REIMAGINING EDUCATION & RESEARCH IN AN ECONOMETRIC-DRIVEN HEALTH CARE ENVIRONMENT
A Confession
but
No Financial Conflicts

Disclosures
On Leadership

"Leadership is a potent combination of strategy and character. But if you must be without one, be without the strategy."

- Norman Schwarzkopf

"I cannot give you the formula for success, but I can give you the formula for failure: Trying to please everybody."

- Herbert Swope

"No person will make a great leader who wants to do it all themselves, or get all the credit for doing it."

- Andrew Carnegie

"Before you are a leader, success is all about growing others. When you become a leader, success is all about growing yourself."

- Jack Welch

"Your people are your greatest resource; listen to their feedback and encourage their dreams. The best leader chooses good people to do the job, and the self-restraint to keep from meddling with them while they do it."

- Theodore Roosevelt

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Inspire Trust
Champion Change
Move Forward
Coach & Develop
Advocate Aurora Health, Inc.

- 250K issues in a World Class Biorepository
- 7 Research Laboratories/Centers (FACT facility)
- $175M NIH grant funding
- $40.1M in annual expenditures
- 711 published articles and abstracts
- 10,000+ patients consented to research studies
- 1,250 research studies, 650+ clinical trials
- 1,620+ credentialed investigators
- 290 institute researchers & team members

The Aurora Research Institute LLC:

- 3.5 million unique patients
- 4,800 aligned physician partners
- 3,200 employed physicians
- 70,000 talent team members
- 500 outpatient locations
- 27 hospitals (5 Level-1 trauma centers, 1 pediatrics, 1 psychiatric)
- $13B revenues
- $9th largest non-profit health system in US.
Biorespository and EMR are valuable resources for the translation of genomic discoveries into personalized medicine for better diagnosis and treatment.

Support Medical Decision

Integration of EHR and BSRC

Query new knowledge

Tissue specimens

250,000 DNA and tissue specimens

The Biospecsitory Program

ORBIT

FDA, CPT, CPIC, Prof societies

EHR, Literature, SNPs

Current knowledge

ARL’s Biorepository and Specimen Resource Center (BSRC)

(Fully automated and computerized – linked to the EHR)
Definitive Healthcare and Modern Healthcare based on reports from the Centers from Medicare and Medicaid Services (CMS). Net Patient Revenue listed in billions of U.S. dollars. Excludes HCA @ $36.9M. Because of publication date, Advocate and Aurora revenue were combined.

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<th>Tier</th>
<th>Hospitals</th>
<th>Net Patient Revenue (Billions)</th>
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LARGEST NOT-FOR-PROFIT HEALTH SYSTEMS
Integrity, Quality, Oversight

(Revenue/equity, cost-savings, asset-utilization)

The Value Proposition:

Econometrics Driving Innovation

Shifting Roles & Partnerships

Biomedical & Health Research

Workforce Development

Health Professions Education/Training

Academia & Health System

Understand economics and drive future growth

Use of statistical strategies and analytics to

Econometrics:
The Good

Education & Workforce Development

The Good

News

Average Annual Job Openings 2016-2026
Current Vacancy Rate

- Reg Nurse: 12%
- Phys Therapy: 12%
- Pharmacist: 20%
- Occ Therapy: 26%
- Nurse Care Manager: 12%
- Speech Path: 18%
- Med Technology: 9%
- Med Informatics: 8%
- Nurse Educ: =2017
- Bus Sys Analyst: =2016
- Ben Hilt Therapy: =2015
- Ath Trainer: =2015

Vacancy Rate, Current Status & Projected Needs March 2017

Aurora Health Care Workforce Needs
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<tr>
<th>Occupation</th>
<th>Total</th>
<th>Employed</th>
<th>Est</th>
<th>Annual Growth Rate</th>
<th>Openings</th>
<th>Period %</th>
<th>Annual Projected Openings</th>
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<td>176</td>
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# U.S. Employment Projections 2014-2024 (Projected)

