Trend-Bending Stroke Care: Reengineering Preventive and Hospital Care to Lower Healthcare Spending

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Right Care University of Best Practices
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CME Learning Objectives

1. Describe three aspects of the epidemiology of stroke, transient ischemic attack and related cardiovascular disease

2. Identify two financial costs of stroke, transient ischemic attack and related cardiovascular disease

3. Explain one innovative cost-saving and quality-improving care delivery method for prevention of cerebrovascular and cardiovascular disease

4. Explain one innovative cost-saving and quality-improving care delivery method for transient ischemic attack and stroke
Disclosures

• Financial disclosures:
  • No financial disclosures relevant to this lecture

• Off-label use disclosures:
  • We will discuss use of tPA in the 3-4.5 hour window
Outline of Talk

1. Imperative for delivery innovation
2. Stanford CERC introduction
3. Stroke care redesign
   a. Clinical science
   b. Innovation methods
4. Cost-saving care model
Imperative for Delivery Innovation

- Two primary factors
  - Healthcare cost crisis
  - Emerging healthcare delivery science

Healthcare Delivery Science

- Current organization and delivery has been stifled by:
  - Fee-for-service reimbursement
  - 3rd party payer system

- The lens of science to the *delivery* of healthcare

**End Goal:** Care is delivered in a way that is of highest quality and lowest possible cost.
Clinical Excellence Research Center

- Founded by Arnold Milstein, MD, MPH in 2010

- Mission: Better Health, Less Spending
  - Safely lower per-capita healthcare spending in the near term, while maintaining or improving quality

- Fellows design and test high-value care models
  - Multidisciplinary approach
  - Diverse clinical design targets
  - Real-world pilots
CERC Delivery Innovation Methods

**Goal:** Develop cost-saving care models that span the care continuum and meet the triple aim

- **Methods**
  - Literature review
    - Clinical science, cost effectiveness
  - Choice of design targets
    - High-cost areas and value gaps in current care
  - Visit and engage with providers at the value frontier

- **Innovation Phase**
  - Design thinking, innovation science, expert mentors

- **Prototype phase**
  - Recruiting pilot partners and moving to co-design and testing
Redesigning Stroke Care...
Cerebrovascular Disease: Definitions and Burden

- **Ischemic stroke**
  - Neurologic injury due to lack of blood flow to central nervous system

- **Transient ischemic attack (TIA)**
  - Transient neurologic symptom due to lack of blood flow to central nervous system, but without permanent ischemia, portends risk of future stroke

- **Epidemiology**
  - 700,000 ischemic strokes in U.S. each year, 4M survivors
  - 250,000 TIAs in U.S. each year
Financial Burden of Vascular Disease in US

- Direct healthcare costs of stroke and heart attack: $67B per year
- Direct healthcare costs of stroke: $25B per year
- Indirect costs to society of stroke and heart attack: $100B per year

![Estimated Direct and Indirect Costs of Major Cardiovascular Diseases, United States, 2010](image)


*AHA Heart Disease and Stroke Statistics Report 2013*
Financial Burden of Stroke and Design Targets

Post-Stroke Costs (first 90 days)

Design Targets

- Prevention of Vascular Disease
- TIA & Acute Stroke Care
- Preventing Readmissions Post-Stroke

Next Steps

- Clinical Science
- Care Delivery Value Gaps

Sources include AHA, ASA, CDC (http://www.theuniversityhospital.com/stroke/stats.htm)
## Preventing Vascular Disease

### Clinical Science

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Prevalence</th>
<th>Relative Risk of Stroke</th>
<th>Risk Reduction with Medication Treatment</th>
<th>Clinical Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>23%</td>
<td>8</td>
<td>32%</td>
<td>Treat &gt;140/90 Goal 120/80</td>
</tr>
<tr>
<td>Hyperlipidemia</td>
<td>21%</td>
<td>1.5</td>
<td>19%</td>
<td>LDL &lt;130 (LDL &lt;70-100)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>7.3%</td>
<td>1.8-6</td>
<td>Stroke reduction with BP treatment</td>
<td>Goal 120/80 HgbA1C &lt;7</td>
</tr>
<tr>
<td>Other CVD/CHD</td>
<td>2.6%</td>
<td>1.7</td>
<td>&gt;50%</td>
<td>Risk factor control, antithrombotic</td>
</tr>
<tr>
<td>Previous TIA/Stroke</td>
<td>1.6%</td>
<td>15</td>
<td>&gt;50%</td>
<td>Risk factor control, antithrombotic</td>
</tr>
<tr>
<td>Atrial fibrillation</td>
<td>1.2%</td>
<td>5.8</td>
<td>~80%</td>
<td>Anticoagulation</td>
</tr>
</tbody>
</table>

