Dickson Advanced Analytics Group

Marcy Neale, MS
Director, Clinical Analytics
WHO WE ARE
Carolinas HealthCare System has a unique story to share. Operating as a fully integrated system and connecting and transforming care delivery throughout the Carolinas, our overarching goal is to provide seamless access to coordinated, high quality healthcare – and provide that care closer to where our patients live.

With 41 hospitals and 900+ care locations, the depth and breadth of services results in a full continuum of integrated care including:

- Prevention and general wellness
- Primary care at more than 180 locations
- Specialty care via several nationally recognized service lines
- Critical care with one of the largest virtual (e-ICU) programs in the nation
- Continuing care including home health, skilled nursing, hospice, palliative care centers, inpatient/outpatient rehab, and long-term acute care hospital
AT-A-GLANCE

- 41 hospitals and 900+ care locations in North Carolina, South Carolina and Georgia
- More than 7,800 licensed beds
- 10.5 million patient encounters in 2012
- 3,000+ system-employed physicians, 14,000+ nurses and more than 60,000 employees
- $1.25 billion in community benefit in 2012
- More than $8 billion in annual revenue
- More than 50 disease-specific certifications from The Joint Commission – one of the highest totals in the country among comparable systems
- The region’s only Level I trauma center
- One of five academic medical centers in North Carolina
- One of the largest HIT and EMR systems in the country
DATA & ANALYTICS DRIVEN
DATA & ANALYTICS DRIVEN

• A centralized advanced analytics capability with more than 100 team members
  – Predicts health needs
  – Evaluates and elevates patient outcomes
  – Drives transformative solutions to promote the health of our communities

• Integrated electronic data warehouse with daily updates supports the platform for consistent business analysis throughout the enterprise
  – Access to more than a petabyte \((10^{15} \text{ bytes})\) of data across the System to provide business intelligence

• Predictive analytics to drive care management
  – Predict in real time a patient's risk for readmission, and create personalized discharge care plans

• Population health analytics
  – Population segmentation
  – Employer partnerships
  – Shared savings
Dickson Advanced Analytics Group (DA²) of Carolinas HealthCare System will be an innovative leader in advanced analytics and business intelligence that predicts health needs, continually elevates patient outcomes, and drives transformative solutions to promote the health of our communities.
Centralized Analytics

Executive (CEO, COO) → Analytics Group
   ↓
Service Line (e.g., Cardiovascular, Orthopedics)
   ↓
Function (e.g., Quality, Finance, Human Resources)

Decentralized Analytics

Executive (CEO, COO) → Service Line (e.g., Cardiovascular, Orthopedics) → Analytics Group
   ↓
Function (e.g., Quality, Finance, Human Resources) → Analytics Group
Why build a centralized capability?

1. Avoid duplicity of work
2. Streamline requests to best suited skill sets
3. Better answers to current questions with more comprehensive data (outcomes, cost, satisfaction, operations)
4. Answers to currently unanswerable questions (across continuum of care)
5. Early preparation for explosion of usable data availability from our EMR
6. Advance a culture of analytics across the enterprise
Service Lines and Functional Units

DA² Advisory Board

Advise, Guide, Recommend

Issues, Escalation

Requests

Estimates, Models, Reports, Analytics

DA²

Data Governance Council

Policies, DUA, External Data Decisions

Color Key:

Blue = Business
Maroon = DA²
Green = IT
Yellow = Governance

Data Marts
Extracts
Automation
SLA

IT Infrastructure Services

Policies, DUA, External Data Decisions

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DA²
Service Lines and Functional Units

ANALYTIC COMPETENCY

Color Key:
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- Pink = External

IT Infrastructure Services

Requests

Client Services
- Opportunity Analysis
- Demand Management

Requests

Analytic Services
- Shared Resource Pool
- Think Tank
- Leading metric development
- Key capabilities

Analytic Services

Research

Requests

Abstraction Services
- Shared Resource pool

Requests

Data Services
- Data Marts, Extracts, Automation, SLA

Requests

Reporting COE

Requests

IT Infrastructure Services

Requests

Services
# Core Analytical Functions

<table>
<thead>
<tr>
<th>Clinical Analytics</th>
<th>Financial and Operational Analytics</th>
<th>Healthcare Economics</th>
<th>Population Health Analytics</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Quality</td>
<td>• Performance Metrics</td>
<td>• Forecasting</td>
<td>• Employer Partnerships</td>
</tr>
<tr>
<td>• Patient Experience</td>
<td>• Marketing</td>
<td>• Program Evaluation</td>
<td>• Shared Savings/Payment Reform</td>
</tr>
<tr>
<td>• Public Reporting</td>
<td>• Business Planning</td>
<td>• Cost Benefit Analysis</td>
<td>• Care Management</td>
</tr>
<tr>
<td></td>
<td>• Input Cost</td>
<td></td>
<td>• Cost of Care</td>
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**Carolinas Healthcare System**
## Analytical Roles

