Engaging Staff with Predictive Analytics to Reduce Labor Costs

Mary Pat Sullivan, RN, MSN, CNS
Chief Nursing Officer & Chief Experience Officer, Overlook Medical Center, Atlantic Health System
About HIMSS

HIMSS is a global voice, advisor and thought leader of health transformation through health information and technology with a unique breadth and depth of expertise and capabilities to improve the quality, safety, and efficiency of health, healthcare and care outcomes. HIMSS designs and leverages key data assets, predictive models and tools to advise global leaders, stakeholders and influencers of best practices in health information and technology, so they have the right information at the point of decision.

HIMSS drives innovative, forward thinking around best uses of information and technology in support of better connected care, improved population health and low cost of care. HIMSS is a not-for-profit, headquartered in Chicago, Illinois, with additional offices in North America, Europe, United Kingdom and Asia.

HIMSS Vision: Better health through information and technology.
About the HIMSS Nursing Informatics Community

www.himss.org/ni
Moderator

Kathleen McGrow, DNP, MS, RN, PMP
Chief Nursing Information Officer,
Microsoft Health & Life Science Industry Team
Speaker

MaryPat Sullivan, RN, MSN, CNS
Chief Nursing Officer & Chief Experience Officer, Overlook Medical Center, Atlantic Health System
Agenda

• Atlantic Health System overview
• Creating a Data-Driven Culture
• Predictive Analytics for Capacity Planning
• Outcomes based score card – Hospital at a glance
• Achievements to date
Learning Objectives:

• Learn how predictive analytics has saved labor costs by being able to predict patient census and optimize bed allocation for staffing.

• Learn how the use of data empowered the decision-making process and improve staff and patient satisfaction.

• Learn about initiatives to engage staff and how predictive analytics can enhance organizational objectives.
Atlantic Health System (2018)

- 16,856 employees
- 4,426 physicians
- 1,758 licensed beds
- 81,717 admissions
- 8,452 births
- 298,727 Emergency visits
- 1,371,081 Outpatient visits
- 50,563 hospice visits

Size and Scale
- 5 hospital system with $2,417 revenue
- Efficient contracts with largest areas health plans
- Alignment strategies with key physician groups
- Non-union

Quality & Specialized Services
- Gagnon Cardiovascular Institute
- Carol G. Smith Cancer Center
- Goryeb Children’s Hospital
- Atlantic Neuroscience Institute
- UHC data base participant

Market Leader
- Leading market share position, more than double nearest competitor
- Excellent socio-demographic characteristics
- Currently overseeing 3 ACO’s
Atlantic Health System

Vision
• Empowering our communities to be the healthiest in the nation

Mission
• Deliver high quality, safe, affordable patient care within a healing culture
• Educate, in an exemplary manner, present and future health care professionals
• Innovate through leadership

Shared Values
• Professionalism, Respect, Involvement, Dignity, Excellence

Morristown Medical Center ranked #28 hospital in United States, #1 in NJ
Goal: Reduce Costs over 3 years

- Reduce overall costs
- Tightly manage labor costs
- Reduce premium pay
- Reduce agency
- Increase revenue
- Reduce leakage
Overlook Medical Center
(2018)

- 3,723 employees
- 1,842 physicians
- 504 licensed beds
- 22,466 admissions
- 2,692 births
- 100,147 Emergency visits
- 264,308 Outpatient visits

Overlook Medical Center ranked #98 hospital in United States
Overlook Strategic Goals

**Desired Competencies**
- Proactive/real-time decision-making
- Improved patient placement
- Ability to address and monitor
  - Service line profitability
  - Labor analytics

**Desired End State**
Organizational Transparency

**Primary Goals**
- Improve patient throughput, initially ED
- Match nurse staffing to patient demand

**Enabling Technology**
- Self-serve analytics
## Need for Timely, Data-Drive Decisions

<table>
<thead>
<tr>
<th>3-5 years</th>
<th>1-2 years</th>
<th>1-4 months</th>
<th>&gt;30 days - Today</th>
</tr>
</thead>
<tbody>
<tr>
<td>What do we need to look like under value-based purchasing?</td>
<td>Where can we find more savings without drastic cuts?</td>
<td>How do we staff for unknown peaks and valleys?</td>
<td>What do we need to do to get these 7 patients out by noon?</td>
</tr>
<tr>
<td>What is the next best use for this capacity?</td>
<td>…and without hurting care quality, patient satisfaction or staff satisfaction?</td>
<td>What is the downstream impact of this OR schedule?</td>
<td>What can we do today to prepare for tomorrow?</td>
</tr>
</tbody>
</table>

**How do we optimally deploy our capital and people resources?**
Capacity Planning in Healthcare

Process by which hospitals can effectively determine the resources (beds and staff) required to meet the forecast patient demand over a given period.

