

*NAS commissioned paper*

# ADRD Health Economics & Public Policy

Paige Lin, PhD

Always  
Thinking  
Ahead.™



Proudly **wellforce**

**CEVR**  
Center for the Evaluation of Value  
and Risk in Health

**Tufts** Medical  
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Center

# Outline

**1**

- **What is the problem?**

**2**

- **How are we going to solve the problem?**

**3**

- **What are the barriers and opportunities?**



**1**

- **What is the problem?**

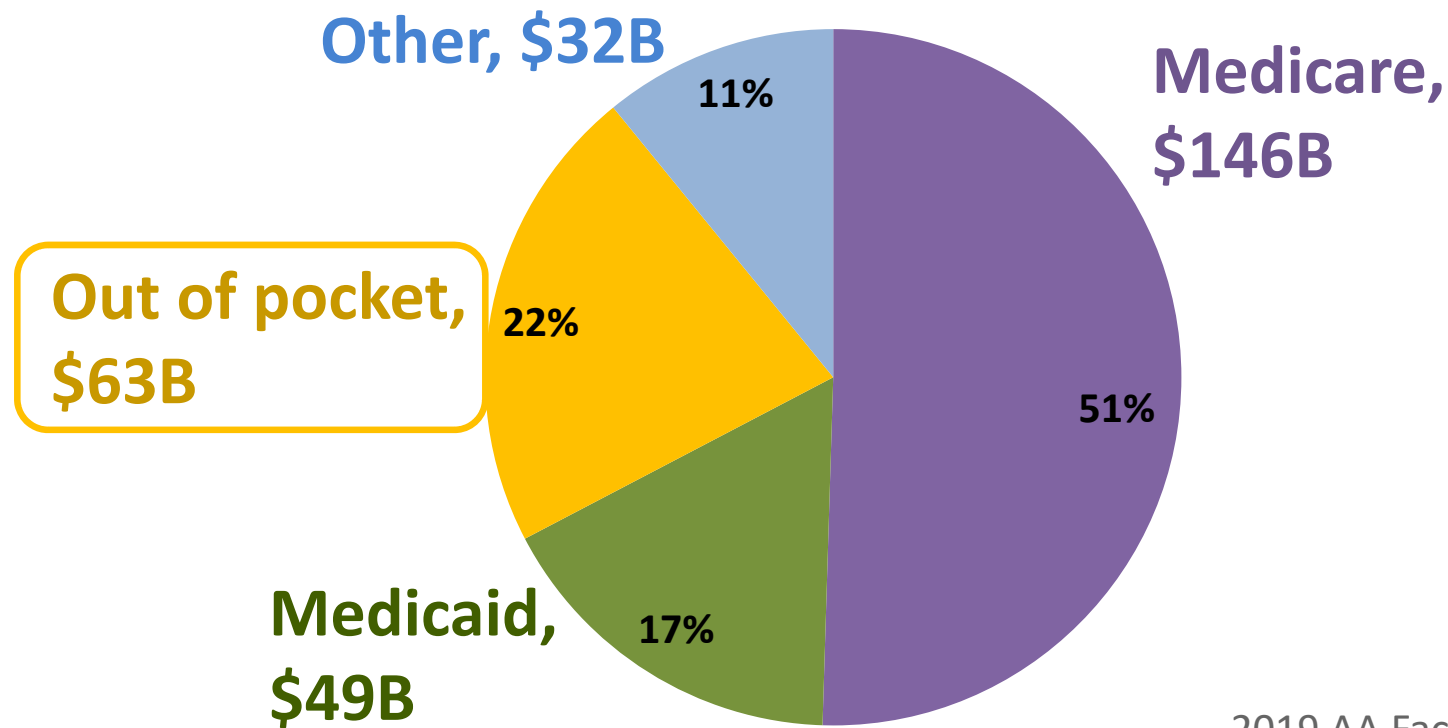
## **ADRD economic costs: Current estimates and future projections**

1

**ADRD imposes a substantial economic burden on patients, caregivers, and the health care system**

Total health care costs for ADRD (2019):

