Value-based Health Care in Dialysis

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Stanford MEDICINE | Department of Medicine

Disclosures

- I serve on the Board of Directors of Satellite Healthcare, Inc., a non-profit dialysis provider headquartered in San Jose, CA (2010-present)
- I served as Medical Director of a National Medical Care (Fresenius) dialysis unit (1996-8)
- I served as Medical Director of a hospital-affiliated dialysis unit at UCSF (1998-2007)
- I currently care for patients at Satellite and DaVita dialysis units
- Glenn = Equal opportunity dialyzer

Outline

- Briefly describe 3 experiments in “value-based health care” as they relate to dialysis in the US
  - Clinical performance measures, G-codes, and “Bundling”
- Describe intended and unintended consequences
- Present results – warts and all
- Introduce the Advancing American Kidney Health initiative
- Contemplate the future (ESKD=“canaries in a coal mine”)

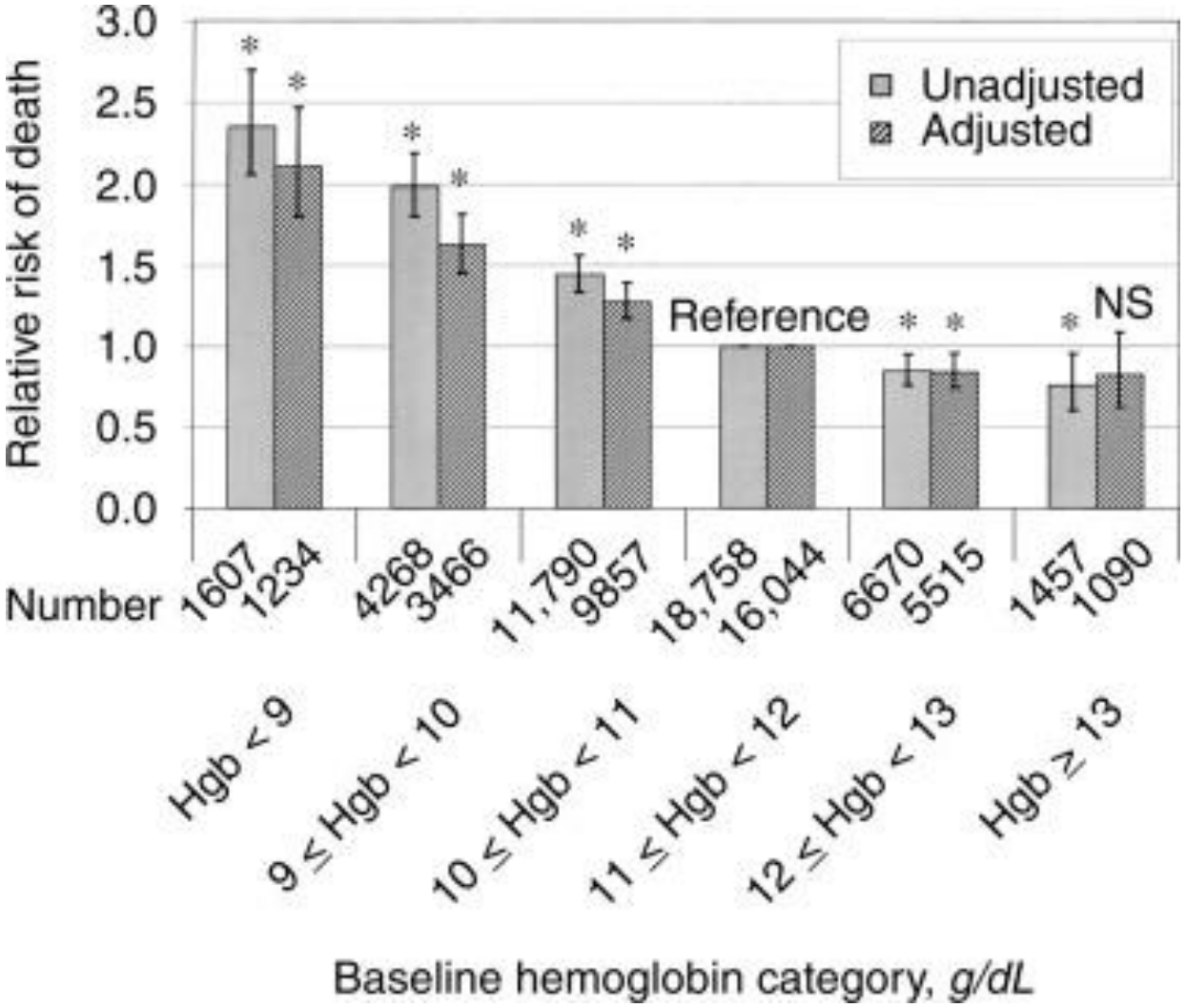
Dialysis in the US - Snapshot

- High mortality rate (roughly 17-18% per year)
- High morbidity (2 hospitalizations, 10-11 hospital days per year)
- Generally poor functional capacity and health-related quality of life
- Sustains life, fails to restore health
- Expensive: >$40B annually, roughly 7% of Medicare expenditures

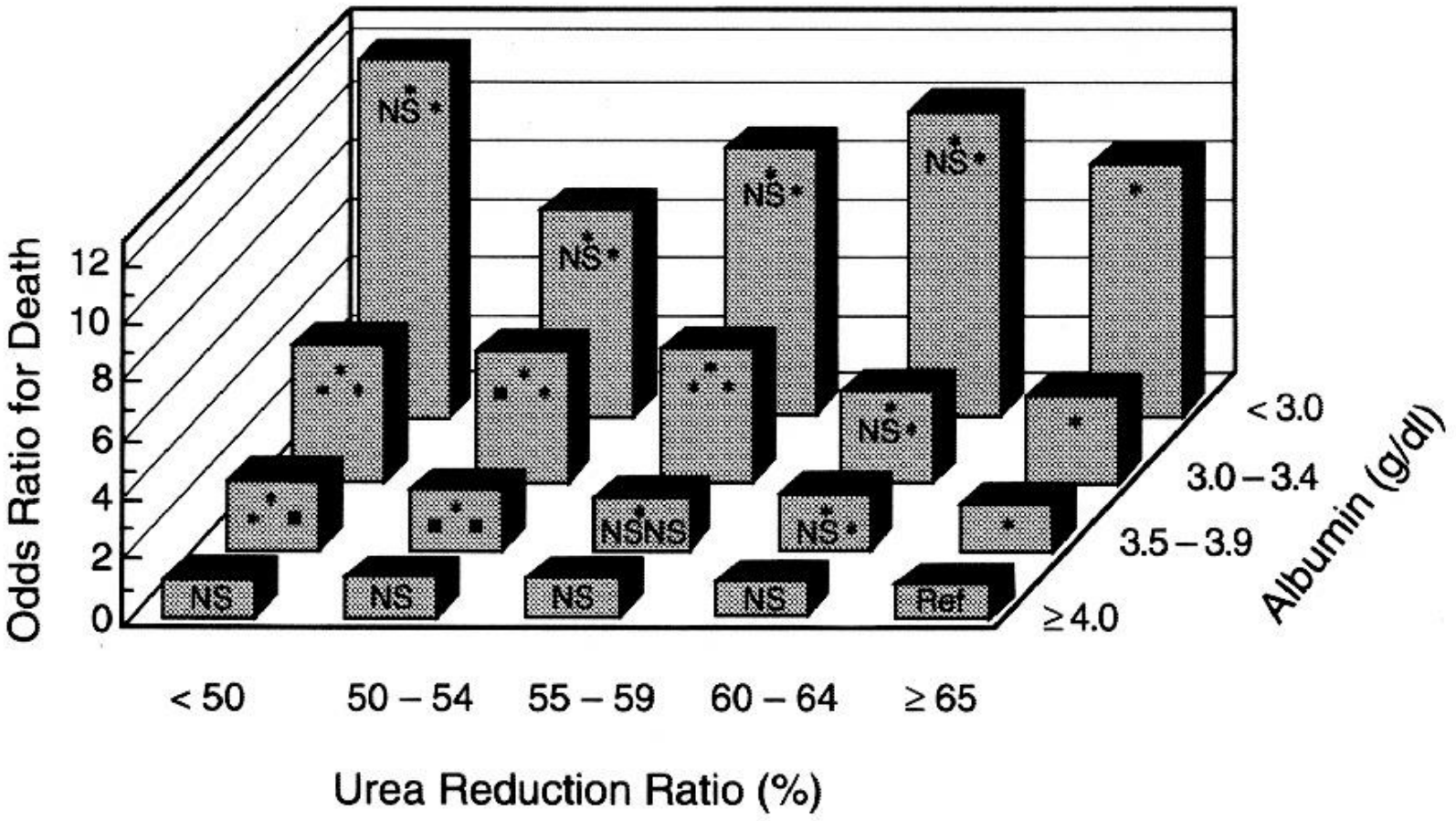
First Steps

- Clinical performance measures (late 90s, early 00s) – pay for performance ("P4P")
  - Proportion of patients with
    - Hemoglobin >11 g/dL
    - Urea reduction ratio >65%
  - Evidence mixed
    - Observational data = yes
    - RCT data = no
  - Easy to measure

