

# 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

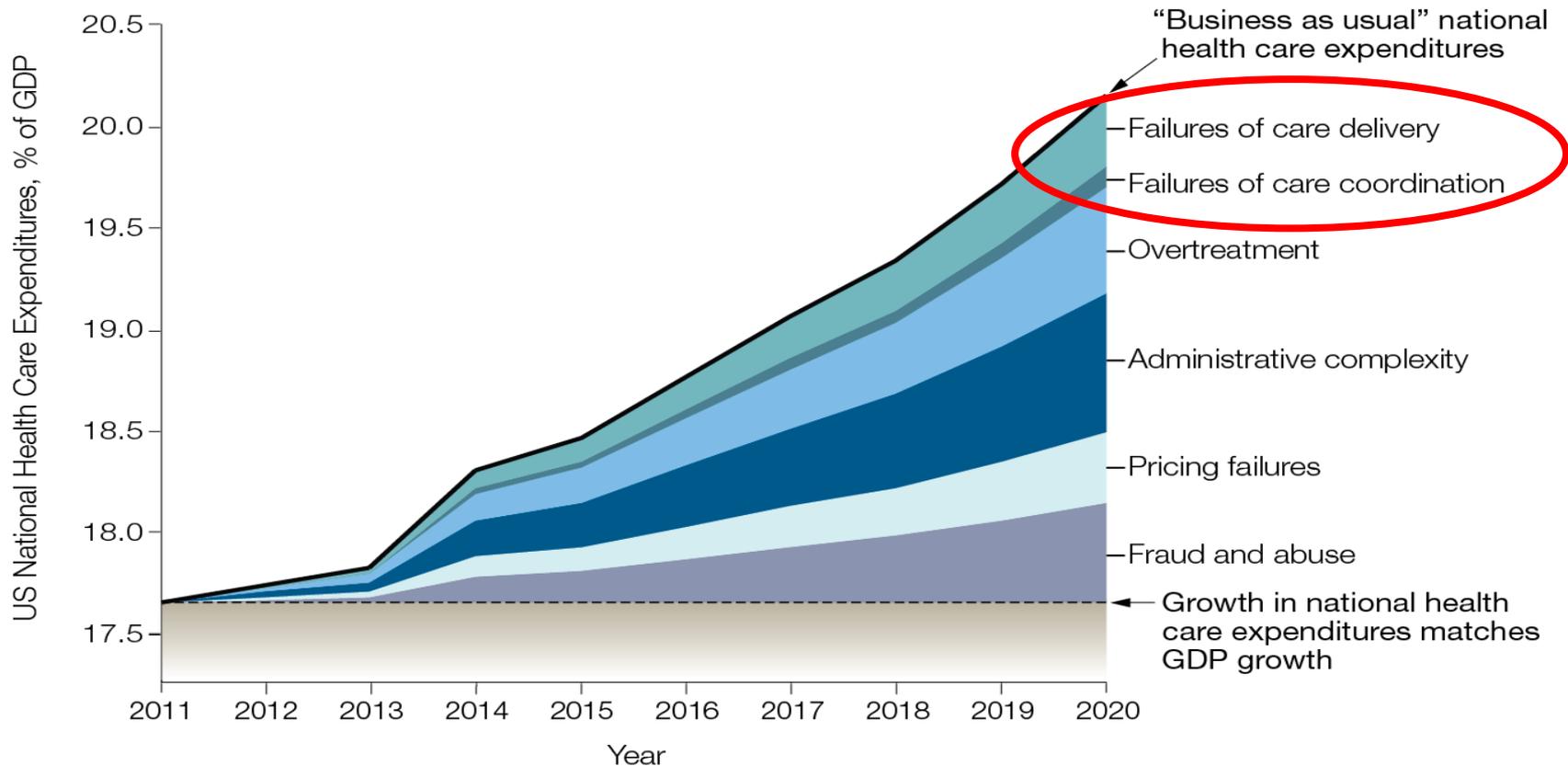
# Outline of Talk

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

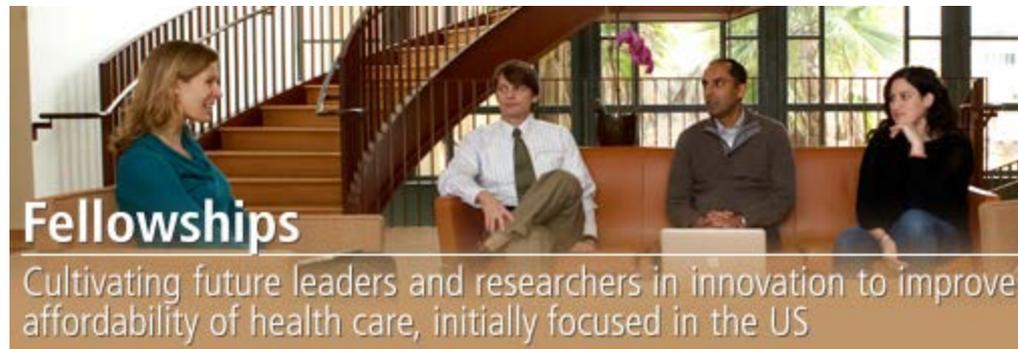
- Current organization and delivery has been stifled by :
  - Fee-for-service reimbursement
  - 3<sup>rd</sup> party payer system
- The lens of science to the *delivery* of healthcare



