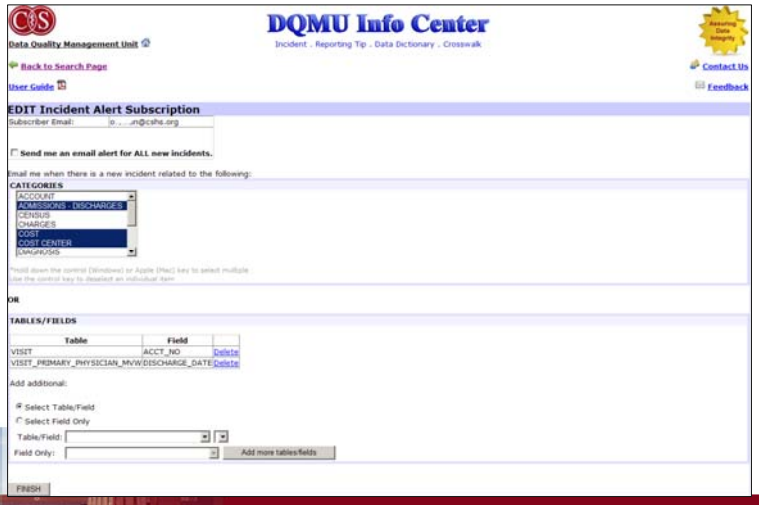

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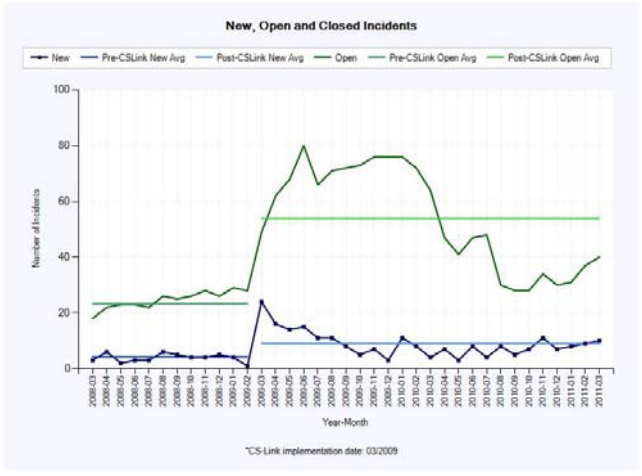
Chart



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The DQMU Info Center

The Technical Details

- Oracle Database: made use of the department's existing database platform
- ASP.Net: web framework used to build the site. Made use of the department's existing web server

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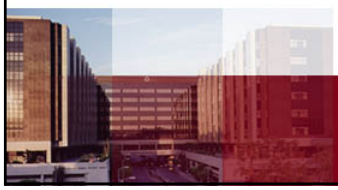
The Clinical Statistical Information (CSI) Initiative

Defining Clinical Statistical Information

- Clinically-oriented data or statistics about specific clinically-defined patient populations or individual patient records containing clinical data, AND
- The above data or statistics become available in the public domain or for use by an outside organization

This definition does not apply to the following: (a) billing data sent to payers; (b) research data under IRB; and (c) financial, operational, or administrative data that are sent externally without any Clinical Statistical Information.



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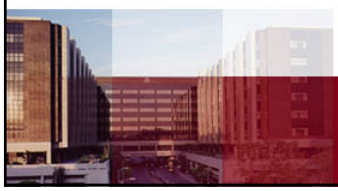
The Clinical Statistical Information (CSI) Initiative

Policy Evolution

- In 2002, a memorandum from the Medical Center's President and CEO specifically required all Medical Center departments to forward requests for data for public reporting of CSI to the Resource and Outcomes Management (ROM) Department for review and approval.
- In 2008, Internal Audit identified improvement opportunities in policies and procedures for accumulating and submitting CSI to outside organizations. ROM was charged to follow up with Medical Center departments who have not obtained proper approval for CSI submissions to external organizations.



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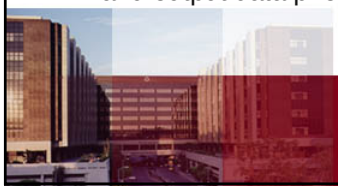
The Clinical Statistical Information (CSI) Initiative

Policy Evolution (cont'd)

- In 2008, corporate policy and procedure implemented governing all CSI released to outside organizations to be systematically prepared and formally approved prior to release.
  - The overarching purpose of this policy and procedure is to minimize any such risks, by minimizing the possibility that inaccurate or incomplete Clinical Statistical Information is released to outside organizations.
- In 2010, ROM Clinical Data Quality Audit for key data elements.
  - Data quality audit aims to ensure data integrity in the input, process, and output data prior to data submission to external organizations.