Hemoglobin and Mortality

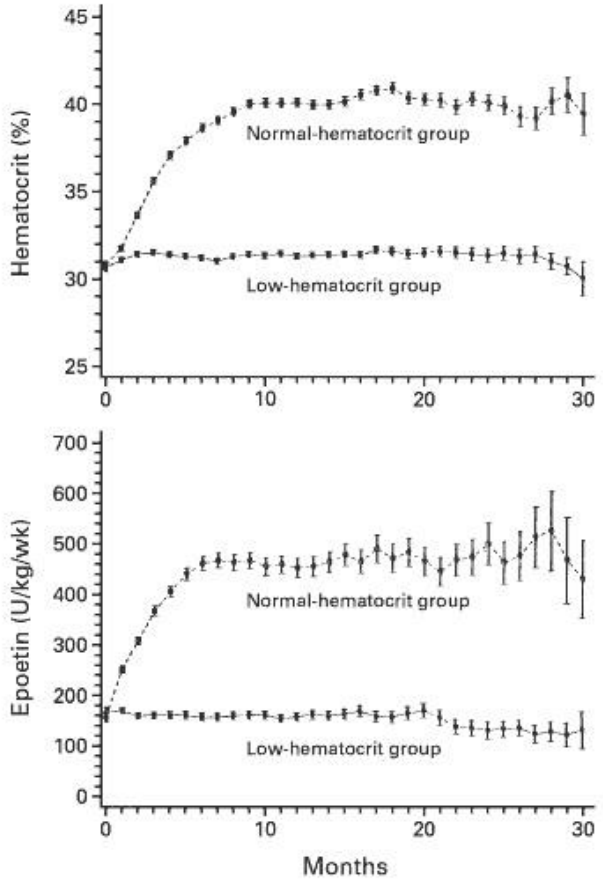


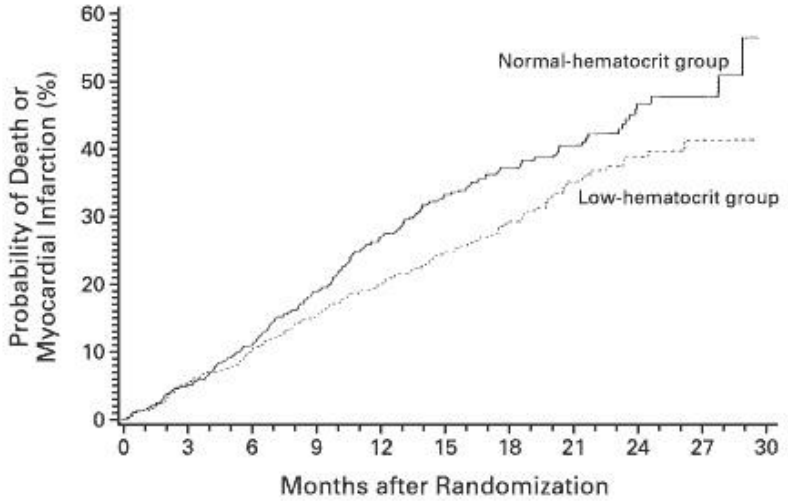
Dialysis Dose and Mortality



Owen et al. NEJM 1993

Normal Hematocrit Trial



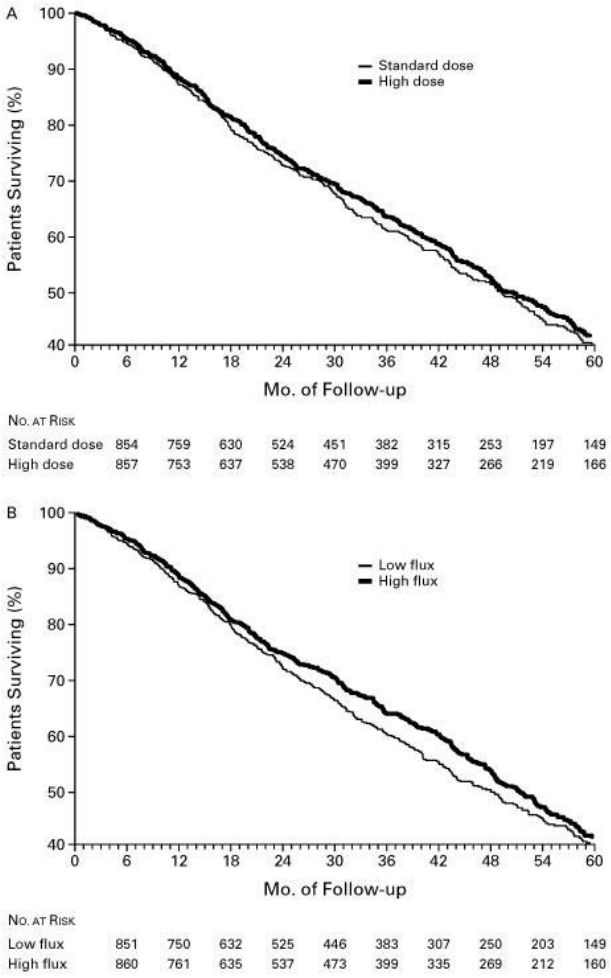


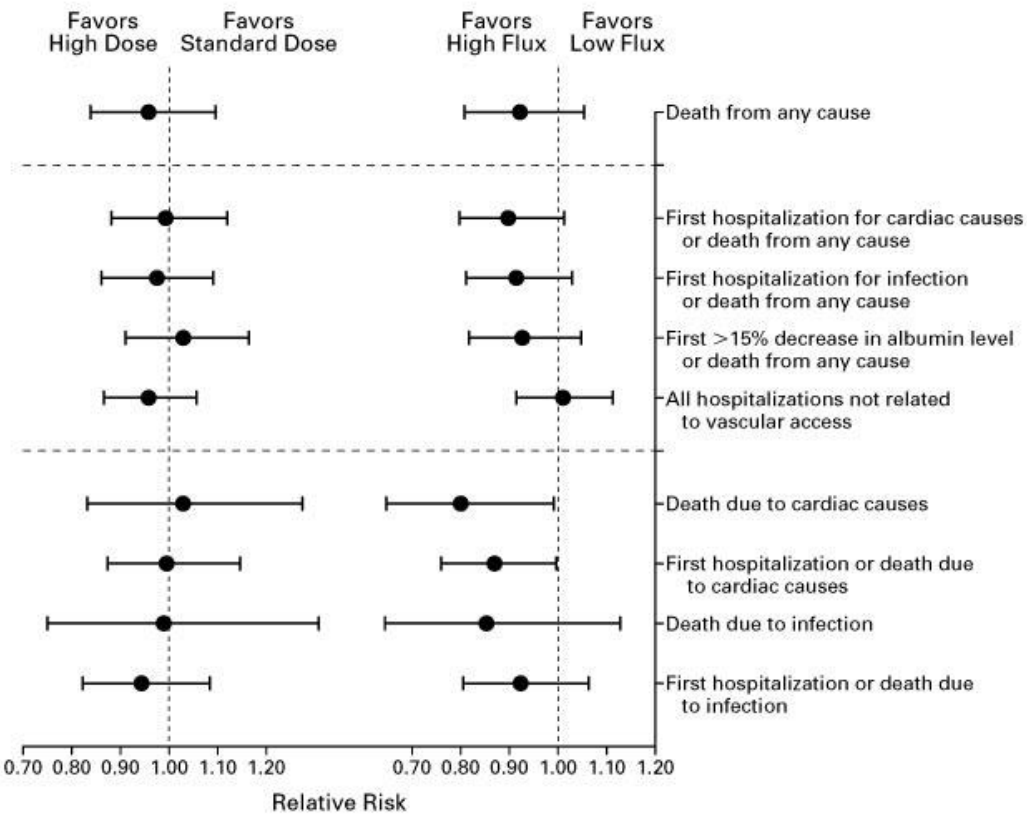
No. at Risk

Normal hematocrit	618	540	476	415	353	259	186	124	69	26
Low hematocrit	615	537	485	434	391	292	216	131	80	20