### Care Delivery Value Gaps

- Imperfect prescribing
- Low medication adherence

Sources include AHA Guidelines for Primary Prevention of Stroke, 2011; Rothwell et al., *Lancet* 2007.
TIA Care

Clinical Science
- Moderate to high risk of stroke in first 90 days after TIA
- Risk factor evaluation imperative; preventive rx reduces risk by 2/3

Care Delivery Value Gaps
- Similar management for all (hospitalization), despite broad range of near-term stroke risk
  - 80% hospitalized
  - 20% have >2% near-term risk
- Imperfect secondary prevention

# High Value Frontier: Best Practice Innovations

<table>
<thead>
<tr>
<th>Phase of Care</th>
<th>Clinical Excellence</th>
<th>Frontier Care Delivery</th>
<th>Frontier Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preventing vascular disease</td>
<td>Evidence-based preventive medications</td>
<td>Team care, proactive outreach, telephonic</td>
<td>Kaiser Permanente, Minneapolis VA, GroupHealth, Ellsworth Medical Clinic (WI), University of Southern California SUSTAIN</td>
</tr>
<tr>
<td></td>
<td>Maximize adherence</td>
<td>Health coaching, telephonic/mobile, financial assistance</td>
<td>Bodenheimer (UCSF), Michigan VA, COACH Program (Australia), Allina (MN), Aetna</td>
</tr>
<tr>
<td>TIA care</td>
<td>Stroke risk evaluation and early secondary prevention</td>
<td>Outpatient TIA care (&quot;TIA clinic&quot;)</td>
<td>Stanford Hospital (CA), La Paz University Hospital (Spain), Monash Medical Centre (Australia), SOS-TIA (France), EXPRESS (UK)</td>
</tr>
<tr>
<td>Stroke care</td>
<td>Rapid tPA delivery</td>
<td>Process redesign</td>
<td>University of Helsinki (Finland), University of Calgary (Canada), Washington University in St. Louis (MO)</td>
</tr>
<tr>
<td>Preventing readmissions post-stroke</td>
<td>Care coordination, transitions checklist</td>
<td>Focus on high-risk patients, rapid outpatient follow-up</td>
<td>Allina (MN), Project BOOST, Care Transitions Program (CO), Transitional Care Model (PA), Grand-Aides</td>
</tr>
</tbody>
</table>
High-Value Innovation Thinking

Vascular risk reduction

Peer health coaching by phone

Targeted patient activation to reduce tPA delays

TIA and Mild Stroke Care

Expedited hospital care for mild acute stroke presenting outside tPA window

Hospital Care for Stroke
**Trend-bending Stroke Care Model Overview**

*"ACT"*

**Avoid** strokes and heart attacks by maximizing preventive medication use

**Convert** hospital care of transient ischemic attack and mild stroke to care in safe alternative settings

**Transform** stroke care: faster tPA treatment and improved transition to post-hospital care

~11% net reduction in direct healthcare spending on stroke and heart attack
### Trend-bending Stroke Care Model: Reengineered Preventive and Hospital Care

<table>
<thead>
<tr>
<th>Challenges</th>
<th>TIA and Mild Strokes: Hospital Admission Not Always Needed</th>
<th>Moderate to Severe Strokes: tPA Delivery Delays and Preventable Readmissions</th>
</tr>
</thead>
</table>
| **Preventing Stroke (and Heart Attack): Inconsistent Care and Low Adherence** | • Stroke and heart attack share risk factors  
  o 20% of Americans at moderate-to-high risk  
  o Basic medications reduce risk  
 • Inconsistent and inefficient preventive care  
 • Low medication adherence | • tPA (clot-busting drug) reduces disability  
  o Most eligible patients miss out on tPA due to system delays  
 • 40% of stroke patients are readmitted to hospital within 1 year  
  o Opportunities remain to prevent readmissions |