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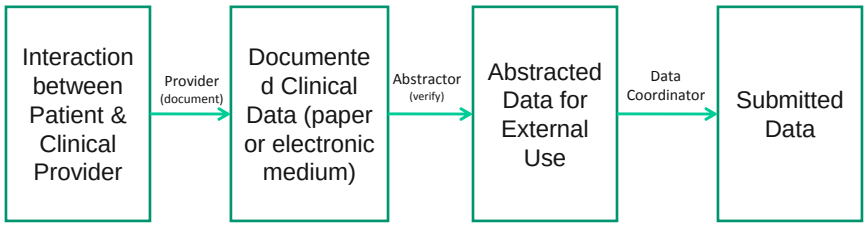
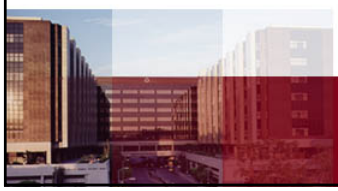
The Clinical Statistical Information (CSI) Initiative

Clinical Data Production Process





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The Clinical Statistical Information (CSI) Initiative

Basic Evaluation of Business Process for Data Production

- Create detailed business/data process flow diagram from initial data collection to final approved data for external release
- Identify key requirements in the process

—Data elements collected?

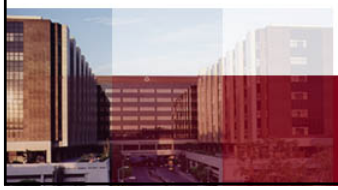
—Patient selection criteria, inclusions and exclusions?

—Primary data collector?

—Who produces the approved final data?

—When is the data collected, reviewed, edited and produced?

—How is the data collected? Paper, database, web-based, etc



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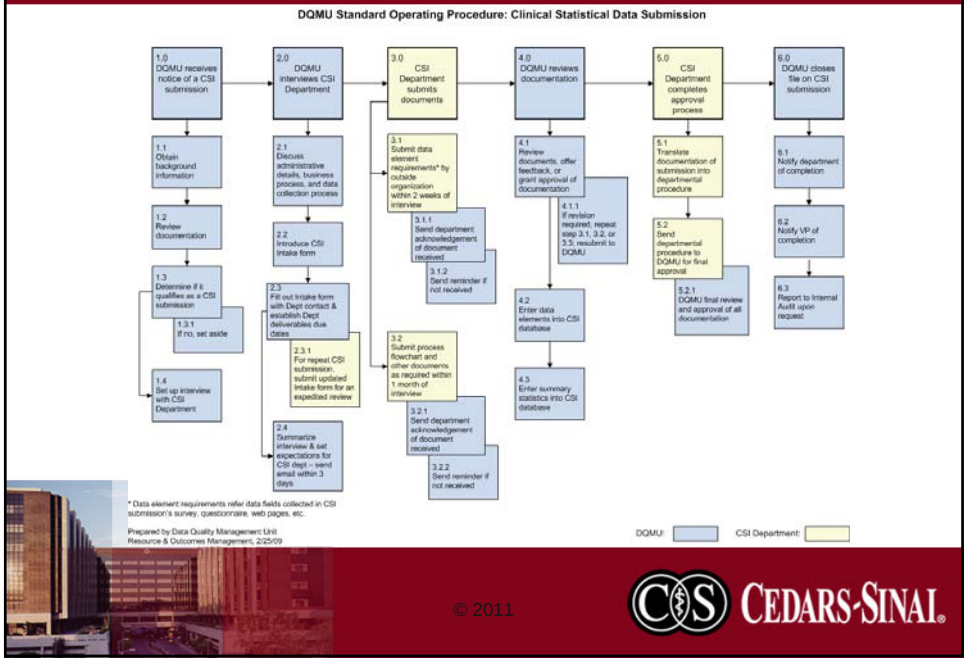