Besarab et al. NEJM 1998

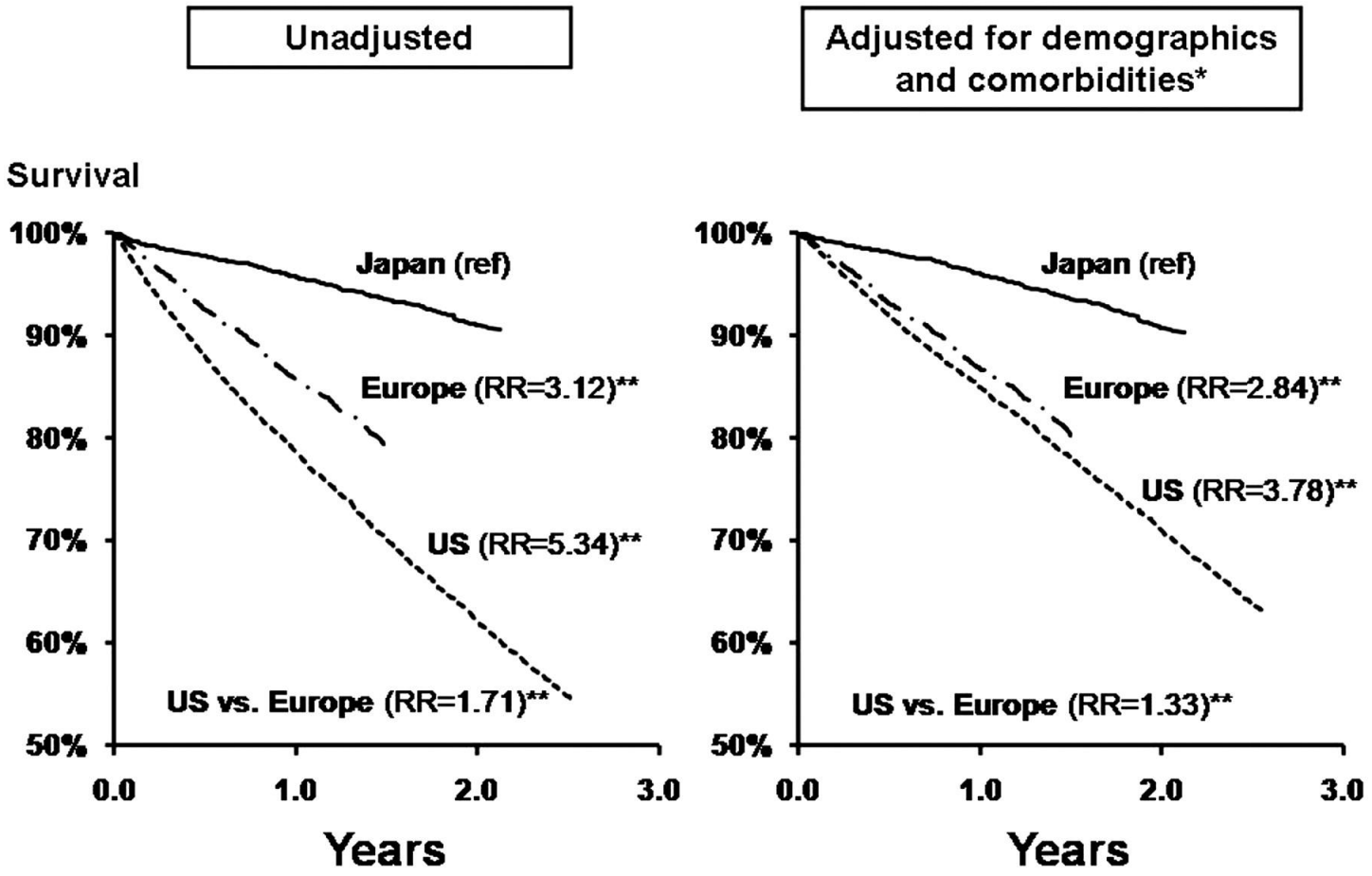
HEMO





Eknoyan et al. NEJM 2002

Worse in the US than Overseas



Robinson and Port, CJASN 2009

Reasons for Differential Mortality

- Case mix
  - Elderly
  - Less palliative care (“do everything”)
  - More and more severe T2DM
  - Nursing home residents
  - Flat supply of deceased donor kidneys
- Practice patterns
  - Vascular access
  - Physician visit frequency

Hypothesis

- More frequent visits = lower mortality

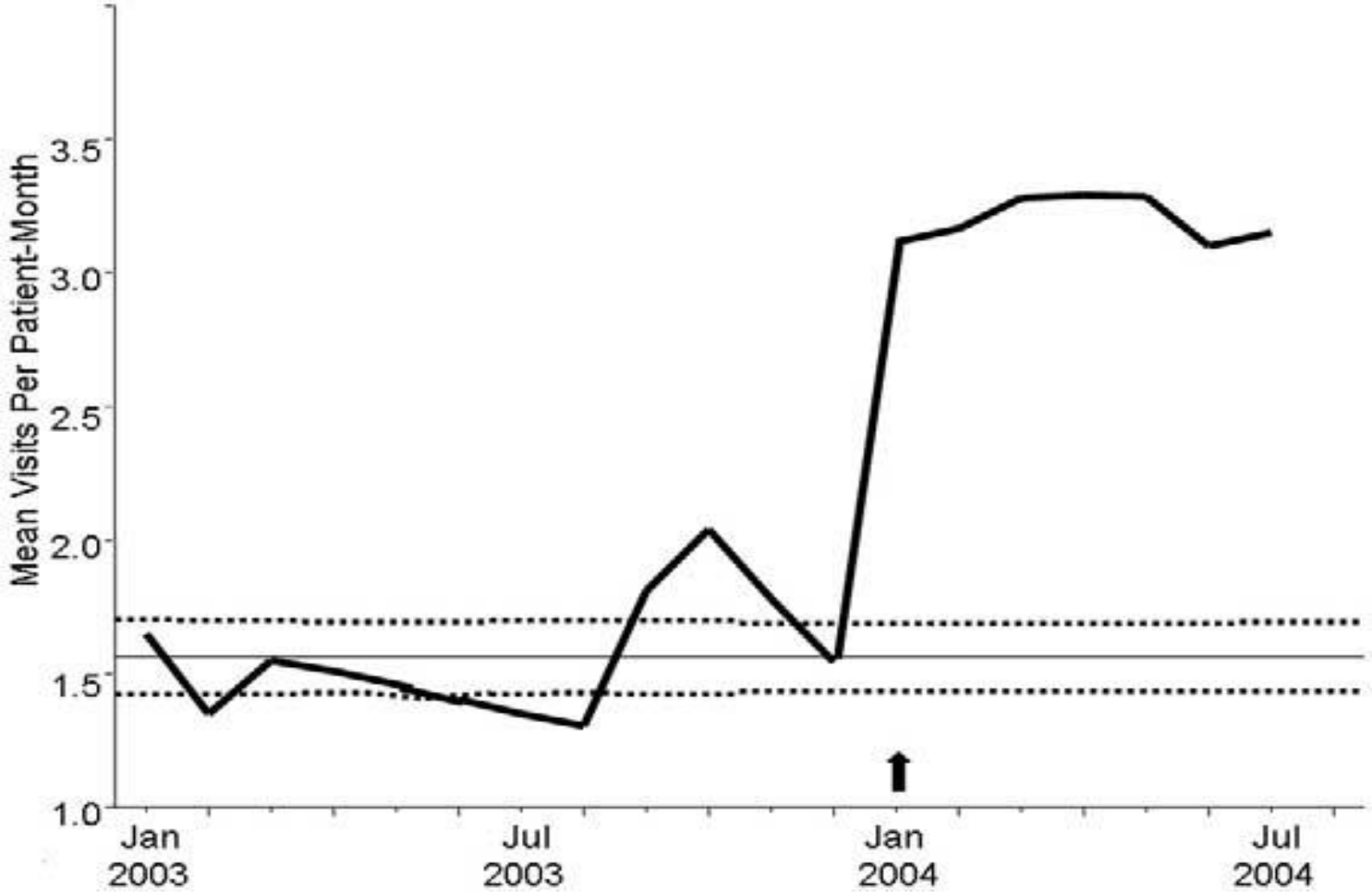
G0319, G0318, G0317

TABLE 1
CMS MCP G Code Scheme for Adult Dialysis Patients, 2004

Dialysis setting for the patient	Visits (*n*)	Code	National average fee
In-center	1 visit	G0319	$201 per month
In-center	2–3 visits	G0318	$252 per month
In-center	4+ visits	G0317	$303 per month
Home	Not applicable	G0323 full month	$252 per month
Home	Not applicable	G0327 part month	Per day $ based on number of outpatient days

