

Is Higher System Spending Intensity Associated with Better Acute Care Outcomes in the USA & Canada?

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Health policy questions

Do acute care patients admitted to hospital systems with higher spending **intensity** have:

- lower mortality?
- higher rates of evidence-based care?
- lower rates of avoidable re-admissions and low acuity ED visits?

Are relationships stronger in vulnerable (low SES, age 65+) patients and remote, northern hospitals?

What are the attributes of high-performing hospital systems?

Longitudinal Acute Care Cohort Study

Hospitalized patients with **incident** admission during 1998-2007 with similar illness severity for:

- Acute myocardial infarction (AMI) (N=179,139)
- Congestive heart failure (CHF) (N=92,377)
- Hip fracture (N=90,046)
- Colon cancer (N=26,755)

Cohort eligibility criteria

- Incident cases, 1st admission during 1998–2007
- Age 20–105 at index date
- Eligible for health benefits for 3 years prior to enrollment
- Followed up to 1 year
- Censored if died

Hospital (Canada) and regional (US) expenditure intensity index

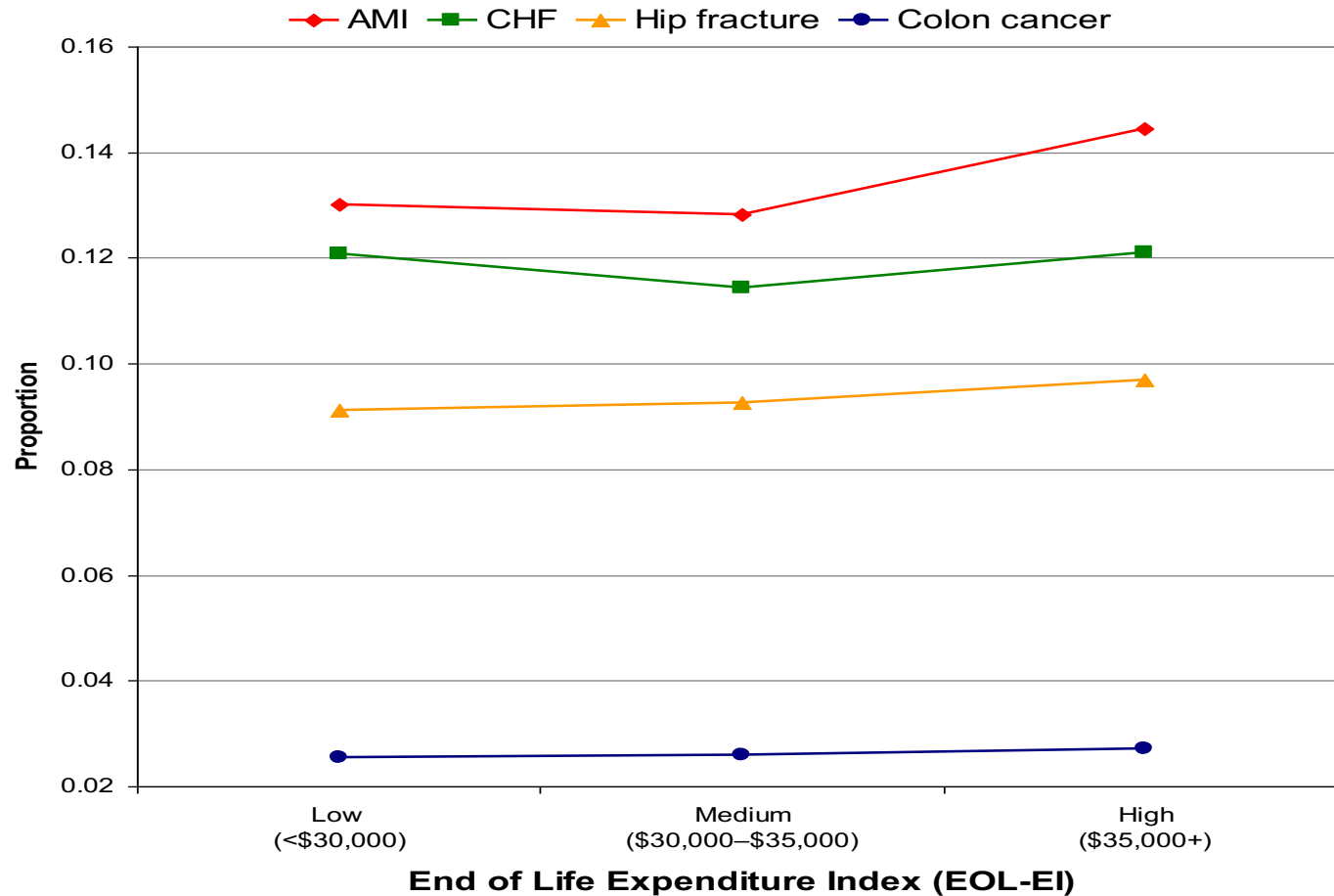
- **Medical intensity** is defined as the amount of care given to **similarly ill** patients.
- Measured as total hospital, ED and physician spending for study patients over 1 year post-admission, aggregated to index hospital level (Canada) or region (US) in:
 - L6M (**EOL-EI**) (exogenous, primary exposure)
 - acute care (**AC-EI**) patients (endogenous)
- Hospital and ED spending computed using standardized Resource Intensity Weights (**RIWs**) x 2008 cost per weighted case, similar to DRGs; physician spending computed using OHIP.
- Controls for differences due to price or policy payments