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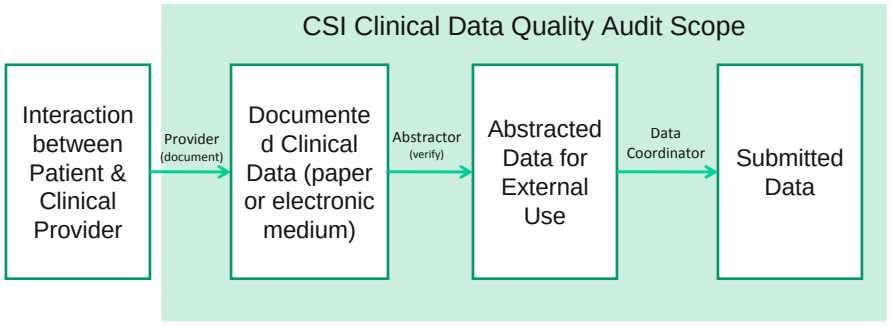

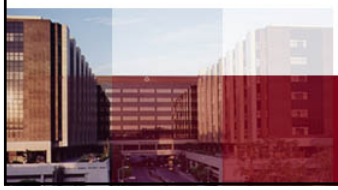

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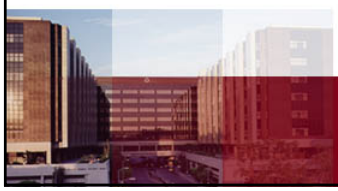
Data Quality Audit

- Notify clinical data submission client of data quality audit
- Develop data quality audit strategy and data control plan

—**Input testing:** identify and document data input methods

—**Process testing:** track flow of specific data element and/or record from source through submission

—**Output testing:** validate representative sample of submitted data against source data



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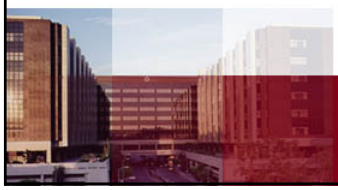
Data Quality Audit (cont'd)

- Present plan to client to establish agreement
- Execute testing plan with client
- Compile test results
- Report test results and significance of findings to client
- Recommend if necessary opportunities for improvement to client
- Follow-up with client on improvement plan



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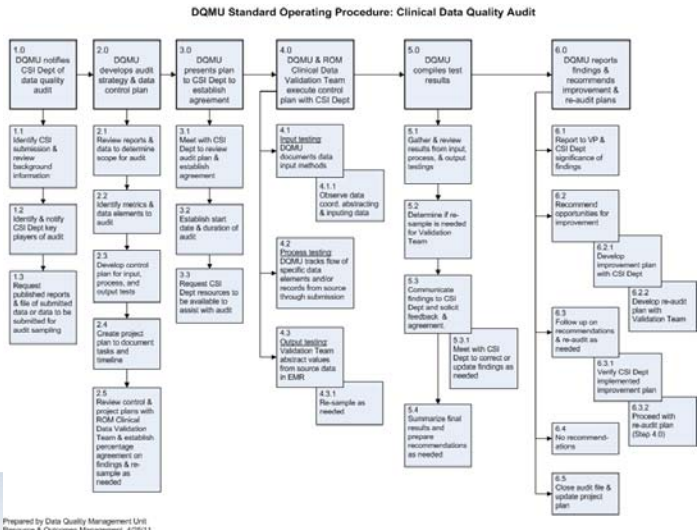

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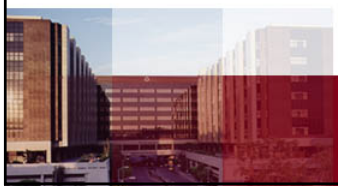
Quality Assurance Activities

- CSI submission: UHC clinical database data extracts
- User Acceptance Testing: Physician profiling application
- Rule-based data monitoring: Corporate Data Warehouse
- Report validation: ROM external reporting
- EHR validation: CS-Link Data Quality Dashboard



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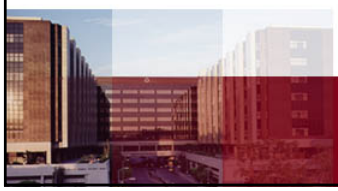
CS-Link Data Quality Dashboard Timeline

- CS-Link Quality and Regulatory Data Committee
  - Chartered June 2009
  - Broad membership
- CS-Link Data Quality Dashboard Working Group
  - Initiated December 2010
  - Membership includes representatives from CS-Link Clinical Documentation Build Team and CS Data Quality Management Team
- Development Currently Underway
  - Pilot Dashboard
  - Scalable Approach



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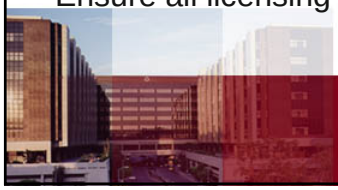
CS-Link Quality & Regulatory Data Committee