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<tr>
<td>Audiologists</td>
<td>13,200</td>
<td>16,900</td>
<td>3,700</td>
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<tr>
<td>Diagnostic medical sonographers and cardiovascular technologists</td>
<td>112,700</td>
<td>140,200</td>
<td>27,500</td>
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<tr>
<td>Clinical laboratory technologists</td>
<td>328,200</td>
<td>380,300</td>
<td>52,100</td>
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<tr>
<td>Medical records and health information technicians</td>
<td>188,600</td>
<td>217,600</td>
<td>29,000</td>
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<tr>
<td>Respiratory therapists and technologists, including cardiopulmonary technologists and diagnostic medical technicians</td>
<td>112,200</td>
<td>140,200</td>
<td>28,000</td>
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<tr>
<td>Audiology assistants</td>
<td>94,400</td>
<td>123,200</td>
<td>28,800</td>
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<td>Physical therapists</td>
<td>210,900</td>
<td>282,700</td>
<td>71,800</td>
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<td>Physicians</td>
<td>297,100</td>
<td>306,200</td>
<td>9,100</td>
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<td>Occupational therapists</td>
<td>27,100</td>
<td>38,700</td>
<td>11,600</td>
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<tr>
<td>Nurse midwives</td>
<td>5,300</td>
<td>6,600</td>
<td>1,300</td>
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<td>Nurse practitioners</td>
<td>38,200</td>
<td>45,600</td>
<td>7,400</td>
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<td>Nurse anesthetists</td>
<td>1,300</td>
<td>1,700</td>
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<td>Nurse assistants</td>
<td>38,200</td>
<td>45,600</td>
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<td>Speech-language pathologists</td>
<td>135,400</td>
<td>164,300</td>
<td>28,900</td>
</tr>
</tbody>
</table>

Source: U.S. Bureau of Labor Statistics
Not Enough Health Professionals to Fill the Need

Gap grows between healthcare job openings & hires.

Source: Bureau of Labor Statistics

Aging US population.

Source: US Census Bureau
Population growth declining

➢ More proprietary and on-line competition
➢ Generational attitudes
➢ Tuition & cost concerns
➢ International student visas decline

Population Declining (lower birth rate)
Lower Student Enrollment Declining (Loss of Tuition Dollars)

Source: AMN Management Services

Figure 1: Percent Change from Previous Year Enrollment by Sector (Title IV Degree-Certifying Institutions)
Stagnant Research Funding

Cumulative number of regulatory changes applicable to research institutions.
Total U.S. medical and health R&D spending in 2017 = $182.3B

- $121.8 billion = Total U.S. Industry spending medical/health R&D (67%)
- $39.5 billion = Federal agencies inc. National Institutes of Health (NIH), etc.
- $20 billion = Foundations, other

Source: Research America

Figure 1: Health Spending versus R&D Investments (in billions)

<table>
<thead>
<tr>
<th>Year</th>
<th>U.S. Medical &amp; Health R&amp;D Spending (in billions)</th>
<th>Total U.S. Health Spending (in billions)</th>
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<td>2017</td>
<td>2016</td>
<td>2015</td>
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Table 1: Total Health Spending versus Medical and Health R&D Investments (in billions)

Research Dollars at Stake: Billion$ at Stake: 5% Health Care

Represents 5% Health Care Investment Dollars $ At Stake:
Table 5: Estimated U.S. Medical and health Research Expenditures ($in millions) and percentage Change

<table>
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<th>Academic Research Institutions</th>
<th>2013</th>
<th>2017</th>
<th>Total</th>
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<tr>
<td>Colleges &amp; universities</td>
<td>7,130</td>
<td>9,644</td>
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<td>Independent Hospital Medical Research Institutes</td>
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<td>Independent Research Centers</td>
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<td>2,798</td>
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<tr>
<td>Total</td>
<td>11,205</td>
<td>14,248</td>
<td>27.6%</td>
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Est. % Change 2013-17 (5yr)

| Shift to Health Systems Prepared to Partner |
| Research Dollars By Funding Source |

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<th>Est % Change</th>
<th>2013-17 (5yr)</th>
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<td>41.81%</td>
<td>1,273</td>
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<td>-0.015%</td>
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<td>35.27%</td>
<td>7,130</td>
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</table>
I. Consumerism:

➢ Clinical trials attracts patients
➢ Provides patients with options & overall better outcomes
➢ Consumers equate research with excellence

II. Economics & Revenue Growth:

➢ Research grants & contracts generate revenue (direct & downstream)
➢ Research is at the core of discovery & innovation
➢ Access to revenue generating technologies (think TAVR, leadless, pacemaker)
➢ Philanthropic dollars for research are a mechanism for grateful patients to give back

III. Reputation & Scholarship:

➢ Research defines a hospital’s reputation, ranking
➢ ‘Top talent’ seek out institutions with research programs
➢ The “Top 100” hospital systems in U.S. all have research in common
➢ Research creates a culture of diversity & creativity
➢ Research invites & seizes partnership opportunities

IV. Culture of Excellence & Inclusion:

➢ Research invites & seizes partnership opportunities
➢ Top talent seek out institutions with research programs
➢ The “Top 100” hospital systems in U.S. all have research in common
➢ Research defines a hospital’s reputation, ranking

VALUE PROPOSITION

INNOVATIVE RESEARCH
Med School’s Business Model is Officially Dead

“The slaughter of academic medicine” - Milton Packard MD

1950-1970s Congress allocated vast funds to support clinicians to advance research. Now, even at most “academic” medical schools academic faculty are employed, paid and managed directly by health systems to generate clinical revenue, not research. Research float medical schools which proudly proclaimed a tripartite mission “research, teaching, and patient care.”

Research float medical schools which poorly

Research float medical schools which poorly

NINH to support clinicians to advance research.

1950-1970s Congress allocated vast funds to the

Traditional academic medical schools represent an honorable past

Model is Officially Dead

Med School’s Business

The Tripartite Mission of Academia: Research, Teaching, Practice

But... Most Non-Academic Health Systems Don’t Necessarily Share
Physician Compensation Incentive

Academic medicine and health system physicians are incentivized by a corporate model that promotes revenues.

What are RVUs? Part of the system Medicare uses to decide how much it will reimburse physicians for each of the 9,000-plus services and procedures covered under its Physician Fee Schedule, and which are assigned current procedural terminology (CPT) code numbers.

The dollar amount for each service is determined by three components: physician’s work, practice expenses, and malpractice insurance.
Academic & Health Care Partnerships

May be difficult, but are necessary
Health System Operating Margins Falling

Median operating cash flow margin showing a decrease over time. The chart indicates a preliminary analysis of nonprofit and public hospitals shows that hospital operating profit declined in 2017.
Hospitals Look for Growth Through M&As and "Innovation"

Touting Moving from Volume to Value-Based Care

"Transformation" "Synergies" "Opportunities"

- Interoperability
- Data security
- Price transparency
- Efficiencies
- Supply chain
- Cost savings

Figure 3

Number of announced hospital mergers and acquisitions, 1998-2017

Hospital consolidation shows no signs of slowing.
The Largest Health System Merger

$29B Total Revenues
($20B Operating + $9B Investment Asset Reporting)

$582M Operating Loss
($290M Operating + $272M Merger Costs)

October 02, 2019
BY Tim Read

Plan for Improvement

with $582M Operating Loss, Lays Out

CommonSpirit Ends Fiscal Year

$290M Operating Loss

($29B Total Revenues
($20B Operating + $9B Investment Asset Reporting)

CommonSpirit + Dignity Health = Catholic Health Initiatives

The Largest Health System Merger
Consumer Role?

Integrity, Quality, Oversight

- Asset utilization
- Cost savings
- Growth: Revenue/equity, consumers

The Innovation Value Proposition:

The Search for Financial Sustainability & Growth

ECONOMETRIC SHIFTS TO INNOVATION
 Consumers Want:
- Interoperability
- Price transparency
- Control of their own health

Innovative Health Care: Consumer Role.

- Consumer healthcare personal medical records
- Consumer empowerment

Provider Control

- Personal medical records
- Consumer healthcare
- Consumer empowerment

- Long term care
- Public health
- Primary care
- Pharmacies
- Labs
- Hospitals
- Specialists
Who Else Owns or Has Access to Your Data?