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

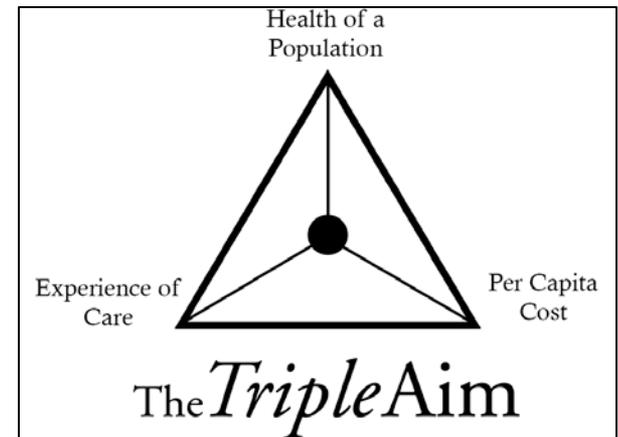


# CERC Delivery Innovation Methods

**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

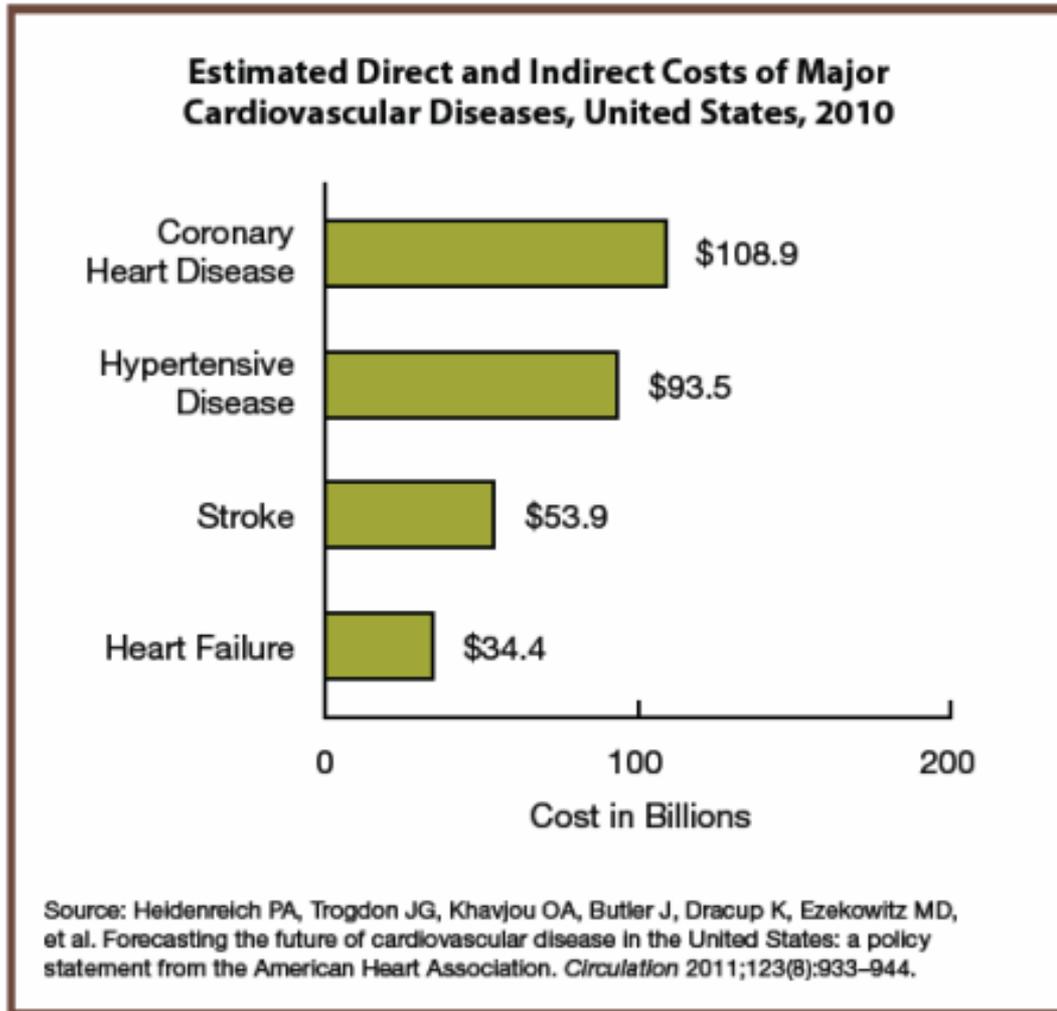