**\$290 billion**



2019 AA Facts & Figures

Julie Zissimopoulos\*, Eileen Crimmins and Patricia St.Clair

## **The Value of Delaying Alzheimer's Disease Onset**

### Year 2010



**3.6M ADRD patients**



**\$307B/yr**

### Year 2050 (status quo)

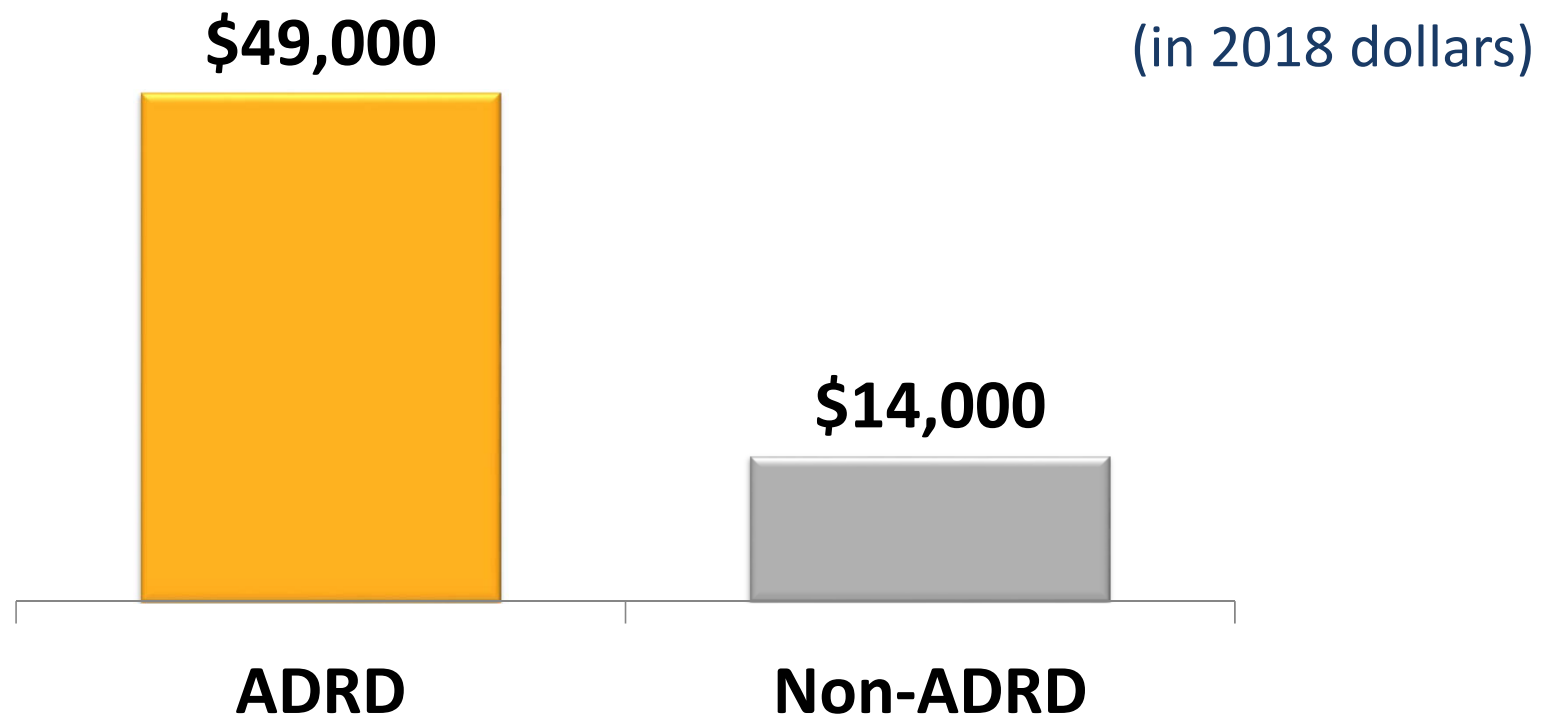
**9.1M ADRD patients**

**\$1.5T/yr**

2