<table>
<thead>
<tr>
<th>Title</th>
<th>Function</th>
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</thead>
<tbody>
<tr>
<td>Clinical Research Nurse</td>
<td>Medical record abstraction</td>
</tr>
<tr>
<td>Informatics Developers</td>
<td>Data preparation &amp; tool development</td>
</tr>
<tr>
<td>BI Analysts</td>
<td>Prepare dashboards and reports</td>
</tr>
<tr>
<td>Data Scientist</td>
<td>Methodological development for analysis and policy</td>
</tr>
<tr>
<td>Statistician</td>
<td>Predictive analytics and statistical methodology</td>
</tr>
<tr>
<td>Health Services Researcher</td>
<td>Research outcomes, cost, and payment drivers</td>
</tr>
<tr>
<td>Epidemiologist</td>
<td>Analyze population health</td>
</tr>
<tr>
<td>Applications Specialist</td>
<td>Technical development of clinical applications</td>
</tr>
<tr>
<td>Healthcare Economist</td>
<td>Forecasting, evaluation</td>
</tr>
</tbody>
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PATIENT-CENTERED POINT OF CARE SUPPORT

Learning Collaborative

Clinical Practice

PCPCS

Analytics
HELPING PATIENTS THROUGH ANALYTICS
What is a HEN?
Centers for Medicare & Medicaid Services Innovation Center (CMMI) announced ‘Partnership for Patients’ April 2011

Provides funding to create Hospital Engagement Networks (HENs) to achieve two core goals:

1 – reduce preventable hospital readmissions by 20%
2 – reduce inpatient harm by 40%

HEN performance period is 3 years (2012-2014)

27 HENs across the country, one of 5 healthcare systems awarded the contract

Leading Edge Advance Practice Topics (LEAPT) contract awarded to six high performing HENs to accomplish additional deep dives into new harm areas (Oct 2013 – Dec 2014)
Severe Sepsis & Septic Shock
Antibiotic Stewardship & C. Diff.
Readmissions Across Continuum
Procedural Harm-OR Coaching
HAC Cost Reporting
Severe Sepsis & Septic Shock
Antibiotic Stewardship & C. Diff.
Carolinas HealthCare System HEN is demonstrating improvement in all Partnership for Patients Focus Areas.
HEN: KEYS TO SUCCESS

Alignment of CHS Quality Goals with HEN focus areas

Engagement through combined “top-down” and “bottom-up” structure

Centralized data analytics and innovation (predicting readmission risk)

Data transparency and “healthy” competition

HEN Quality Coaches and Key Staff from Medication Safety and Infection Prevention to provide high level perspective and guidance

Leadership awareness, presence and engagement
Drive and integrate quality and patient safety excellence

Formal, coordinated structure

Rapid replication of best practices

Address existing gaps in care

Monthly videoconference meetings

Foster team contribution to achieving clinical excellence
QUALITY AND PATIENT SAFETY

Early August 2013
CHS Quality and Service Goals Retreat

September 2013
Definitions, Baseline, and Target Development

November 2013
QCC Endorses 2014 Goal Targets

Late August 2013
Preliminary QCC Discussion of Priorities

October 2013
Facility Presentations

December 2013
QCC Chair Reviews Specific Goals and Final Goals are Published to QCC for Comment
## Hospital Name

### Quality and Service Metrics 2014

<table>
<thead>
<tr>
<th>Metric</th>
<th>Base</th>
<th>Target</th>
<th>Stretch</th>
<th>Apr2013 - Mar2014</th>
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<td>97</td>
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<td></td>
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** Cut off date for readmissions is February 12, 2014 to reduce effect of incomplete data.