- **Transient ischemic attack (TIA)**

- 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

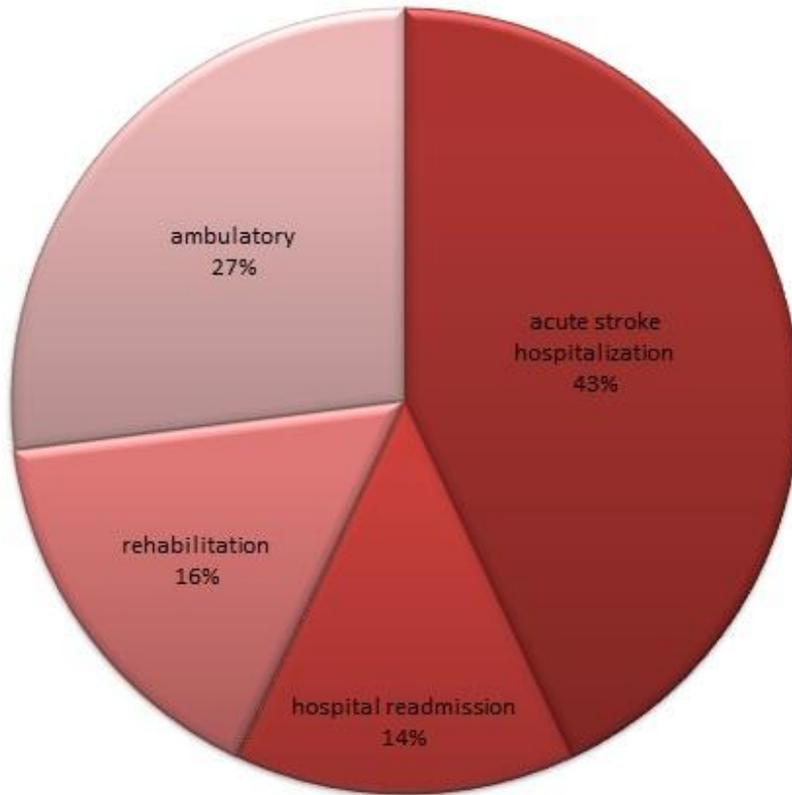
# Financial Burden of Vascular Disease in US