**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

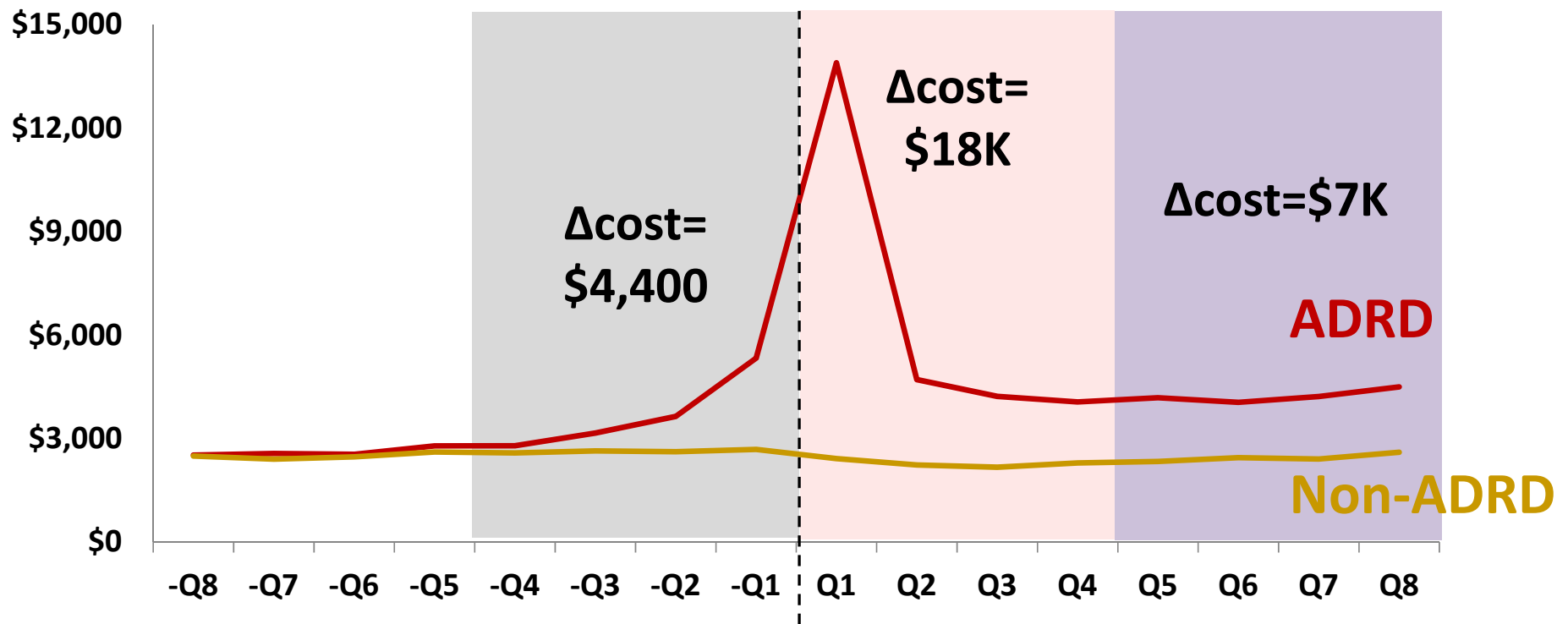




# Medicare costs of ADRD vs. non-ADR

Quarterly costs

Diagnosis

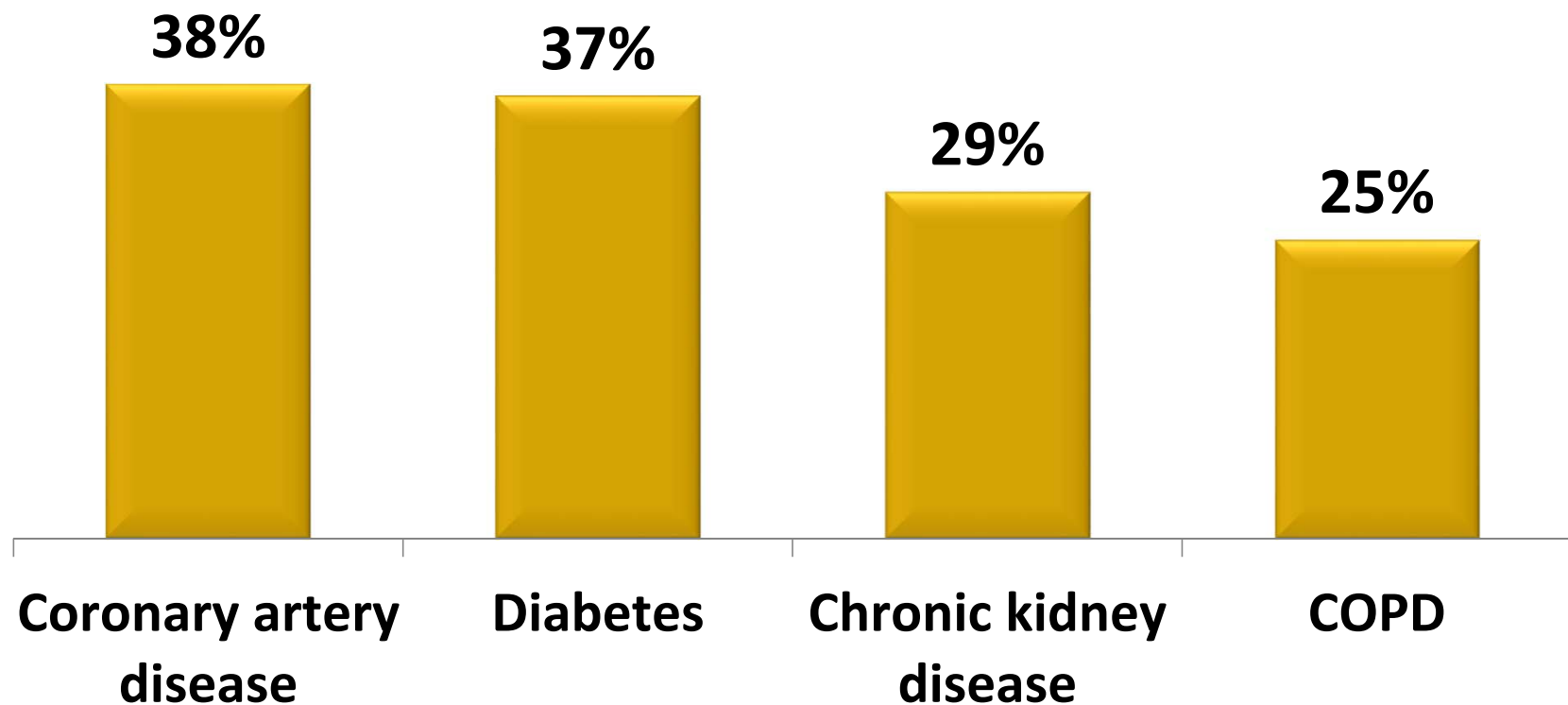


Lin et al. JAGS 2016

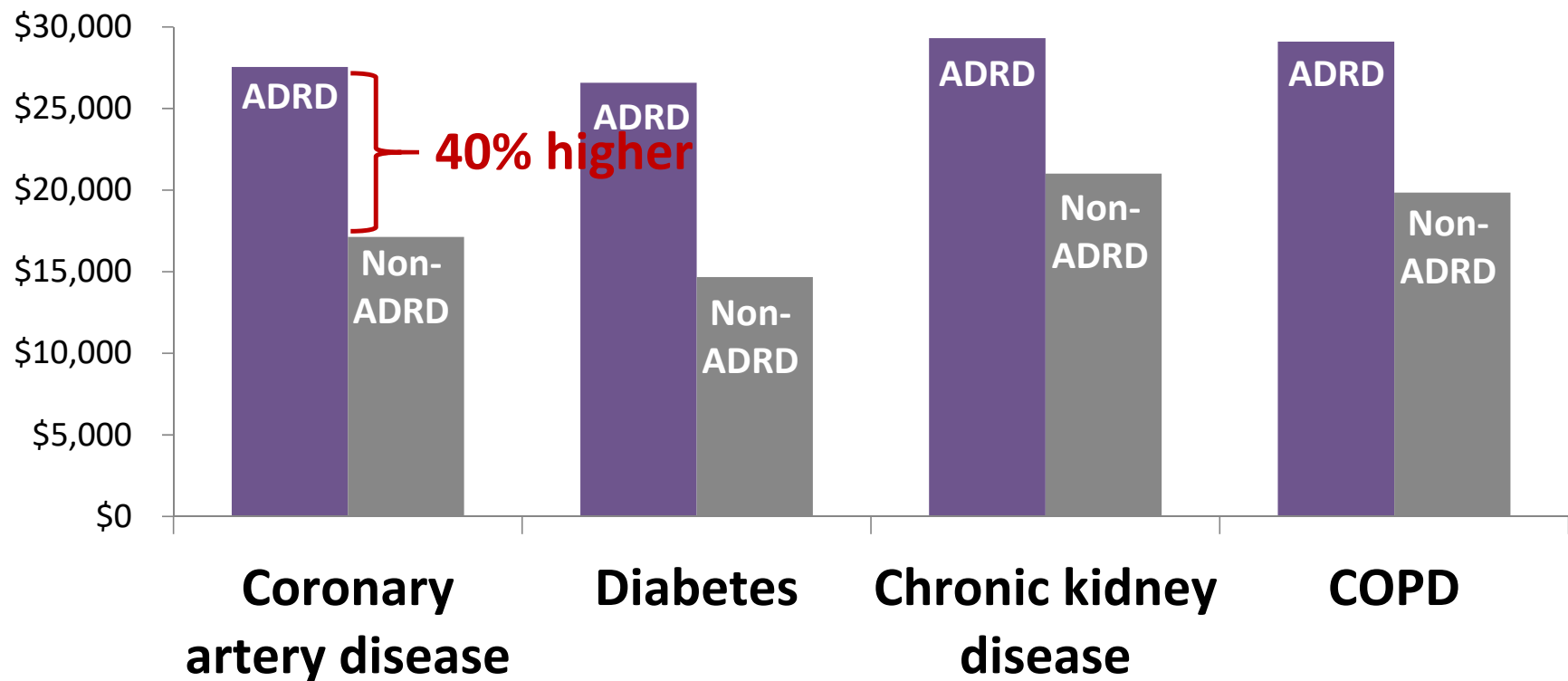
3

**Comorbidities are highly prevalent in people with ADRD and substantially increase care costs**