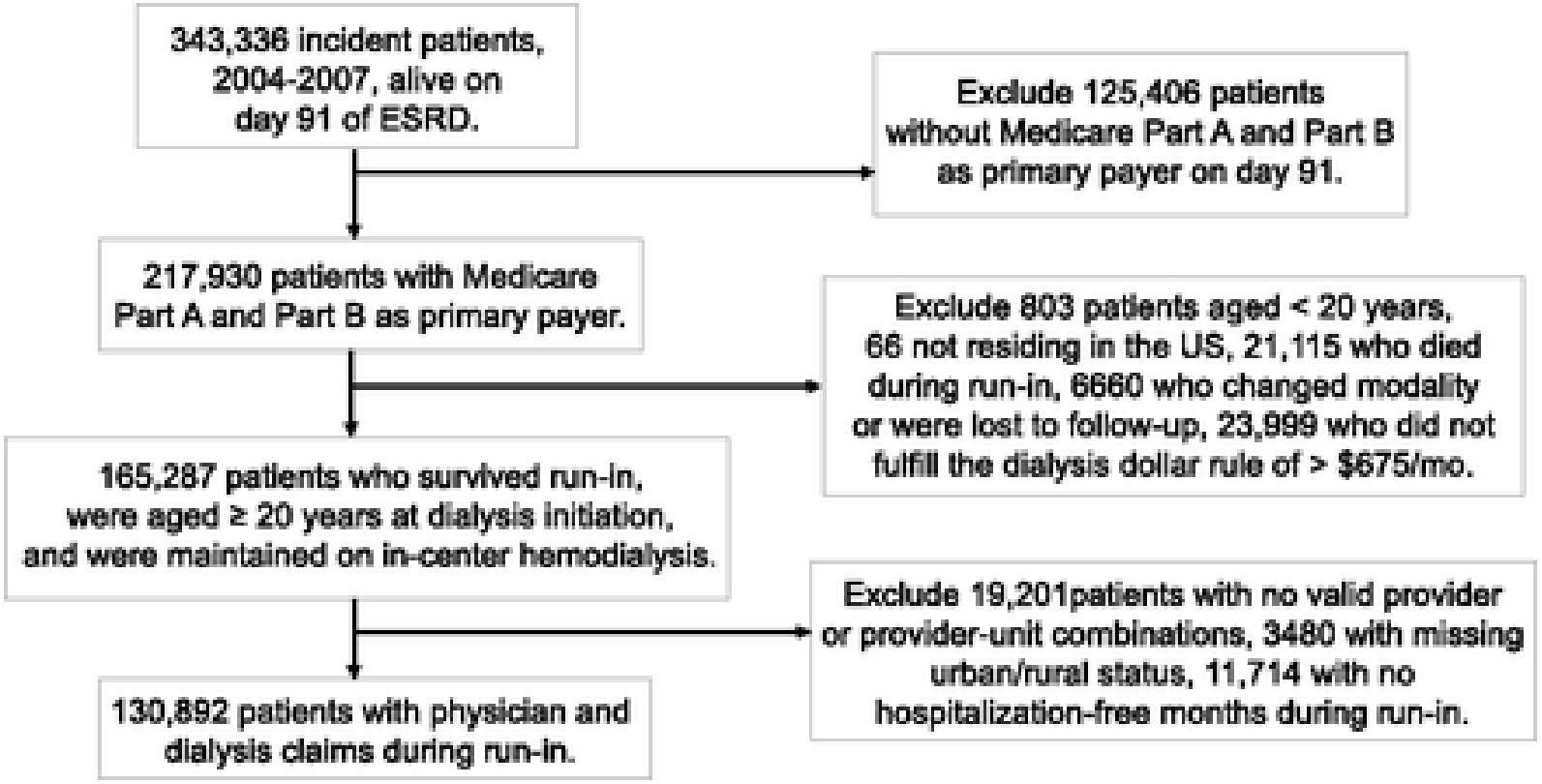
CMS = Centers for Medicare and Medicaid Services; MCP = Monthly Capitated Payment.

Predictable Response



Mentari et al., AJKD 2005

Visit Frequency and Mortality



Slinin et al., JASN 2012

Visit Frequency and Mortality

- Comparing patients seen fewer than 4 times per month to those seen 4 or more times, no significant difference in mortality using traditional Cox model, time-varying Cox model, or using an instrumental variable approach
- 2 to 4% relative (miniscule) reduction in hospitalization with 4 or more visits per month

Slinin et al., JASN 2012

G-code Reimbursement and Mortality

- Used two difference in difference approaches

  1) Patients who were enrolled in Managed Care Organizations/HMOs (Medicare Advantage) were not affected by g-code reimbursement.

    – They remained on a capitated system.

  2) Patients residing in rural areas were less affected by the policy due to less willingness of physicians in those areas to travel the longer distances required to visit patients at remote facilities

Erickson et al., 2013

G-code Reimbursement and Mortality

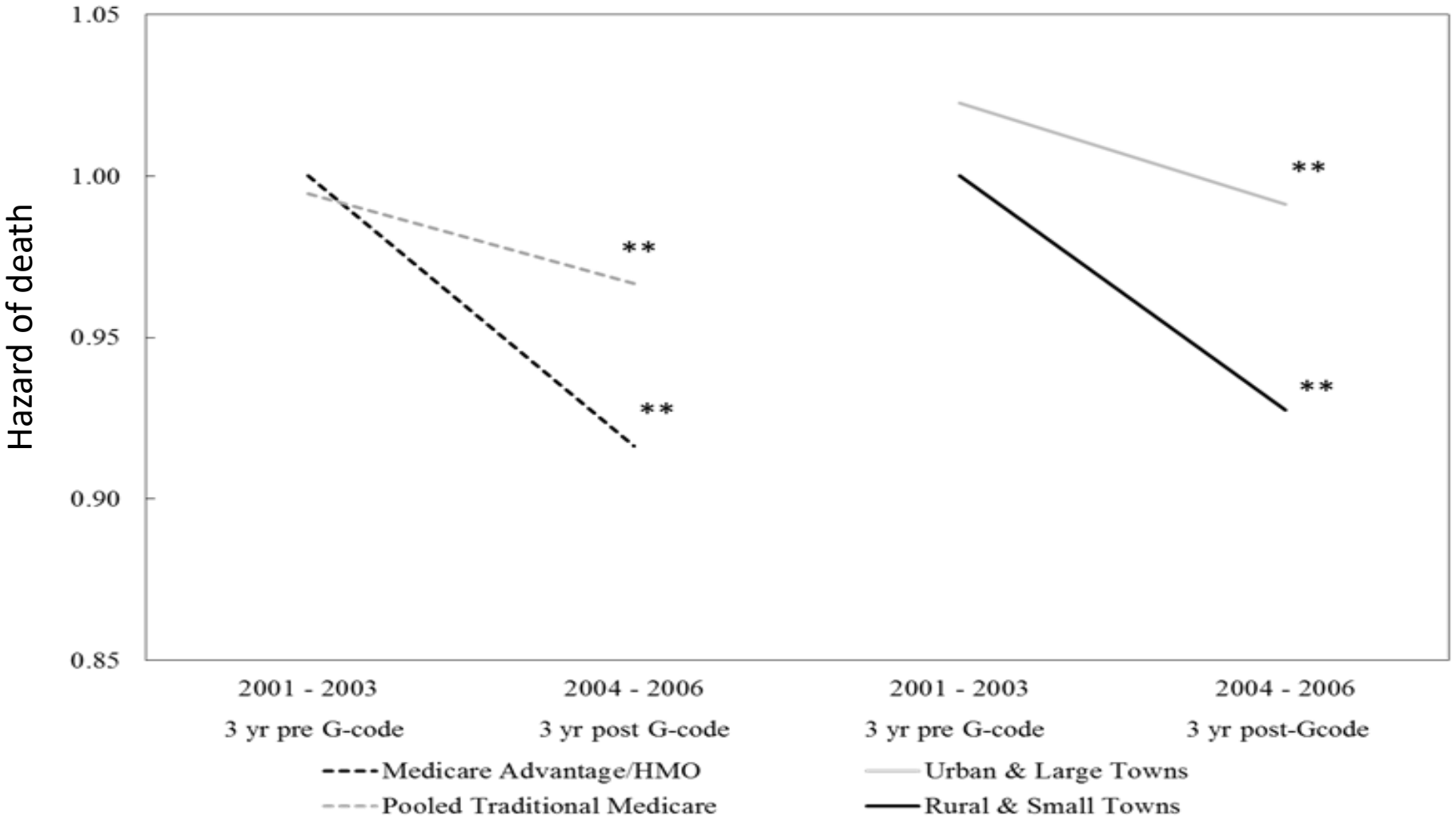
- Cohort – Patients in the United States starting hemodialysis in the 3 years before and 3 years after G-code reimbursement
- Outcome – Time to death
- Statistical analysis – Proportional hazards regression model policy (before vs. after) modeled as a time-varying covariate