Pharma and Device Manufacturing Industry collecting and saving your data from clinical trials.

23andMe Moving Beyond Consumer DNA Tests, Building a Clinical Trial Recruitment Business and in Drug Development - Sept 26, 2019 (10M customers) – 80% contacted and opted in.

Google About 1 in 20 Google searches are health-related and some 72 percent of internet users search online for health information, according to research from John Hopkins University in collaboration with Google.

Apple: The organization is updating iPhone software with a health records feature so users can share and manage their personal medical records. Also using Apple Watch to collect health data.

Amazon and Other Tech Giants are Using AI to Find Protein Structures in Hunt for New Drugs
"You don’t want to chase a bunch of things that end up being science projects."

Chief Strategy & Growth Officer
Banner Health

Modern Healthcare June 17, 2019

Not a substitute or replacement for research

Health Care Innovation
The rise and fall of Theranos

The $9B blood-testing startup that went defunct from Silicon Valley

Innovation Run Amuck

Founded 2003
Partnersed with Walgreens 2013
Defunct 2018

How Did This Happen?
Elizabeth Holmes—CEO and chairman of the board of Theranos
Sunny Balwani—president and COO of Theranos
Riley P. Bechtel—chairman of the board of the Bechtel Group Inc.
William H. Foege MD—former director of CDC and prevention
William H. Frist MD—heart and lung transplant surgeon, former US senator
Henry A. Kissinger—former US secretary of state
Richard Kovacevich—former CEO of Wells Fargo
James N. Mattis—retired US Marine Corps general
Sam Nunn—former US senator, chair of Senate Armed Services Committee
Gary Roughead—retired US Navy admiral
George P. Shultz—former US secretary of state

2 graduates from medical school
2 Theranos leaders
2 corporation leaders
2 former military leaders
6 former government officials
• Academia and Health Care Systems Are in a Fragile State
• A Solid “Value Proposition” must be in place
• Consumers Need to be at the Center of Solutions
• Leaders Need to Identify Sustainable New Strategies
• Integrity, Oversight and Quality Must be Maintained
• Innovation is Important, but has Limitations
• Partnerships are Absolutely Critical

SUMMARY
How Does Education Keep Ahead of the Curve?

1. Adopt Recommendations & Strategies from the ASAHP Task Force

   - Adopt Recommendations & Strategies from the ASAHP
   - Develop meaningful academic & healthcare partnerships*
   - Assess clinical education interprofessional competencies*
   - Advocate for interprofessional practice and referrals*
   - Promote effective use of technology into education*
   - Incorporate effective use of technology into education*
   - Explore adding education opportunities in gap areas*
   - Insert "Innovation Learning" into the curriculum

2. Explore adding education opportunities in gap areas

3. Insert "Innovation Learning" into the curriculum
How Are Large Healthcare Delivery Systems Adopting?

JP Morgan Conference 2019

Major shift from a traditional strategy of buying and building hospitals to a strategy that focuses on leveraging the "platform" they already have in place to create more value and simply providing care, to a strategy that focuses on leveraging the platform they already have in place to create more value and simply providing care.

Health System Strategy: Leveraging Your "Platform"

1. Create a Digital Front Door — or Someone Else Will
2. Drive Affordability and Reduce Cost — or Risk Being the Problem
3. Tackle Social Determinants of Health — or You Won’t Be the Hub for Health in Your Community
4. Create Partnerships for Healthcare Innovation — or Lose the Upside
5. Become the Hub for Targeted Services and Chronic Conditions — or They Will Go Elsewhere
6. Leverage Applied (Performance) Analytics — or You’ll Lose Your Way

Common platforms: Facebook, Amazon, Google, Apple and even Starbucks have always: 1) started with a very small niche, 2) built an audience & trust, and 3) added other offerings on top of that platform.

Think of it in terms of cell phones (Blackberry) to smartphones (iPhone and Android devices). One was a product; the other was a platform. They already have in place to create more value and simply providing care, to a strategy that focuses on leveraging the platform they already have in place to create more value and simply providing care.
THANK YOU!