## Comorbidities in Medicare beneficiaries with ADRD



## ADRD can complicate comorbidity management and increase care costs



4

**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



1

- What is the problem?

2

- How are we going to solve the problem?

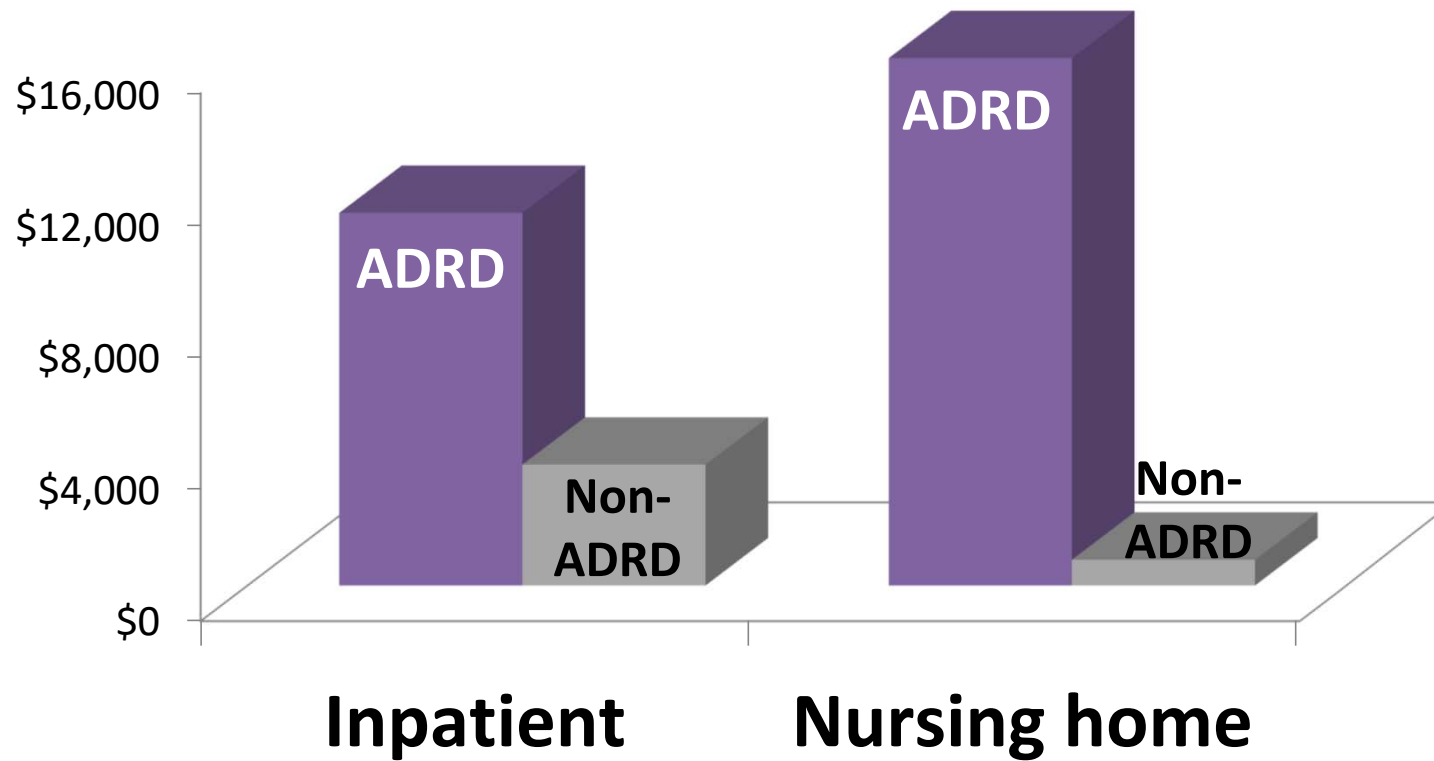
**Bend the cost curve:  
Understand ADRD cost drivers**