Key Assumptions

1) Physician visit frequency did not increase substantially in patients in HMOs in response to G-codes ("contamination")

2) There are no unobservable factors that differentially affected the "case" (Medicare) group from the "control" (HMO) group

Change in Relative Hazards with Enactment of G-codes



Results of D-i-D Analyses

Difference in Difference Analysis Using Time Varying Covariates Traditional Medicare vs. Medicare Advantage/HMO[1]				
	Hazard Ratio	LCI	UCI	p-value
Baseline Hazard for Traditional Medicare Compared to Medicare Advantage/HMO	0.995	0.963	1.027	0.738
Adjustment to Hazard Following G-codes				
Patients on Medicare Advantage/HMO	0.916	0.884	0.949	<0.001
Patients on Traditional Medicare	0.972	0.958	0.986	<0.001
Medicare-G code interaction	1.061	1.021	1.102	0.002

- Urban vs. Rural comparison shows a non-significant trend towards less improvement in survival in the group most affected by the policy (i.e., urban/large towns)

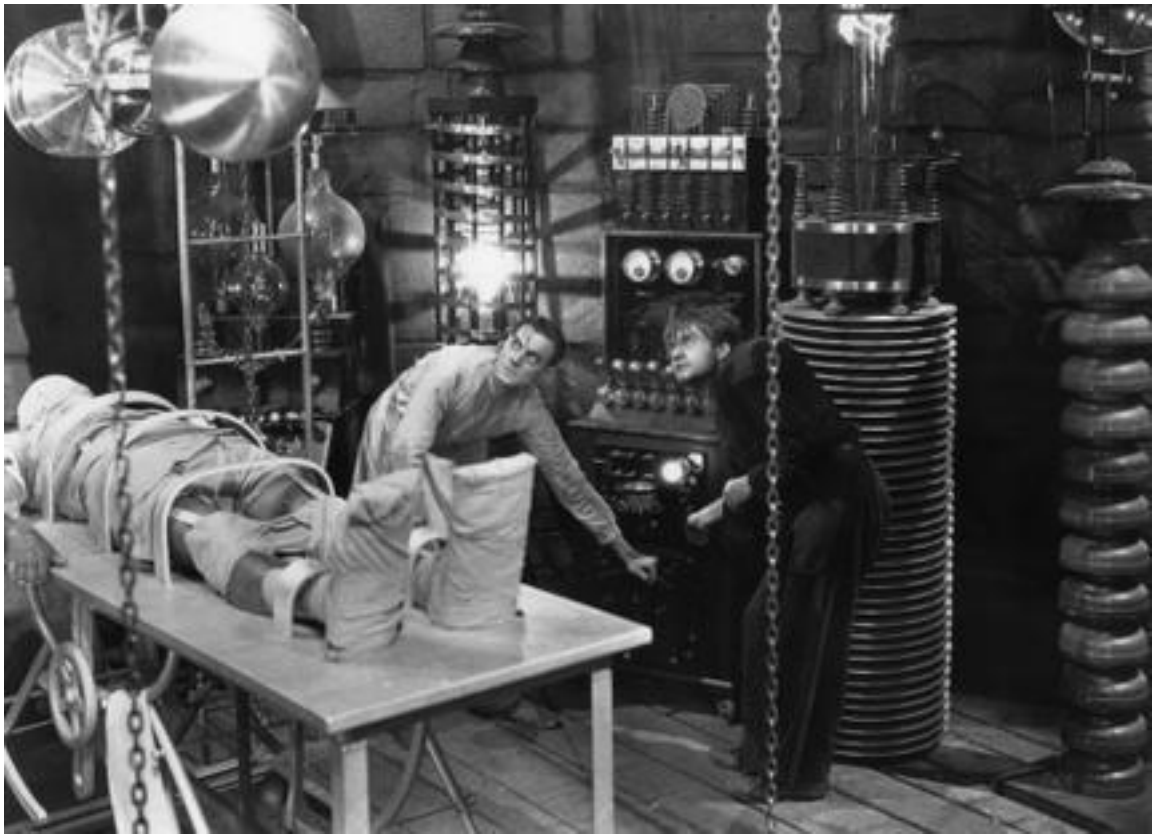
Conclusions

- The reimbursement policy designed to align economic incentives and improve patient care increased costs without an improvement in patient survival

- On average, the policy was certainly not helpful and possibly harmful

Why aren’t more visits beneficial?

- Perhaps seeing your nephrologist is bad



Why aren't more visits beneficial?

- Perhaps some patients benefit from more frequent visits, while others do not
  - Policy led to a shift of time and attention away from those who benefit as physicians aimed to see all (most/many/some) patients 4 times per month to maintain or augment professional fee revenue
  - Quality of visits decreased?
  - Unintended consequences?