- 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

# 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

# Preventing Vascular Disease

## Clinical Science

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

## Care Delivery Value Gaps

- Imperfect prescribing
- Low medication adherence



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

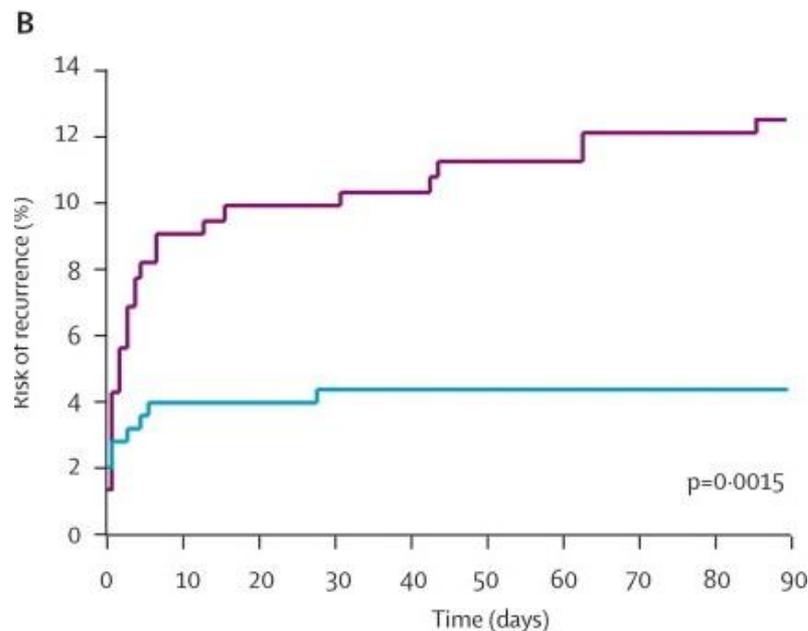
# TIA Care

## 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

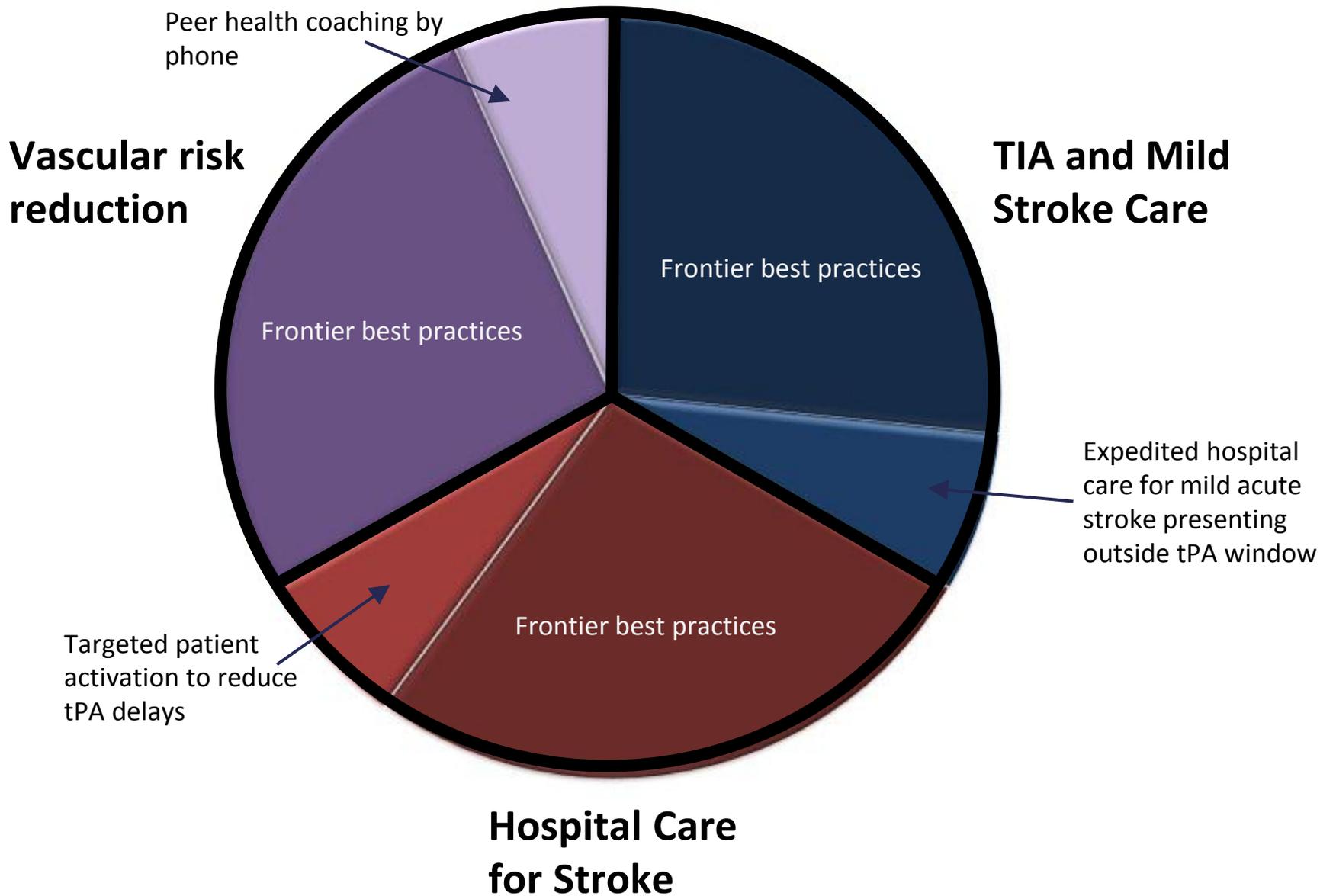
- Similar management for all (hospitalization), despite broad range of near-term stroke risk
  - 80% hospitalized
  - 20% have >2% near-term risk
- Imperfect secondary prevention