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YTD Colors:  ■ No Goals Set | ■ Below Base | ■ Below Target | ■ Above Target | ■ Above Stretch
QUALITY AND PATIENT SAFETY
# Quality and Patient Safety

## Patient Safety Composite Metrics 2014

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<tr>
<th>Metric</th>
<th>Apr2013 - Mar2014</th>
<th>Current Rolling Year</th>
</tr>
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<tbody>
<tr>
<td><strong>Catheter Associated Urinary Tract Infection</strong></td>
<td>1.394</td>
<td></td>
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<tr>
<td><strong>Central Line Associated Bloodstream Infection</strong></td>
<td>0.485</td>
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<tr>
<td><strong>Clostridium Difficile (Lab ID)</strong></td>
<td>0.927</td>
<td></td>
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<tr>
<td><strong>Falls with moderate to severe injury and Other Trauma</strong></td>
<td>0.447</td>
<td></td>
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<tr>
<td><strong>PC-01 Early elective delivery</strong></td>
<td>0.202</td>
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<tr>
<td><strong>PSI-03 Pressure ulcer</strong></td>
<td>0.110</td>
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<tr>
<td><strong>PSI-04 Death among surgical inpatients</strong></td>
<td>0.733</td>
<td></td>
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<tr>
<td><strong>PSI-06 Iatrogenic pneumothorax</strong></td>
<td>0.428</td>
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<tr>
<td><strong>PSI-11 Postoperative respiratory failure</strong></td>
<td>0.513</td>
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<td><strong>PSI-12 Postoperative PE or DVT</strong></td>
<td>0.718</td>
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<tr>
<td><strong>PSI-13 Postoperative sepsis</strong></td>
<td>0.183</td>
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<td><strong>PSI-14 Postoperative wound dehiscence</strong></td>
<td>0.511</td>
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<td><strong>PSI-15 Accidental puncture or laceration</strong></td>
<td>0.190</td>
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<tr>
<td><strong>PSI-17 Birth trauma rate - injury to neonate</strong></td>
<td>0.554</td>
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<tr>
<td><strong>PSI-18 Obstetric trauma rate - vaginal delivery with instrument</strong></td>
<td>0.523</td>
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<tr>
<td><strong>PSI-19 Obstetric trauma rate - vaginal delivery w/o instrument</strong></td>
<td>0.734</td>
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<tr>
<td><strong>Surgical Site Infection (COLO/HYST)</strong></td>
<td>0.568</td>
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**YTD Colors:**  
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- Below Target  
- Above Target  
- Above Stretch
HOME HEALTH TRANSFERS

- **Transfers to Acute Care from Home Health (%):**
  - Jan-10: 17%
  - Jul-10: 22%
  - Jan-11: 27%
  - Jul-11: 32%

- **Improvement in Oral Medication Management (Lower is Better):**
  - Roper

- **Strategy Execution:**
  - Analyze and Develop Strategy
  - Execute Strategy

- **Results:**
  - 863 Admissions Avoided
  - $7.9 Million Savings
### Telemonitoring Yields Significant Improvement in Readmissions

<table>
<thead>
<tr>
<th></th>
<th>7 Days</th>
<th>14 Days</th>
<th>30 Days</th>
<th>Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usual Care (N = 1137)</td>
<td>11.9%</td>
<td>19.9%</td>
<td>29.1%</td>
<td>22.3%</td>
</tr>
<tr>
<td>Telemonitor (N = 638)</td>
<td>8.5%</td>
<td>14.9%</td>
<td>22.6%</td>
<td>22.6%</td>
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p = 0.028, p = 0.016, p = 0.012
OUR FUTURE STATE
ANNUAL HEALTH EXPENDITURES

Healthcare Cost Drivers

- Technology and Prescription Drugs
- Longer Lifespans
- Chronic Disease (75%)
- Administrative Costs (7%)
- Lack of Accountability

Source: Centers for Medicare and Medicaid Services.
Limit Chronic Disease Progression

- High Risk
- Low Risk

- Low Cost
- High Cost

Terminated
Disabled
Deceased
Completing the 360º View

**Consumer Data**
- Provides socio-geographic consumption trends.

**Personal Health Survey**
- Captures health and lifestyle risks not readily available elsewhere.

**Claims**
- Supply a wealth of medical data at the member level.

**Biometric and Clinical Data**
- Identify the status of disease not just its presence.

**Patient**
Completing the 360° View

- Multi-year strategy
- 11-system integration
- >300 users (including call center)
- 360° Patient View CRM for Care Management
ENTERPRISE DATA WAREHOUSE

- Statistical analysis
- Predictive Analytics
- Optimization

IBM InfoSphere suite

Source Systems

Source Mapping
Metadata
ETL

Atomic

Conform

Data Mart 1
Data Mart 2
Data Mart N

Enterprise Data Warehouse
IBM Data Model, Netezza database appliance