Determinants of Visit Frequency

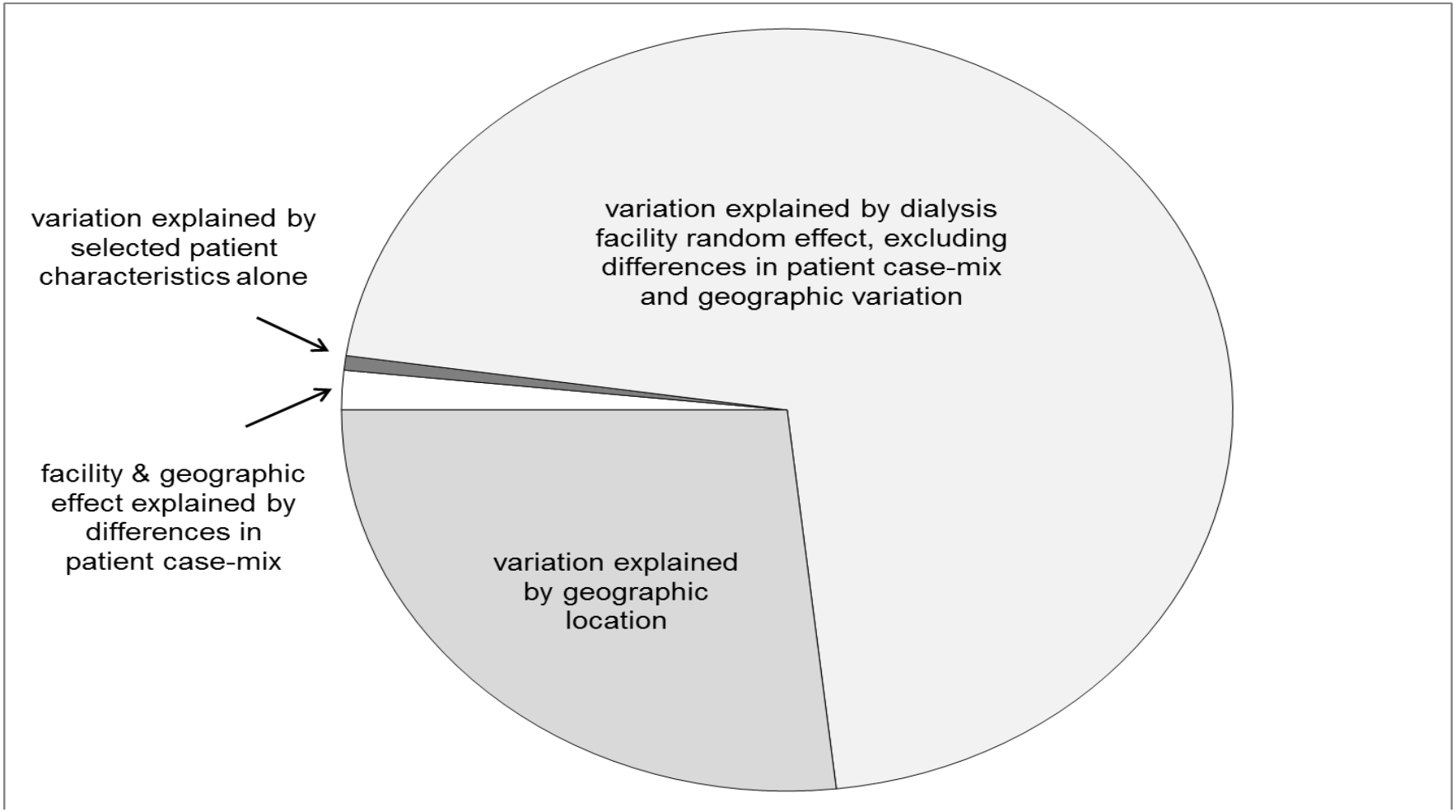
- All prevalent hemodialysis patients in the United States in 2006 covered by Medicare Parts A&B.
- Primary Outcome: Whether or not a patient was seen 4 or more times in a month
- Exclusion: Months when a patient changed insurance, changed providers, died, or was hospitalized

Erickson et al., CJASN 2013

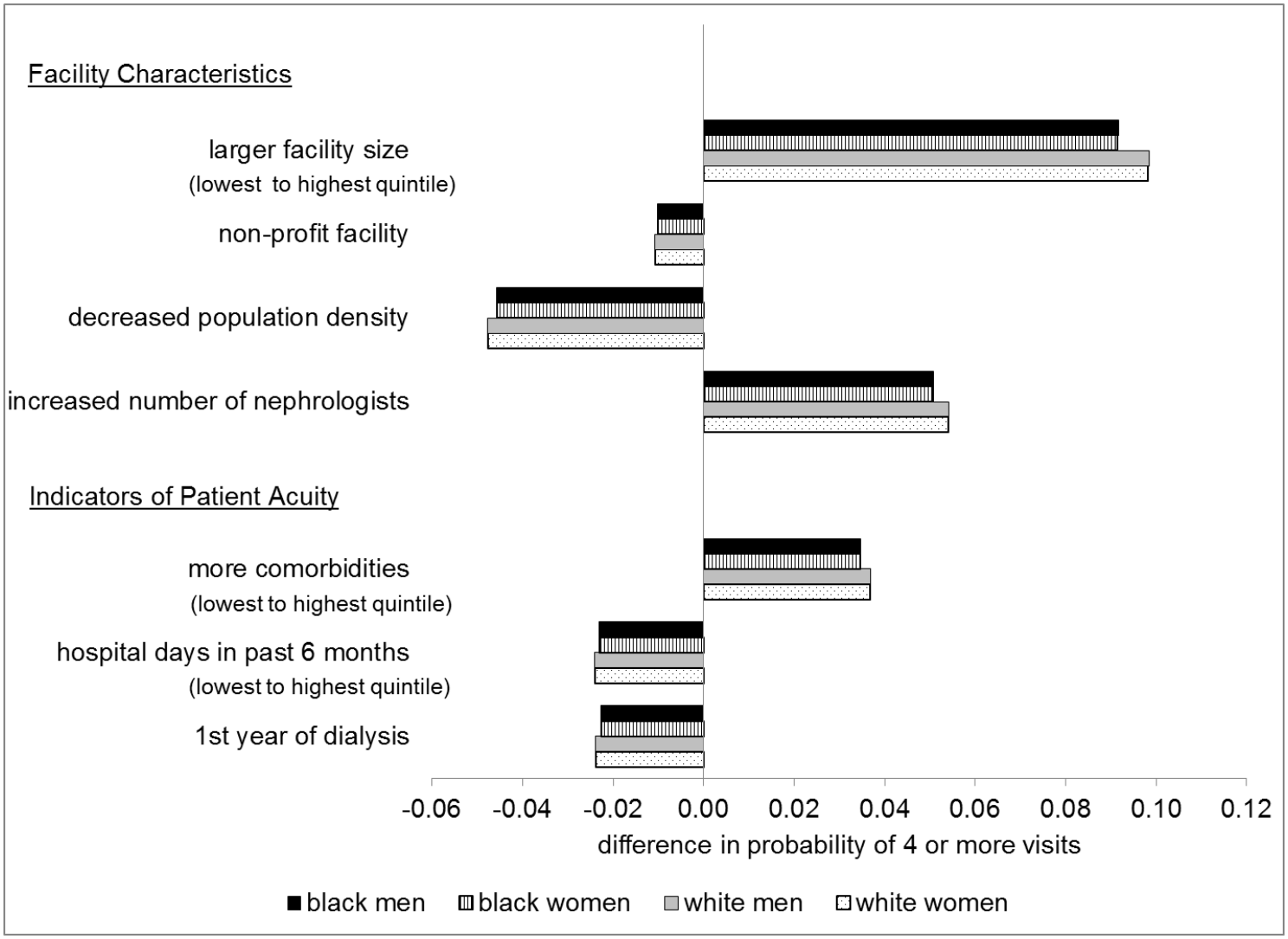
About the data

- 217,986 patients in 4,757 hemodialysis facilities met inclusion criteria for the variance decomposition analysis (yielding a total of 1,809,359 patient-months).
- On average, patients were seen 4 or more times during 69% of months.
- Demographics, socioeconomic, co-morbidities, number of recent hospitalizations

Variation Decomposition: Patient, Facility, and Geographic Effects (July 2006)



Change in Probability of 4 or More Visits



Other Consequences

- Increase in vascular access creation within the first 90 days 
- Increase in the number of vascular access procedures, but no increase in vascular access survival
- Lower rates of home dialysis, especially patients in larger facilities
- Increase in cost between $13 and $87 million per year + opportunity costs
- Global warming