Committee Objectives

- Identify data elements necessary for Medical Center functions that should be available in CS-Link
- Provide a multi-disciplinary forum for review of CS-Link clinical content for purposes of Quality/Safety, resource management and Regulatory guidelines
- Help ensure that CS-Link designed clinician documentation will support abstracting and coding
- Ensure Quality and Core Measure reporting needs can be supported with CS-Link documentation tools
- Ensure all licensing requirements are maintained with CS-Link



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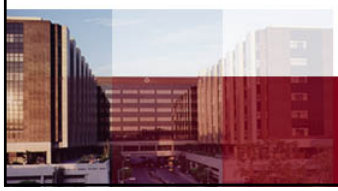
CS-Link Quality & Regulatory Data Committee

Key Activities

- Inventory of currently reported and anticipated data related to clinical care needed for public reporting or internal quality management
- Review CS-Link clinical content to ensure the support needs identified above
- Note where changes/modifications are needed, provide feedback to application team, ensure changes are made.



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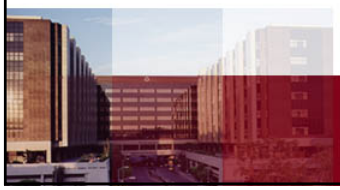
CS-Link Quality & Regulatory Data Committee

Key Activities (cont'd)

- Provide a consistent data quality perspective for content review and oversight
- Own the migration of current data abstracting related to quality, safety, regulatory and core measure reporting to CS-Link
- Develop and update dashboard of measures to reflect progress



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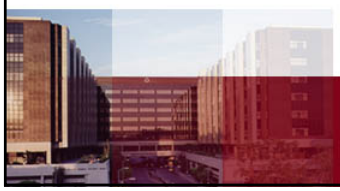
Charge for CS-Link Data Quality Dashboard Working Team

- For each key Quality Council Dashboard Measure, develop method for evaluating data quality at three points of data lifecycle
  - ensuring input data quality
  - ensuring internal logic data quality
  - ensuring extract data quality
- If all three are "green," then leadership can be confident that the measure is an accurate representation of performance



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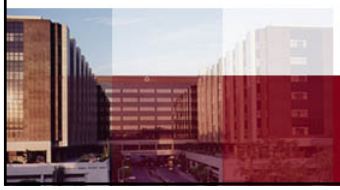
CS-Link Data Quality Dashboard: Progress

- Focus of Pilot Determined
  - VTE Prophylaxis for ICU patients that are part of the VAP Bundle
  - Will be used to develop a standardized process for evaluating data quality of other key Quality Council measures derived from CS-Link.
- The build team had completed, but not released, a new build for VAP Bundle, including VTE Prophylaxis, due to perceived data quality problems with initial build released with IP2.



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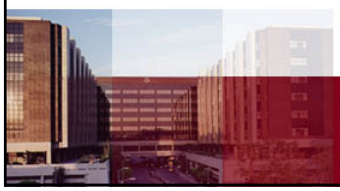
Process for Evaluating Input Data Quality

- Identify data elements needed to operationalize VAP ICU VTE Prophylaxis measure
- Develop Data Acquisition Workflow to document how required data elements are input into CS-Link
- Ensure new build will cover "gaps" by comparing:
  - Original CareVue data flow (believed to be correct)
  - Current CS-Link build (believed to be problematic)
  - Redesigned CS-Link build (believed to be correct)
- Develop and test reports to allow ongoing assurance of continuing data input integrity



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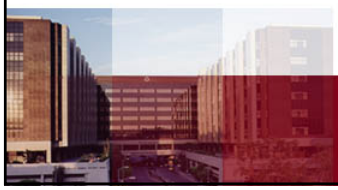
Process for Evaluating Internal Logic Data Quality

- Evaluate how each data element needed to operationalize VAP ICU VTE Prophylaxis measure:
  - flows from point of entry into CS-Link through the various internal CS-Link environments
  - until it reaches the CS-Link Clarity data base (from which it will be extracted for the Quality Council Dashboard)
- Ensuring integrity by highlighting any decision-points, programmed transformations, or calculations implemented during this process
- Develop and test reports to allow ongoing assurance of continuing internal logic data integrity



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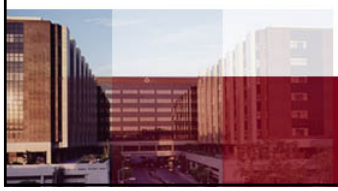
Process for Evaluating Extract Data Quality