1

**Inpatient, nursing home and  
end-of-life care costs are high in ADRD**

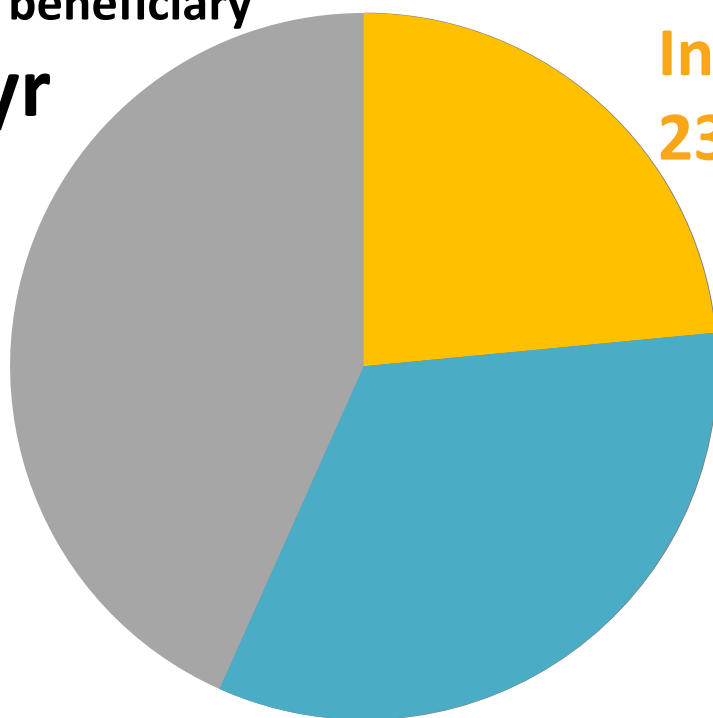


# ADRD cost drivers



# ADRD cost drivers

Total health care costs of  
Medicare ADRD beneficiary  
**\$49,000/yr**



**Inpatient,  
23%**



**Including avoidable  
hospitalizations &  
readmissions**

**Nursing home,  
33%**

**In 2013**

**410,000**

**Medicare ADRD patients had**

**Avoidable hospitalizations**

**Unplanned readmissions**

**\$4.7B**

Lin et al. A&D 2017

2

**ADRD cost drivers differ by care setting**

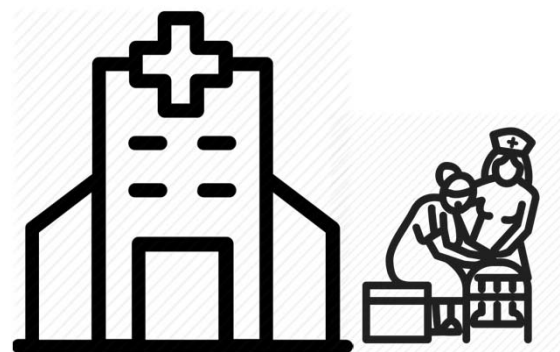
# ADRD cost drivers differ by care setting