# High Value Frontier: Best Practice Innovations

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

# High-Value Innovation Thinking



# Trend-bending Stroke Care Model Overview

## "ACT"

**A**void strokes and heart attacks by maximizing preventive medication use

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

**T**ransform 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*

Challenges

## Preventing Stroke (and Heart Attack): Inconsistent Care and Low Adherence

- Stroke and heart attack share risk factors
  - 20% of Americans at moderate-to-high risk
  - Basic medications reduce risk
- Inconsistent and inefficient preventive care
- Low medication adherence



## TIA and Mild Strokes: Hospital Admission Not Always Needed

- 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



## Moderate to Severe Strokes: tPA Delivery Delays and Preventable Readmissions

- tPA (clot-busting drug) reduces disability
  - Most eligible patients miss out on tPA due to system delays
- 40% of stroke patients are readmitted to hospital within 1 year
  - Opportunities remain to prevent readmissions



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

- Target patients with elevated risk scores
- Top-of-license team with prescribing power
  - Phone follow-up
  - Non-MD monitoring
  - Generic medications
- Layperson coaches support adherence
- No co-pays for heart attack patients

Solutions

## Convert hospital care to care in safe alternative settings

- Outpatient care for TIA
  - ER triage to predict near-term stroke risk
  - Offer priority clinic to low-risk patients
- Full expedited workup for mild stroke in <23 hours

## Transform tPA Delivery and Improve Transition to Post-Hospital Care

- Maximize efficiency of 911-to-tPA time to deliver tPA to three times as many patients
  - Targeted patient activation
  - Teleneurologist with EMS
  - Immediate imaging and tPA
- Evidence-based readmission prevention
  - ID high-risk patients
  - Coaching, prompt PCP visit