1. Review & Analyze Historical Trends
2. Forecast Patient Demand
3. Schedule Resources to Meet Demand
4. Monitor & Measure Against Plan
5. Adjust & Refine Plan
Aligning Resources with Predicted Patient Demand

- Identify patterns and trends
- History based on last 4 years patient demand, last 2 years staffing
- Fine-tune timing of demand with initiatives put into place
• Nursing biggest cost center
• How do we get the rest of the organization to use similar tools?
‘If the staffing is not balanced appropriately then my staff get pulled to other units, which is always a dissatisfier. Now that we know what type of admissions are arriving and when, we can assign the right staff and prepare for them.’
Anticipating Hourly Admissions and Discharges

02 Today's Ins and Outs Total

Print setup
Wednesday, June 05, 2019 10:15AM

Patients In

- Projected: 13
- Total Projected: 127
- Actual

Patients Out

- Projected: 9
- Total Projected: 124
- Actual

<table>
<thead>
<tr>
<th>Unit (Group)</th>
<th>Projected</th>
<th>Actual</th>
<th>Variance</th>
<th>Projected</th>
<th>Actual</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>OVERLOOK MEDICAL CENTER</td>
<td>13</td>
<td>0</td>
<td>-13</td>
<td>9</td>
<td>0</td>
<td>-9</td>
</tr>
<tr>
<td>Critical Care</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Medicine</td>
<td>5</td>
<td>0</td>
<td>-5</td>
<td>3</td>
<td>0</td>
<td>-3</td>
</tr>
<tr>
<td>Neuro</td>
<td>2</td>
<td>0</td>
<td>-2</td>
<td>1</td>
<td>0</td>
<td>-1</td>
</tr>
<tr>
<td>Psychiatry</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Surgery</td>
<td>1</td>
<td>0</td>
<td>-1</td>
<td>3</td>
<td>0</td>
<td>-3</td>
</tr>
<tr>
<td>Women &amp; Children</td>
<td>5</td>
<td>0</td>
<td>-5</td>
<td>1</td>
<td>0</td>
<td>-1</td>
</tr>
</tbody>
</table>
STEPS: Treatment/Clinical

- Optimal resource allocation
- Standardized staffing model
- Balanced workloads
- Engaged physician leadership

- Deceased care silos
- Cooperation at planning vs. unit level
Physician Engagement

- Monthly Executive Patient Throughput Team
- CMO
- Nurse Managers
- Physician over Case Management
- Directors of Neuroscience, Finance, Operations, ED, Special Projects
STEPS: Electronic Secure Data

- Proactive, data-driven behavior
- Reliance on single source of truth
- Leveraging data across planning horizons

- “It’s like scarily predictable.”
- “I love that all the information can be gathered in one place.”
- “The biggest thing is how accurate it is and how much you can look at things ahead of time and then make decisions based in that.”
- It creates transparency… that is the first step in improving processes.”
## Projection Accuracy

<table>
<thead>
<tr>
<th>Midnight on:</th>
<th>Census from CapPlan</th>
<th>Projections Made:</th>
<th>1 Day Prior Projection Accuracy</th>
<th>2 Day Prior Projection Accuracy</th>
<th>3 Day Prior Projection Accuracy</th>
<th>4 Day Prior Projection Accuracy</th>
<th>5 Day Prior Projection Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Median</td>
<td>Average</td>
<td>Median</td>
<td>Average</td>
<td>Median</td>
<td>Average</td>
<td>Median</td>
</tr>
<tr>
<td>Today</td>
<td>301</td>
<td>364</td>
<td>366</td>
<td>351</td>
<td>334</td>
<td>336</td>
<td>344</td>
</tr>
<tr>
<td>Monday, May 20, 2019</td>
<td>312</td>
<td>374</td>
<td>374</td>
<td>350</td>
<td>334</td>
<td>332</td>
<td>336</td>
</tr>
<tr>
<td>Tuesday, May 21, 2019</td>
<td>315</td>
<td>366</td>
<td>368</td>
<td>358</td>
<td>334</td>
<td>332</td>
<td>336</td>
</tr>
<tr>
<td>Wednesday, May 22, 2019</td>
<td>318</td>
<td>385</td>
<td>368</td>
<td>353</td>
<td>334</td>
<td>332</td>
<td>336</td>
</tr>
<tr>
<td>Thursday, May 23, 2019</td>
<td>294</td>
<td>337</td>
<td>334</td>
<td>351</td>
<td>334</td>
<td>332</td>
<td>336</td>
</tr>
<tr>
<td>Friday, May 24, 2019</td>
<td>266</td>
<td>311</td>
<td>328</td>
<td>350</td>
<td>351</td>
<td>350</td>
<td>350</td>
</tr>
<tr>
<td>Saturday, May 25, 2019</td>
<td>266</td>
<td>321</td>
<td>359</td>
<td>381</td>
<td>382</td>
<td>382</td>
<td>382</td>
</tr>
<tr>
<td>Sunday, May 26, 2019</td>
<td>256</td>
<td>322</td>
<td>344</td>
<td>345</td>
<td>345</td>
<td>345</td>
<td>345</td>
</tr>
<tr>
<td>Monday, May 27, 2019</td>
<td>258</td>
<td>310</td>
<td>310</td>
<td>291</td>
<td>291</td>
<td>291</td>
<td>291</td>
</tr>
<tr>
<td>Tuesday, May 28, 2019</td>
<td>272</td>
<td>318</td>
<td>299</td>
<td>286</td>
<td>286</td>
<td>286</td>
<td>286</td>
</tr>
<tr>
<td>Wednesday, May 29, 2019</td>
<td>267</td>
<td>309</td>
<td>296</td>
<td>294</td>
<td>294</td>
<td>294</td>
<td>294</td>
</tr>
<tr>
<td>Thursday, May 30, 2019</td>
<td>289</td>
<td>335</td>
<td>333</td>
<td>357</td>
<td>357</td>
<td>357</td>
<td>357</td>
</tr>
<tr>
<td>Friday, May 31, 2019</td>
<td>349</td>
<td>84.66%</td>
<td>83.94%</td>
<td>84.66%</td>
<td>83.94%</td>
<td>84.66%</td>
<td>83.94%</td>
</tr>
</tbody>
</table>
Leveraging Data Across Planning Horizons