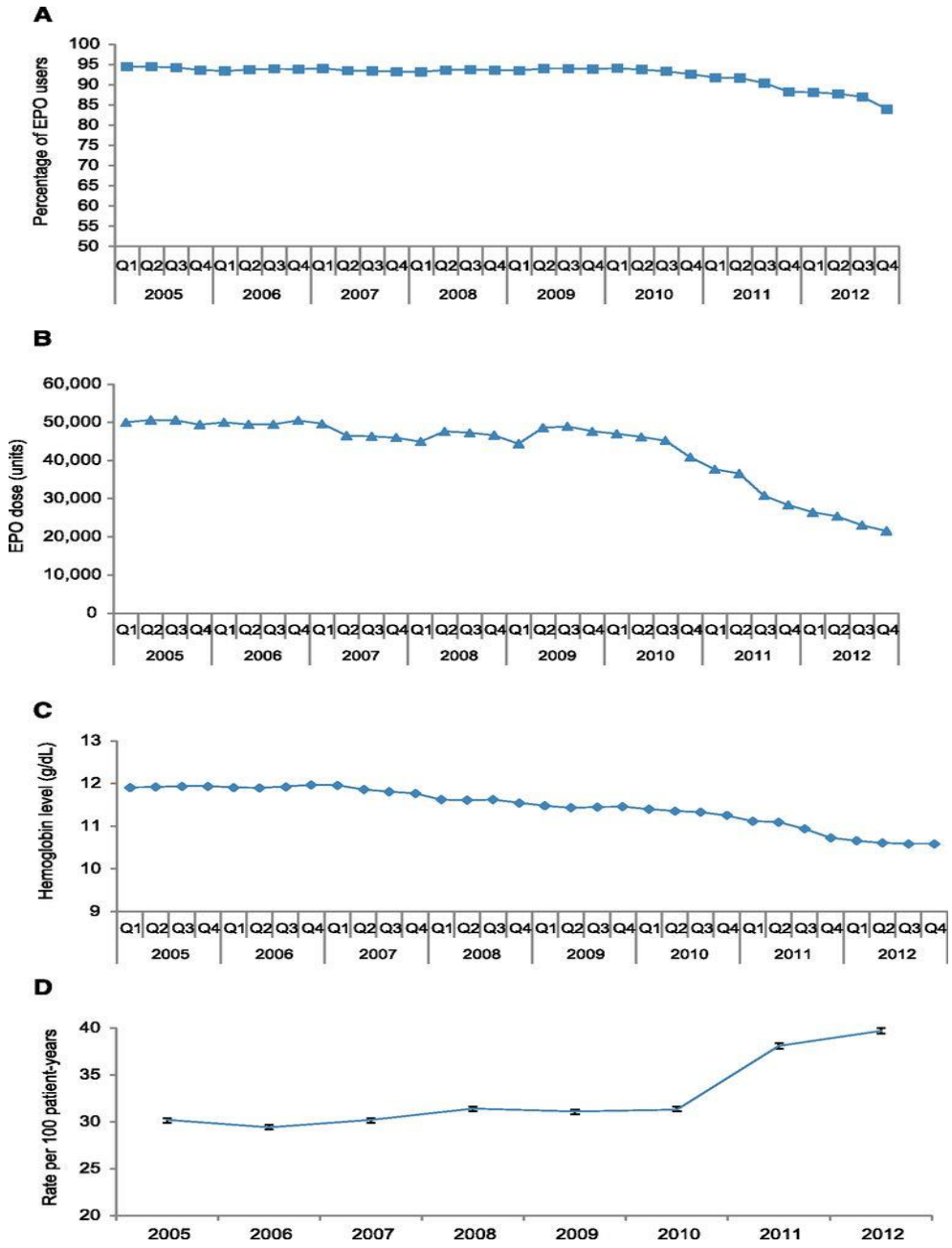
Erickson, et al. JASN, CJASN, AJPH, AJKD 2014-17

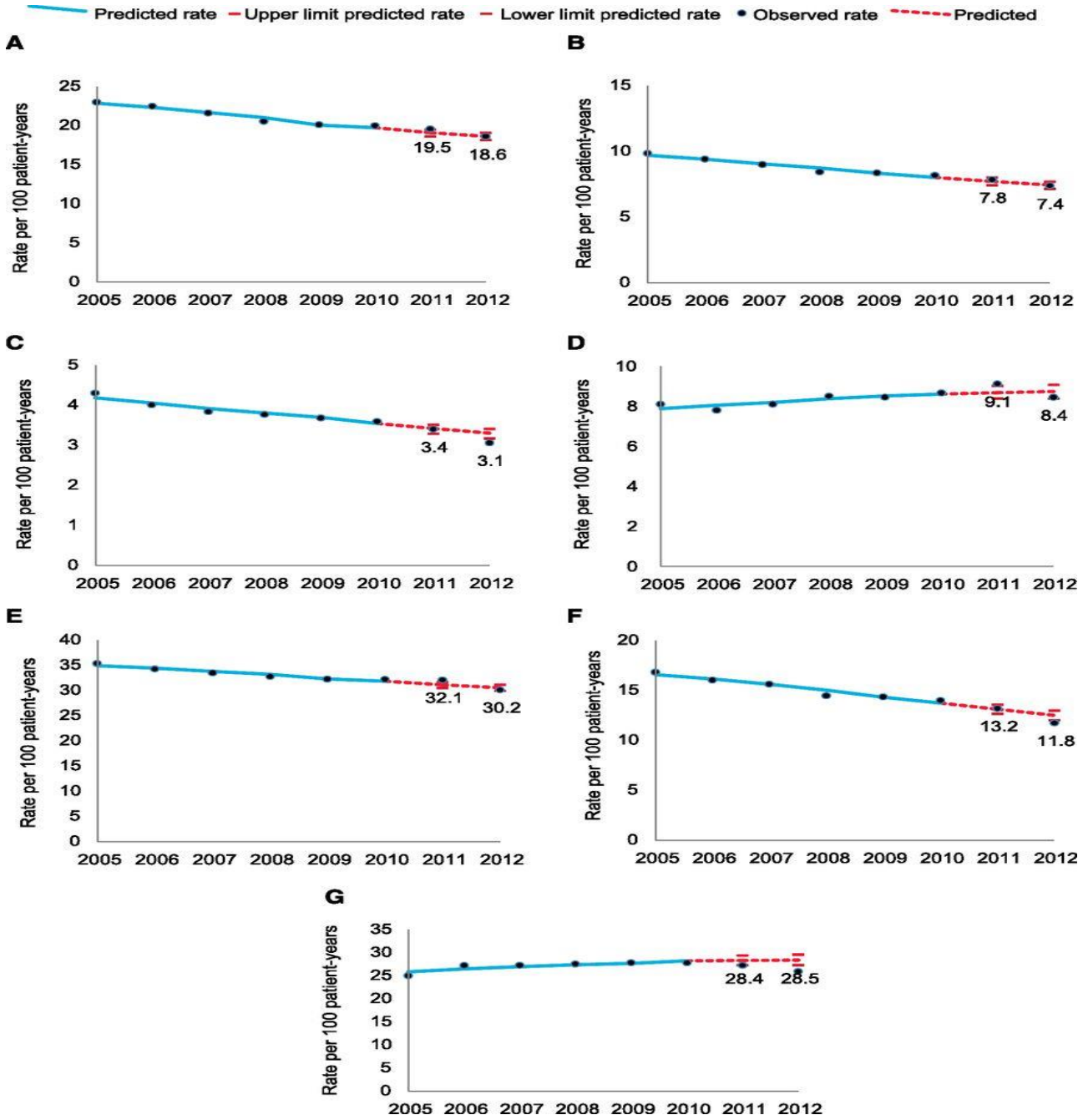
“Bundling”

- The ESRD Prospective Payment System of 2011
  - dialysis services
  - intravenous drugs (ESAs, IV iron)
  - oral drugs with intravenous equivalents (vitamin D)

Intended Consequences of Bundling

- Reduce “over-use” of medications (ESAs) compared to a fee-for-service payment
- Improve quality of dialysis and related care
- Maintain access to care
- Increase proportion of patients on home dialysis
- Reduce overall ESRD program expenses


A
Percentage of EPO users
100
95
90
85
80
75
70
65
60
55
50
Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4
2005 2006 2007 2008 2009 2010 2011 2012
B
EPO dose (units)
60,000
50,000
40,000
30,000
20,000
10,000
0
Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4
2005 2006 2007 2008 2009 2010 2011 2012
C
Hemoglobin level (g/dL)
13
12
11
10
9
Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4
2005 2006 2007 2008 2009 2010 2011 2012
D
Rate per 100 patient-years
40
35
30
25
20
2005 2006 2007 2008 2009 2010 2011 2012