## Community-based



**40% direct costs**  
**60% informal care costs**

## Institutionalized



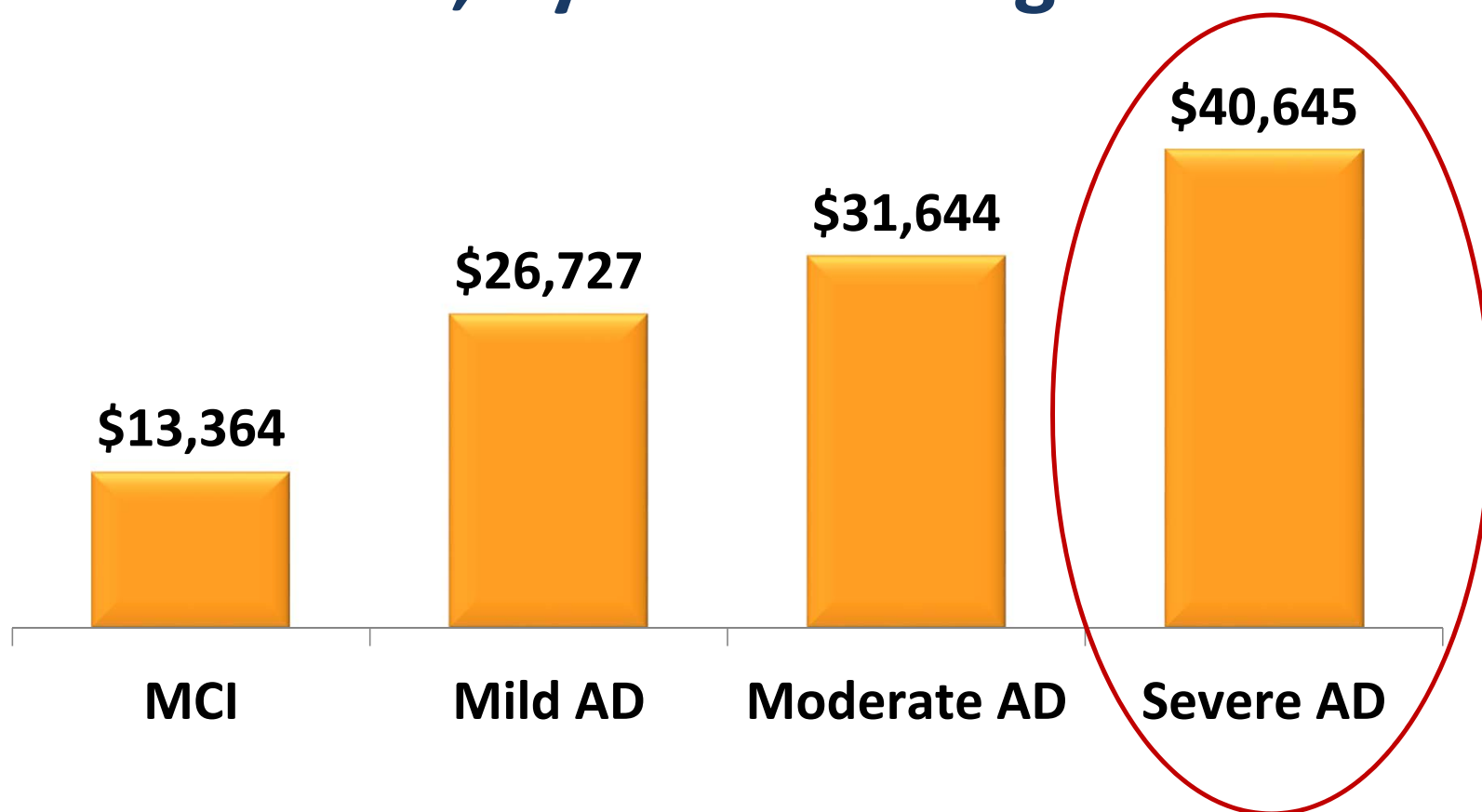
**>85% direct costs**

Schaller et al. Int J Geriatr Psychiatry 2014

3

**ADRD costs rise with increasing  
disease severity**

## Annual AD costs, by disease stage



Gustavsson et al. A&D 2011; Green et al. A&D 2019

## ADRD cost impact on stakeholders, by disease stage

|          | Preclinical Stage | Prodromal Stage | Mild Dementia | Moderate Dementia | Severe Dementia |
|----------|-------------------|-----------------|---------------|-------------------|-----------------|
| Patients |                   |                 |               |                   |                 |

Jönsson, Lin, Khachaturian. A&D 2017



# ADRD cost impact on stakeholders, by disease stage

|            | Preclinical Stage | Prodromal Stage | Mild Dementia | Moderate Dementia | Severe Dementia |
|------------|-------------------|-----------------|---------------|-------------------|-----------------|
| Patients   | Low               | Moderate        | Moderate      | High              | High            |
| Caregivers | Low               | Low             | Moderate      | High              | High            |
| Family     | Low               | Low             | Moderate      | Moderate          | High            |
| Payers     | Low               | Low             | Moderate      | Moderate          | High            |
| Society    | Low               | Low             | Moderate      | Moderate          | High            |

## Treatment goals

- Delay progression to more costly stages
- Maintain functionality

Jönsson, Lin, Khachaturian. A&D 2017

1

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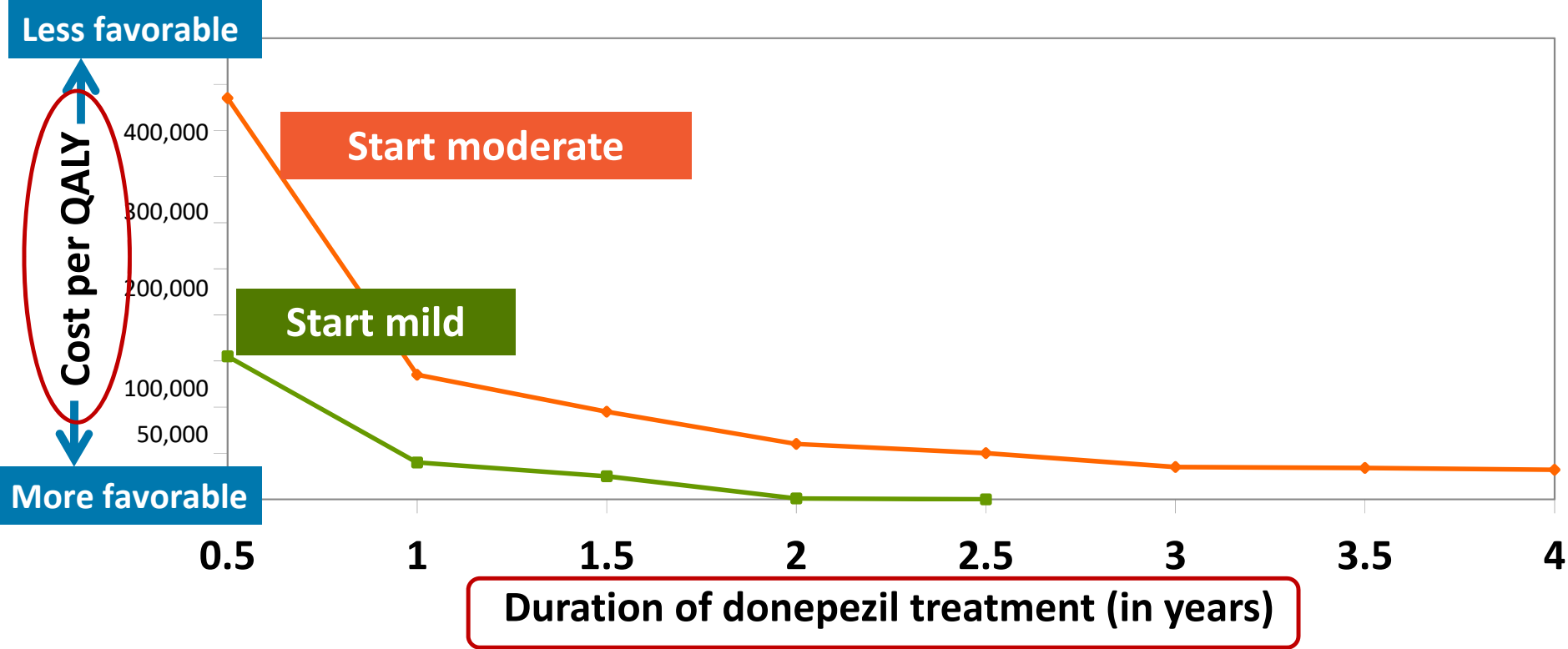
• What are the barriers and opportunities?

