1. What is the problem?
2. How are we going to solve the problem?
3. What are the barriers and opportunities?
• What is the problem?

ADRD economic costs:
Current estimates and future projections
ADRD imposes a substantial economic burden on patients, caregivers, and the health care system
Total health care costs for ADRD (2019):

$290 billion

- Medicare, $146B (51%)
- Medicaid, $49B (17%)
- Out of pocket, $63B (22%)
- Other, $32B (11%)

2019 AA Facts & Figures
Year 2010

3.6M ADRD patients

$307B/yr

Year 2050 (status quo)

9.1M ADRD patients

$1.5T/yr
People with ADRD incur higher health care costs than those without the condition, even before they receive the diagnosis.
Medicare costs of ADRD vs. non-ADRD

(in 2018 dollars)

$49,000

ADRD

$14,000

Non-ADRD
Medicare costs of ADRD vs. non-ADRD

Quarterly costs

$15,000
$12,000
$9,000
$6,000
$3,000
$0

- Q8  - Q7  - Q6  - Q5  - Q4  - Q3  - Q2  - Q1  Q1  Q2  Q3  Q4  Q5  Q6  Q7  Q8

Δcost= $4,400
Δcost= $18K
Δcost= $7K

ADRD
Non-ADRD

Lin et al. JAGS 2016
Comorbidities are highly prevalent in people with ADRD and substantially increase care costs
Comorbidities in Medicare beneficiaries with ADRD

- **Coronary artery disease**: 38%
- **Diabetes**: 37%
- **Chronic kidney disease**: 29%
- **COPD**: 25%
ADRD can complicate comorbidity management and increase care costs

Coronary artery disease 40% higher
Diabetes
Chronic kidney disease
COPD

2019 AA Facts & Figures
ADRD are associated with substantial caregiver “spillover” costs and health effects
ADRD caregiver burden

- **>18 billion hours** of (unpaid) informal care, valued at **$234 billion** (2019 AA Facts & Figures)

- Increased risk of anxiety, depression, and sleep disorders
• What is the problem?

• How are we going to solve the problem?

Bend the cost curve:
Understand ADRD cost drivers
Inpatient, nursing home and end-of-life care costs are high in ADRD
ADRD cost drivers

Inpatient Nursing home

<table>
<thead>
<tr>
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<th>ADRD</th>
<th>Non-ADRD</th>
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<tbody>
<tr>
<td>ADRD</td>
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<tr>
<td>Non-ADRD</td>
<td>$12,000</td>
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</tbody>
</table>
ADRD cost drivers

Total health care costs of Medicare ADRD beneficiary

$49,000/yr

Inpatient, 23%

Nursing home, 33%

Including avoidable hospitalizations & readmissions

2019 AA Facts & Figures
In 2013

410,000 Medicare ADRD patients had

Avoidable hospitalizations
Unplanned readmissions

$4.7B

Lin et al. A&D 2017
ADRD cost drivers differ by care setting
ADRD cost drivers differ by care setting

Community-based
40% direct costs
60% informal care costs

Institutionalized
>85% direct costs

Schaller et al. Int J Geriatr Psychiatry 2014
ADRD costs rise with increasing disease severity
Annual AD costs, by disease stage

- MCI: $13,364
- Mild AD: $26,727
- Moderate AD: $31,644
- Severe AD: $40,645

# ADRD cost impact on stakeholders, by disease stage

<table>
<thead>
<tr>
<th>Preclinical Stage</th>
<th>Prodromal Stage</th>
<th>Mild Dementia</th>
<th>Moderate Dementia</th>
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<td><strong>Patients</strong></td>
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Jönsson, Lin, Khachaturian. A&D 2017
ADRD cost impact on stakeholders, by disease stage

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<tbody>
<tr>
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<td>Moderate</td>
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<td>Society</td>
<td>Low</td>
<td>Low</td>
<td>Moderate</td>
<td>Moderate</td>
<td>High</td>
</tr>
</tbody>
</table>

Treatment goals

- Delay progression to more costly stages
- Maintain functionality

Jönsson, Lin, Khachaturian. A&D 2017
1. What is the problem?

2. How are we going to solve the problem?

3. What are the barriers and opportunities?

Value of ADRD interventions & reimbursement challenges
Intervention at earlier stages of ADRD may be more cost-effective
Cost-effectiveness of donepezil for mild/moderate AD

More favorable

Less favorable

Start mild

Start moderate

Duration of donepezil treatment (in years)

Cost per QALY

Neumann et al. Neurology 1999
Disease spectrum

- Preclinical, presymptomatic
- MCI
  - Amnestic
  - Non-amnestic
- Mild AD
- Moderate AD
- Severe AD
Will MCI therapy be cost-effective?

Hypothetical, disease modifying treatment for MCI

Base case: $51,000/QALY
Will MCI therapy be cost-effective?

**Base case:** $51,000/QALY

**Assumptions**
- Treatment cost: $5,000/yr
- Treatment effectiveness: 20% reduction in MCI → AD conversion rate
For payers, the issue is budget impact
Budget impact of an innovative agent

$84K
(Hepatitis C)

17,000 new cases/yr $1.4B/yr
Imagine an effective, disease-modifying biologic AD drug…

>130 AD treatment agents in clinical trial

Cummings et al. A&D TRCI 2019
Cost of care × # of people × Duration of disability

Source: Zaven Khachaturian
Budget impact for AD?

\[ \text{Cost} \times \text{Duration} \times \frac{1}{2} \text{ of the AD population} = \text{Budget impact for AD?} \]

\[ \text{Cost} = \$10K/yr \times \text{Duration} \times 2.5M \text{ people} = \$25B/yr \]

chronic treatment

$1.4B/yr$
Budget impact for AD: early intervention

MCI due to AD

- Costs of screening & diagnostics?
- # needed to test?
- Costs of false +/- results?
- Follow-up costs?

88 million
age ≥55
Are we prepared to meet demand?

Assessing the Preparedness of the U.S. Health Care System Infrastructure for an Alzheimer’s Treatment

Jodi L. Liu, Jakub P. Hlávka, Richard Hillestad, Soeren Mattke
Are we prepared to meet demand?

3.5M people would see a dementia specialist for evaluation.

27,000 dementia specialists in 2020.

14 months

Wait times might be extensive.

Liu et al. RAND 2017
Thank you!

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