**Net Benefits: ↑ Experience ↑ Clinical Outcome ↓ Spending ~11%**

# 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



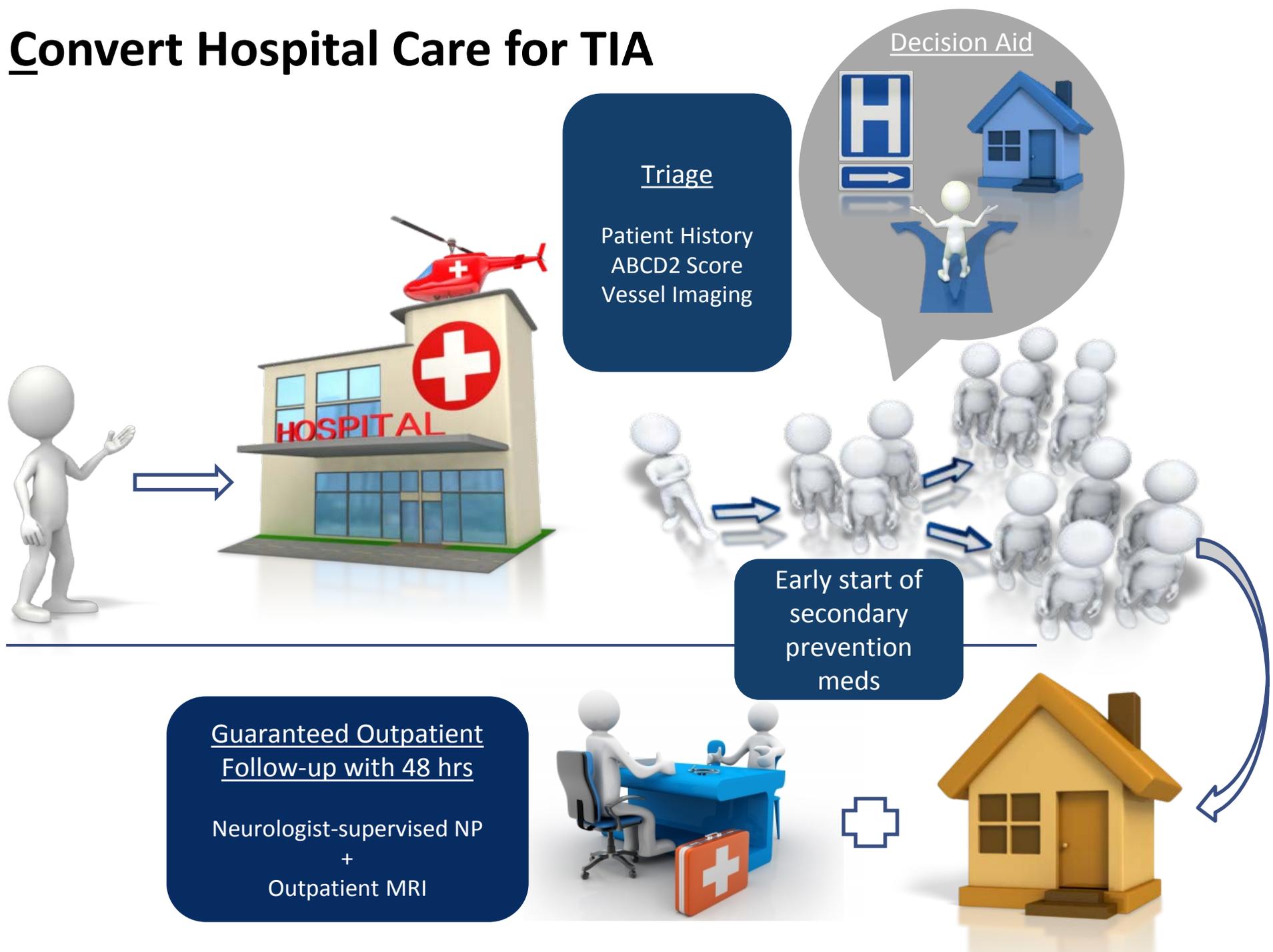
 Toolkit 

Motivational interviewing  
+  
Reminders  
+  
Financial Barriers  
+  
Socio-cultural Factors

Eliminating Medication Copays for Stroke and MI



# Convert Hospital Care for TIA



Decision Aid

Triage

Patient History  
ABCD2 Score  
Vessel Imaging

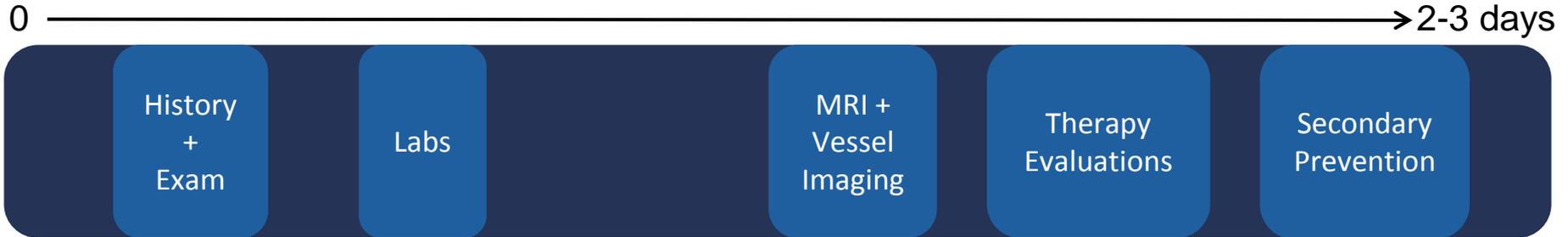
Early start of  
secondary  
prevention  
meds