## Value of ADRD interventions & reimbursement challenges

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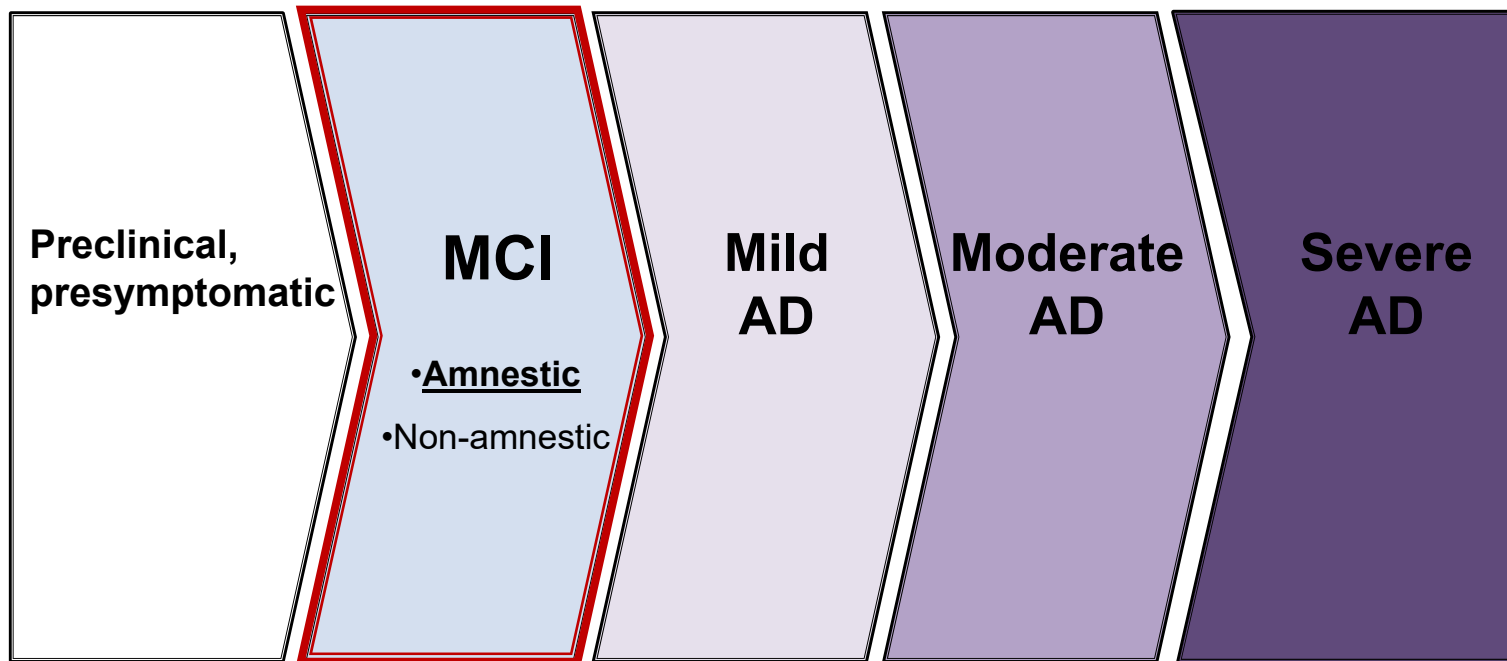
**Intervention at earlier stages of  
ADRD may be more cost-effective**

# Cost-effectiveness of donepezil for mild/moderate AD



Neumann et al. Neurology 1999

# Disease spectrum



# Will MCI therapy be cost-effective?



Alzheimer's & Dementia ■ (2019) 1-13

Alzheimer's  
&  
Dementia

Featured Article

Assessing cost-effectiveness of early intervention in Alzheimer's disease: An open-source modeling framework

Colin Green<sup>a,\*</sup>, Ron Handels<sup>b,c</sup>, Anders Gustavsson<sup>c,d</sup>, Anders Wimo<sup>c</sup>,  
Bengt Winblad<sup>c,e</sup>, Anders Sköldunger<sup>c</sup>, Linus Jönsson<sup>c,f</sup>