<table>
<thead>
<tr>
<th>Solutions</th>
<th>Avoid strokes and heart attacks by maximizing preventive medication use</th>
<th>Convert hospital care to care in safe alternative settings</th>
<th>Transform tPA Delivery and Improve Transition to Post-Hospital Care</th>
</tr>
</thead>
</table>
| **Net Benefits: ↑ Experience ↑ Clinical Outcome ↓ Spending ~11%** | • Target patients with elevated risk scores  
 • Top-of-license team with prescribing power  
  o Phone follow-up  
  o Non-MD monitoring  
  o Generic medications  
 • Layperson coaches support adherence  
 • No co-pays for heart attack patients | • Outpatient care for TIA  
  o ER triage to predict near-term stroke risk  
  o Offer priority clinic to low-risk patients  
 • Full expedited workup for mild stroke in <23 hours | • Maximize efficiency of 911-to-tPA time to deliver tPA to three times as many patients  
  o Targeted patient activation  
  o Teleneurologist with EMS  
  o Immediate imaging and tPA  
 • Evidence-based readmission prevention  
  o ID high-risk patients  
  o Coaching, prompt PCP visit |

- 275,000 TIAs & 700,000 ischemic strokes per year in US
- 80% of TIA patients are hospitalized, though few have >2% risk of near-term stroke
- All stroke patients are hospitalized; 1/2 are mild
- 275,000 TIAs & 700,000 ischemic strokes per year in US
- 80% of TIA patients are hospitalized, though few have >2% risk of near-term stroke
- All stroke patients are hospitalized; 1/2 are mild
Avoid Strokes and Heart Attacks...

Proactive Outreach to Patients with Elevated Risk based on Risk Calculators

Nurse-based Telephonic Prescribing of Generic Meds and Appropriate Follow-up

Peer Health Coaches Reducing Medication Adherence Barriers

Eliminating Medication Copays for Stroke and MI

Toolkit

Motivational interviewing + Reminders + Financial Barriers + Socio-cultural Factors
Convert Hospital Care for TIA

Triage
Patient History
ABCD2 Score
Vessel Imaging

Guaranteed Outpatient Follow-up with 48 hrs
Neurologist-supervised NP + Outpatient MRI

Early start of secondary prevention meds

Decision Aid
Convert Hospital Care for Mild Stroke (those not eligible for tPA)

Hospital Admission

0 → 2-3 days
- History + Exam
- Labs
- MRI + Vessel Imaging
- Therapy Evaluations
- Secondary Prevention

Observation Status

0 → 23 hrs
- History + Exam
- Labs
- MRI + Vessel Imaging
- Therapy Evaluations
- Secondary Prevention

Key
- Value Add
- Non-value Add

Support Line
Transform Hospital Care for Stroke...Faster tPA

Better Recognition of Stroke and Rapid Dialing of 911 (Via Targeted Health Coaching)

Teleneurologist

Obtaining Patient History and Preparing Team

Circumvent ED

Immediate CT Scan and, if Eligible, tPA Administered by Neuro-trained Nurses

Additional Opportunity to Work with Emerging Teleneurology Networks to Ensure Faster tPA Delivery for Rural Settings
Transform Hospital Care for Stroke...
Improved Transition to Post-Hospital Setting

During Hospitalization

- Proactive Focus on Patients with Elevated Readmission Risk
- High-Value Transitions Planning Checklist
  - Med Rec and Teaching
  - Return Precautions
  - Avoidance of Delirium

Post-Hospitalization

- Peer Health Coaching to Better Ensure Smooth Transition
- PCP Visit Within 7 days of Hospitalization

Toolkit
Solidify Understanding + Offer Support
Stroke Care at a Lower Cost: Projected Net Cost Savings at Year 1 and Year 3

for 50,000 people, of whom 10,000 are at elevated risk for stroke and/or heart attack

- Avoid Stroke and Heart Attack: 70 strokes and heart attacks avoided in 1st year
- Convert Hospitalizations: TIA + Mild Stroke: 110 hospitalizations converted in 1st year
- Transform stroke care: tPA and Transitions: 10 disabling strokes averted; 12 readmissions prevented in 1st year

$\sim 11\%$ net reduction in direct spending on stroke and heart attack

Total Net Savings: $1,720,000$
The Future: Technological Innovations

• Virtual health coaching
  • mHealthCoach's Flornce

• Portable imaging
  • Ischiban headband
  • Phantom-S trial in Germany

• Advanced mobile diagnostics
  • iMote2
Thank you!

Questions or Comments?