Guaranteed Outpatient  
Follow-up with 48 hrs

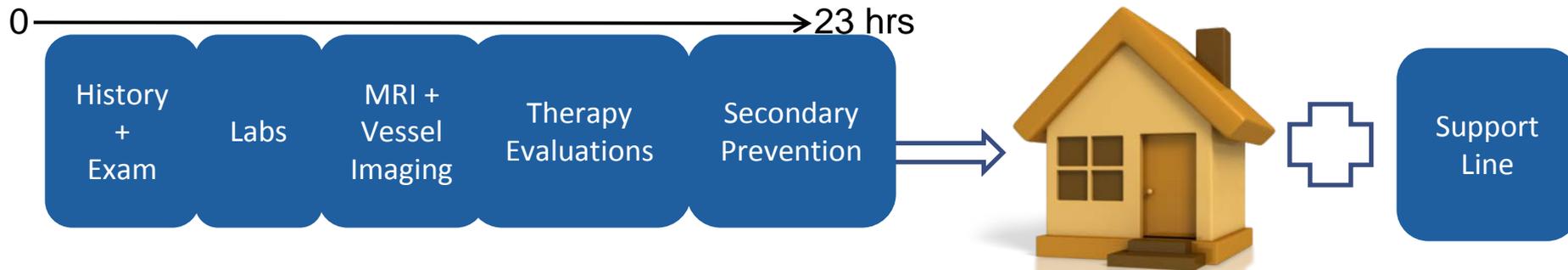
Neurologist-supervised NP  
+  
Outpatient MRI

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

## Hospital Admission



## Observation Status



### Key



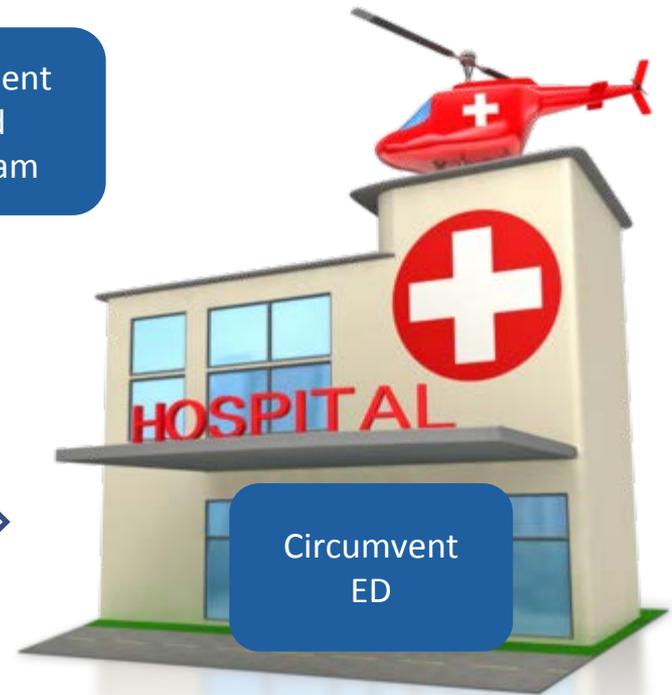
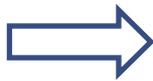
# Transform Hospital Care for Stroke...Faster tPA

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

Teleneurologist



Obtaining Patient History and Preparing Team



Circumvent ED

Additional Opportunity to Work with Emerging Teleneurology Networks to Ensure Faster tPA Delivery for Rural Settings