**Long Term Planning**
- Model impact of network changes, regional plan
- Budget and physical capacity decisions
- Set targets and assumptions (linking plans)

**Weekly & Monthly Planning**
- Manage current variation to plan
- Update forecasts and schedule resources
- Informed decision making

**Daily Planning**
- Unit focus - manage current and projected patients
- Focus on relieving immediate patient flow issues
- Prevent Overtime and Agency for next few days
STEPS: Savings

- Right-sizing capacity
- Flexing surgical & critical care units based on predicted demand
  closed M/S 21 days & CC 30 days 2018

Labor costs
- $51,523.92 M/S
- $109,180.80 CC

- Productivity 0.37
- day reduction in HPPD
- Efficiency
- Earlier discharges
### Project Scorecard Matrix

#### Capacity Planner - Overlook Medical Center

<table>
<thead>
<tr>
<th>Levers</th>
<th>Objective</th>
<th>Initiative</th>
<th>Measures (KPI's) - Objective Related</th>
<th>Baseline 2017</th>
<th>YTD (PP INCL)</th>
<th>PP26</th>
<th>Target</th>
<th>Point Person for Initiative</th>
<th>Source Report</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROWTH</td>
<td></td>
<td>Nurse managers proactively manage staffing adjustments 72 hours out - evaluate staffing schedules to support peak workload demand</td>
<td>Utilization of Staffing projections</td>
<td>8 Hrs</td>
<td>8 Hrs</td>
<td>36 HRS</td>
<td>72 Hrs</td>
<td>Staff requested, actual summary report; actual versus budget report</td>
<td></td>
</tr>
<tr>
<td>QUALITY</td>
<td>Match Staffing to Demand</td>
<td>Plus/Minus 0.3 care hours (ex. Medicine x HPPD, target x - HPPD) Productivity Improvement by Planning Group</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MARGIN</td>
<td></td>
<td>Decrease Overtime by 2% at each Planning Group</td>
<td>Decrease in Overtime by Planning Groups</td>
<td>UTIL 2017</td>
<td>YTD 2018</td>
<td>PP26</td>
<td>Target % Loss</td>
<td>Variance</td>
<td>Comments</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Increase Utilization of Planner in ongoing projects Agency &amp; Sitters (NEURO, CC, M/S, ED)</td>
<td>Utilization of Planner Agency Usage</td>
<td>UTIL 2017</td>
<td>YTD (PP INCL) 2016</td>
<td>PP26</td>
<td>Target % Less</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- Baseline numbers if what was utilized.
- NOTE: Sitter Dollars include OVL staff (PCT).

**Source Report:**
- Hours Per Patient Day Chart
- Client report on OT trends Productivity Report per PP
- Use Baseline 2015
- Forecasting center, Resource Planning Centre weekly agency report PP

**HIMSS**
transforming health through information and technology
**Benefits Recap**

**Patient and Staff Satisfaction**
- Anticipated arrivals, reduced wait times

**Treatment/Clinical**
- Optimal Resource allocation
- Engaged physician leadership
- Decreased care silos

**Electronic Secure Data**
- Proactive, data-driven behavior
- Data leveraged across planning horizons

**Savings**
- Right-sized capacity
- Reduced labor costs
- Increased efficiency & Productivity
Thank Your For Attending!

**MaryPat Sullivan**, RN, MSN, CNS
Chief Nursing Officer & Chief Experience Officer,
Overlook Medical Center, Atlantic Health System
MaryPatricia.Sullivan@atlantichealth.org
Join the HIMSS Nursing Informatics Community!

www.himss.org/ni
Nursing Informatics Resources at HIMSS

www.himss.org/library/nursing-informatics
View the most recent issue of the Online Journal of Nursing Informatics (OJNI): Volume 23, Number 1

www.himss.org/ojni
HIMSS Nursing Informatics
Community Contact Information

Tammy Kwiatkoski, MBA
Director, Clinical Informatics
tkwiatkoski@himss.org

Trisha Pongco, CAHIMS
Coordinator, Clinical Informatics
tpongco@himss.org