Predicted rate
Upper limit predicted rate
Lower limit predicted rate
Observed rate
Predicted
A
Rate per 100 patient-years
25
20
15
10
5
0
19.5
18.6
2005 2006 2007 2008 2009 2010 2011 2012
B
Rate per 100 patient-years
15
10
5
0
7.8
7.4
2005 2006 2007 2008 2009 2010 2011 2012
C
Rate per 100 patient-years
5
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3.4
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2005 2006 2007 2008 2009 2010 2011 2012
D
Rate per 100 patient-years
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9.1
8.4
2005 2006 2007 2008 2009 2010 2011 2012
E
Rate per 100 patient-years
40
35
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20
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2005 2006 2007 2008 2009 2010 2011 2012
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Rate per 100 patient-years
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Rate per 100 patient-years
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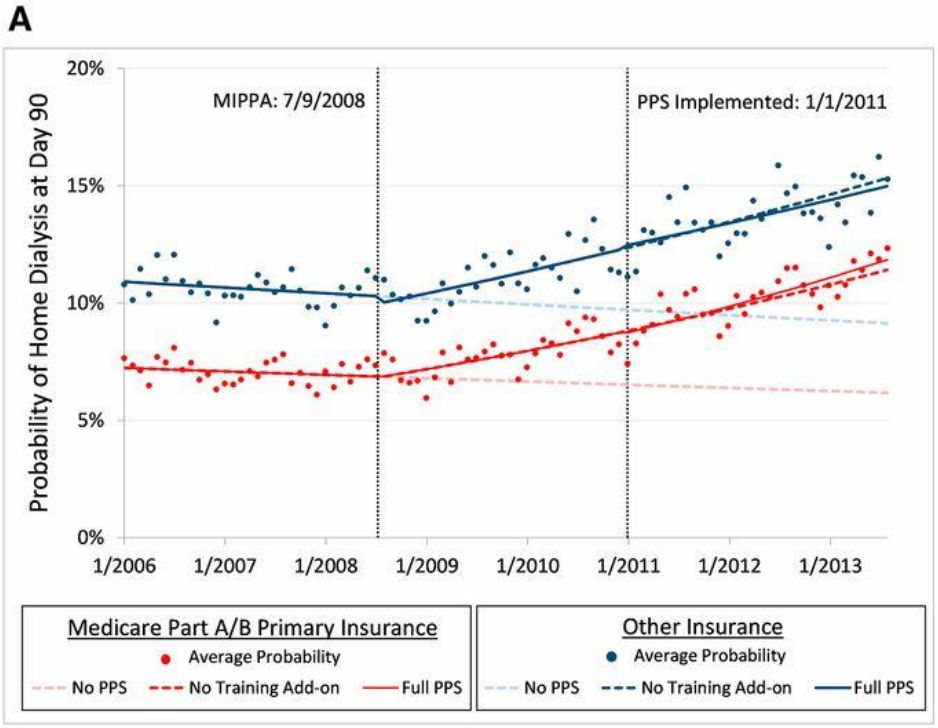
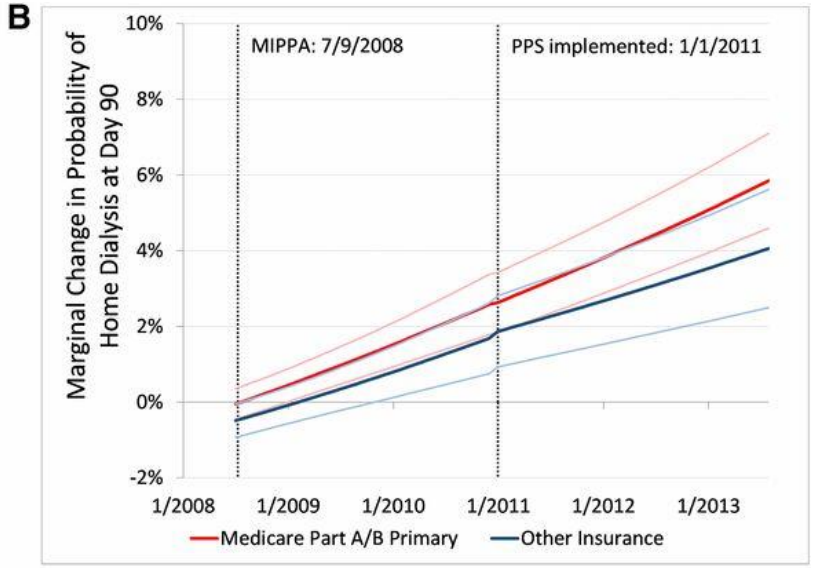
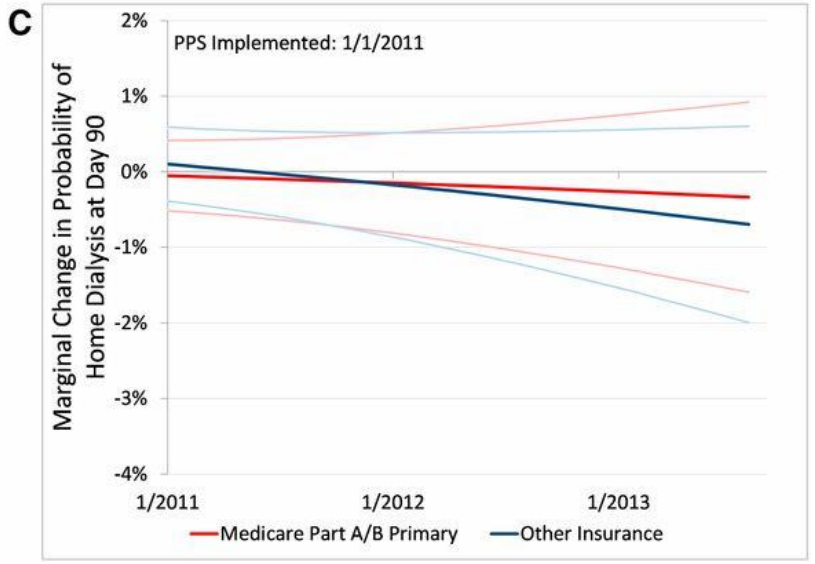
2005 2006 2007 2008 2009 2010 2011 2012







Lin E et al. JASN, 2017

Unintended Consequences

- From existing for-profit dialysis providers' perspective
  - Incentive (fiduciary responsibility) to reduce costs (i.e., provide fewer services)
  - Less likely to adopt newer, more costly therapies
  - Smaller providers less likely to enter market
  - Larger providers "too big to fail"

- From pharmaceutical or device manufacturers' perspective
  - Less likely to develop new product to improve patients' lives
  - US market essentially off the table

- From societal perspective
  - Potential for higher overall prices owing to less competition

Challenges

- Align incentives more broadly across nephrology practice
- Incorporate patient preferences
- Focus on CKD care should be on slowing progression and preventing cardiovascular complications
- Enhance remuneration to physicians and health systems that safely and effectively forestall the need for dialysis; reduce remuneration from dialysis providers to physician practices
- If kidney failure cannot be avoided, promote living donor kidney transplantation, and facilitate home-based, incremental peritoneal and home hemodialysis

Exploring Care Attributes of Nephrologists Ranking Favorably on Measures of Value

Brian M. Brady,[1,2,3] Meera V. Ragavan,[2,3] Melora Simon,[2] Glenn M. Chertow,[1,3] and Arnold Milstein[2,3]

[1]Division of Nephrology, [2]Clinical Excellence Research Center, and [3]Department of Medicine, Stanford University School of Medicine, Stanford, California

Table 4. Expert nephrologist scores on feature effect and transferability

Design Feature	Average Effect on			Transferability	
	Cost	Quality	Cost and Quality	FFS	Value
Rapidly adjustable office visit frequency for unstable patients	4	5	9	2.33	4
Close monitoring and management to preserve renal function	3.67	4.33	8	3.67	4
Rapid access to surgeon for vascular access problems	3.67	3.33	7	3.33	4
Multidimensional medication management at every visit	3	4.67	7.67	3.67	4
Education to support self-management at every contact	3.33	4.67	8	3	4
Optimizing peritoneal dialysis selection and management	4	3.33	7.33	3.67	4
Previsit preparation	3.33	3.67	7	4	4.33
Early planning for and execution of vascular access	4	4.33	8.33	3.33	4.33
In-office infusion for anemia management	1.67	3	4.67	2.33	3
Encouragement of autonomous practice for midlevel providers for low-complexity patients	3.67	4	7.67	2.33	2.67
Upshifted staff roles for medical assistants	3.67	4	7.67	2	3.33
Investment of dialysis revenue into predialysis patient care	2.33	3	5.33	2	2

All design features were scored on a scale from 1 to 5, with higher scores indicating higher effect. FFS, fee-for-service.

Advancing American Kidney Health

Reduce risk of kidney failure	Improve access to and quality of person-centered treatments for kidney failure	Increase access to kidney transplants
By 2030, ↓new ESKD pts by 25%	By 2025, 80% new pts with home dialysis or transplant	By 2030, double number of kidneys available for transplant
Improve identification of populations at risk and in early stages of kidney disease	Improve care coordination and education for safer transition to treatment for kidney failure	Increase deceased donor organ recovery and reduce discards
Encourage adoption of treatments to retard or stop kidney disease progression	Introduce new value-based payment models that better align incentives	Reduce disincentives to living organ donation and provide financial incentives
	Catalyze the development of the artificial kidney	