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



# 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



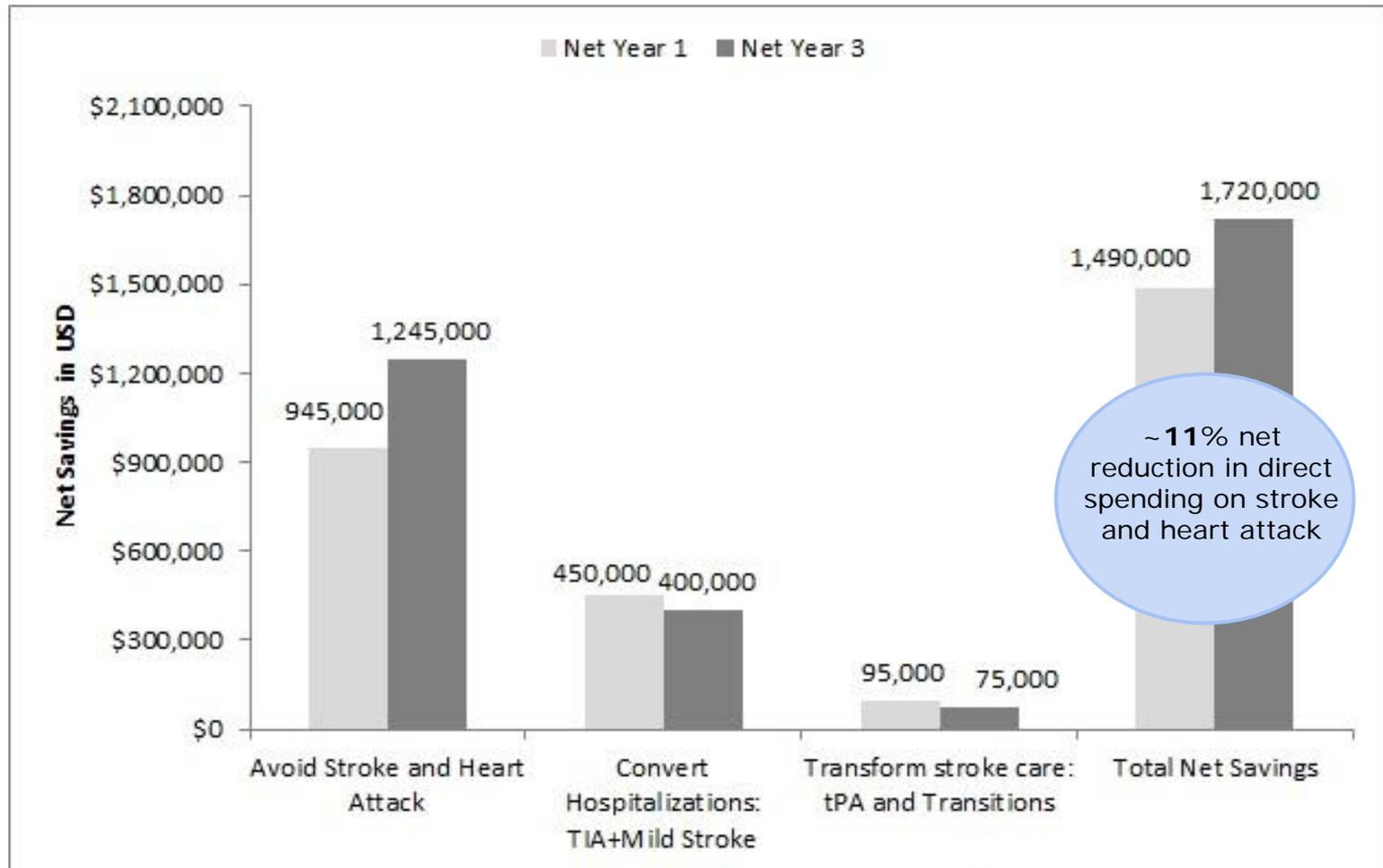
 Toolkit   
Solidify Understanding  
+  
Offer Support

PCP Visit Within 7 days of Hospitalization



# 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



**70** strokes and heart attacks avoided in 1st year

**110** hospitalizations converted in 1st year

**10** disabling strokes averted; **12** readmissions prevented in 1st year

# 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?**