## Hypothetical, disease modifying treatment for MCI

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

# Will MCI therapy be cost-effective?



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## Assumptions

- Treatment cost: \$5,000/yr
- Treatment effectiveness: 20% reduction in MCI → AD conversion rate

2

**For payers, the issue is budget impact**



# Budget impact of an innovative agent

**\$84K**

(Hepatitis C)



17,000 new cases/yr

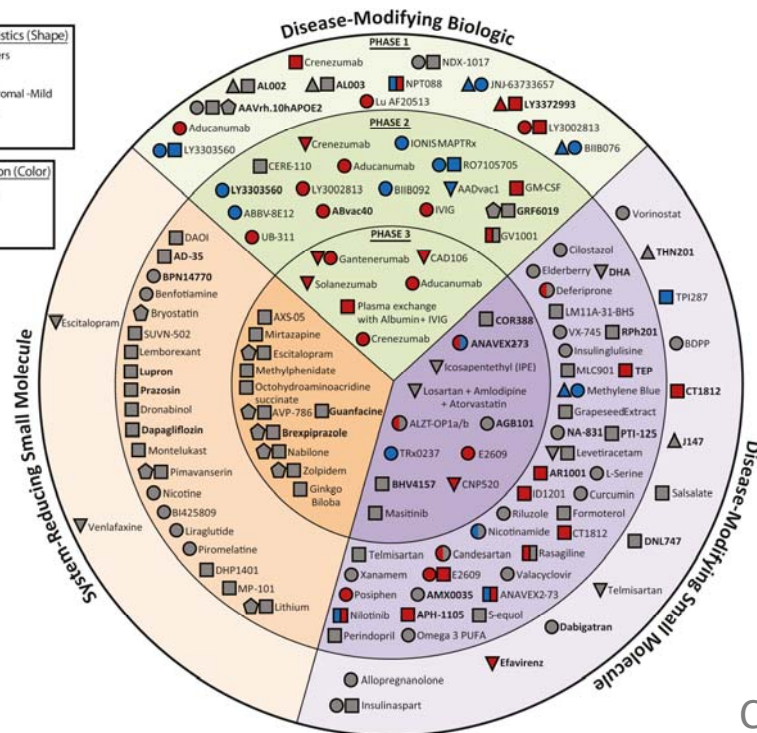


**\$1.4B/yr**



>130 AD treatment agents in clinical trial

*Imagine*



*e-modifying*

Cummings et al. A&D TRCI 2019

**Cost of care**

**X**

**# of people**

**X**

**Duration of  
disability**



**ADRD**

**Cost**

**Duration**

**People**

Source: Zaven Khachaturian

# Budget impact for AD?

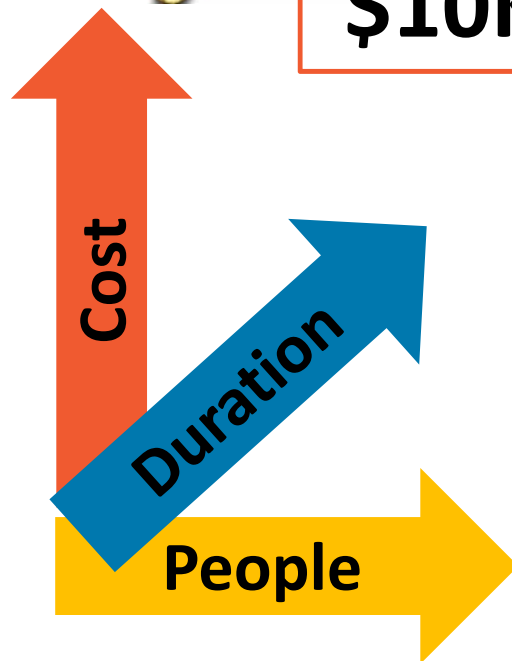


**\$10K/yr** X **2.5M people**

*1/2 of the AD population*

**= \$25B/yr**  
chronic treatment

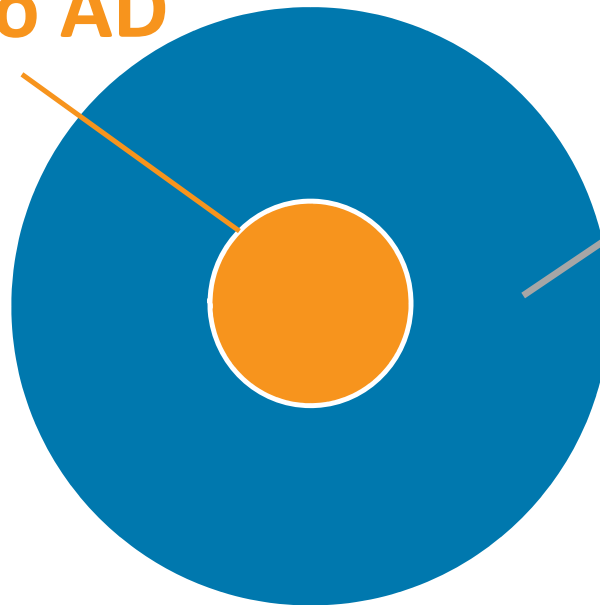
**\$1.4B/yr**



# 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

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*Jodi L. Liu, Jakub P. Hlávka, Richard Hillestad, Soeren Mattke*

# Are we prepared to meet demand?

**3.1M**

people who have been diagnosed with dementia  
specialists for a specialist would see  
a dementia specialist to  
learn about treatment



**27,000**

dementia specialists in 2020

**14**

months

**Wait times might be extensive**

Liu et al. RAND 2017





# Thank you!

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