- Evaluate how each data element needed to operationalize VAP ICU VTE Prophylaxis measure:
  - is extracted from CS-Link Clarity data base for use by the Business Objects team to construct the measure in the Quality Council Dashboard
- Ensuring integrity by highlighting any decision-points, programmed transformations, or calculations implemented during this process
- Develop and test reports to allow ongoing assurance of continuing data extract integrity



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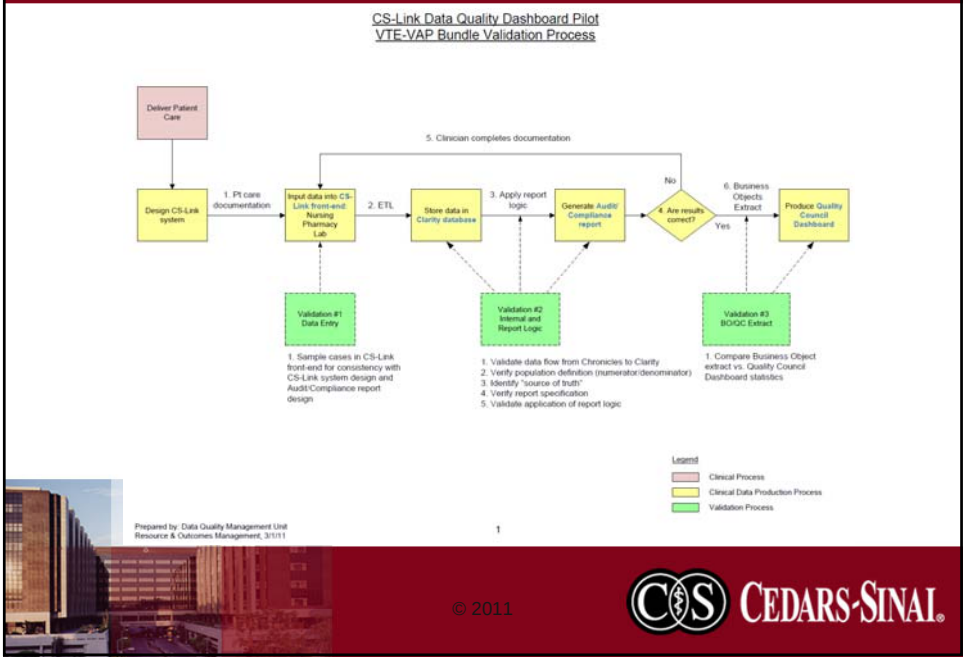
CS-Link Data Quality Dashboard: Process Flowchart



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Data Validation & Risk Management

Level / Approach	Method	Risk Management Effectiveness*	Data Access Requirement	Currently Applied
1. Sample-based	Spot check few cases	Low	Application, front-end	Yes
2. Population-based	Aggregated, ad hoc query	Medium	Database, back-end	No
3. Proactive monitoring	Rule-based, ongoing	High	Continuous; Database, back-end	No
* Special Case: Report validation	Report specs verification & content validation	High	Report specs; Database, back-end	No (specs & spot check only)

* Effectiveness is based on low to zero risk tolerance for error.

Prepared by: Data Quality Management Unit
Resource & Outcomes Management, 4/26/11

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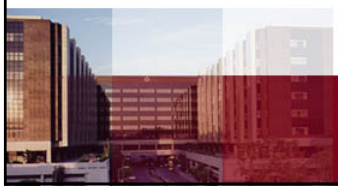
Concluding Thoughts on EHR Validation

- We believe we have a good working model
- We have established communication between the build team and the data quality management team
- There are limitations to the degree that this process can mitigate risks
- We will be challenged to implement this process for multiple measures simultaneously



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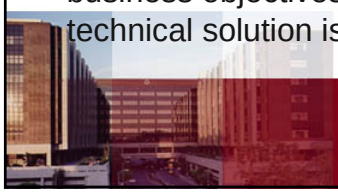
LESSONS LEARNED

- Simplify the message and repeat it constantly
- Usable data = Meaningful data (the user has the final say)
- Start with small projects and try to build on existing efforts to get early wins
- DQM work is inherently collaborative: governance, working groups, and problem resolution must include sufficient cross-functional representation
- Create a sustainable program, not just a short-lived project, by establishing and communicating standard routines
- Longstanding data problems usually result from divergent business objectives among data producing departments; the technical solution is usually the smaller hurdle.



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