Conceptual framework: Accountable care organizations (ACO)

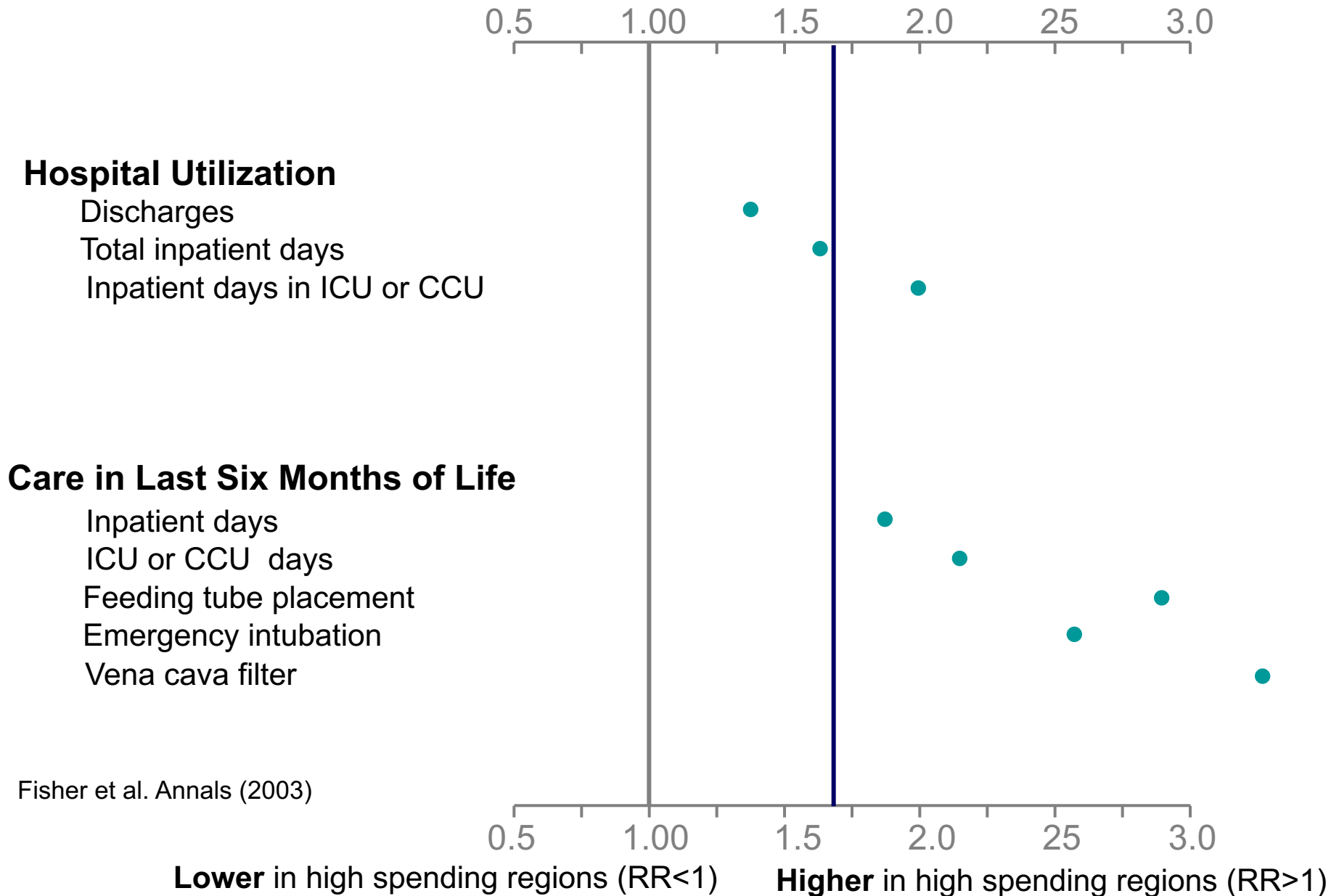
Hospital and associated medical staff (specialists and PC physicians) comprise a “**system of care**” or a virtual ACO that is accountable for patients

Study of hospital system-level effects

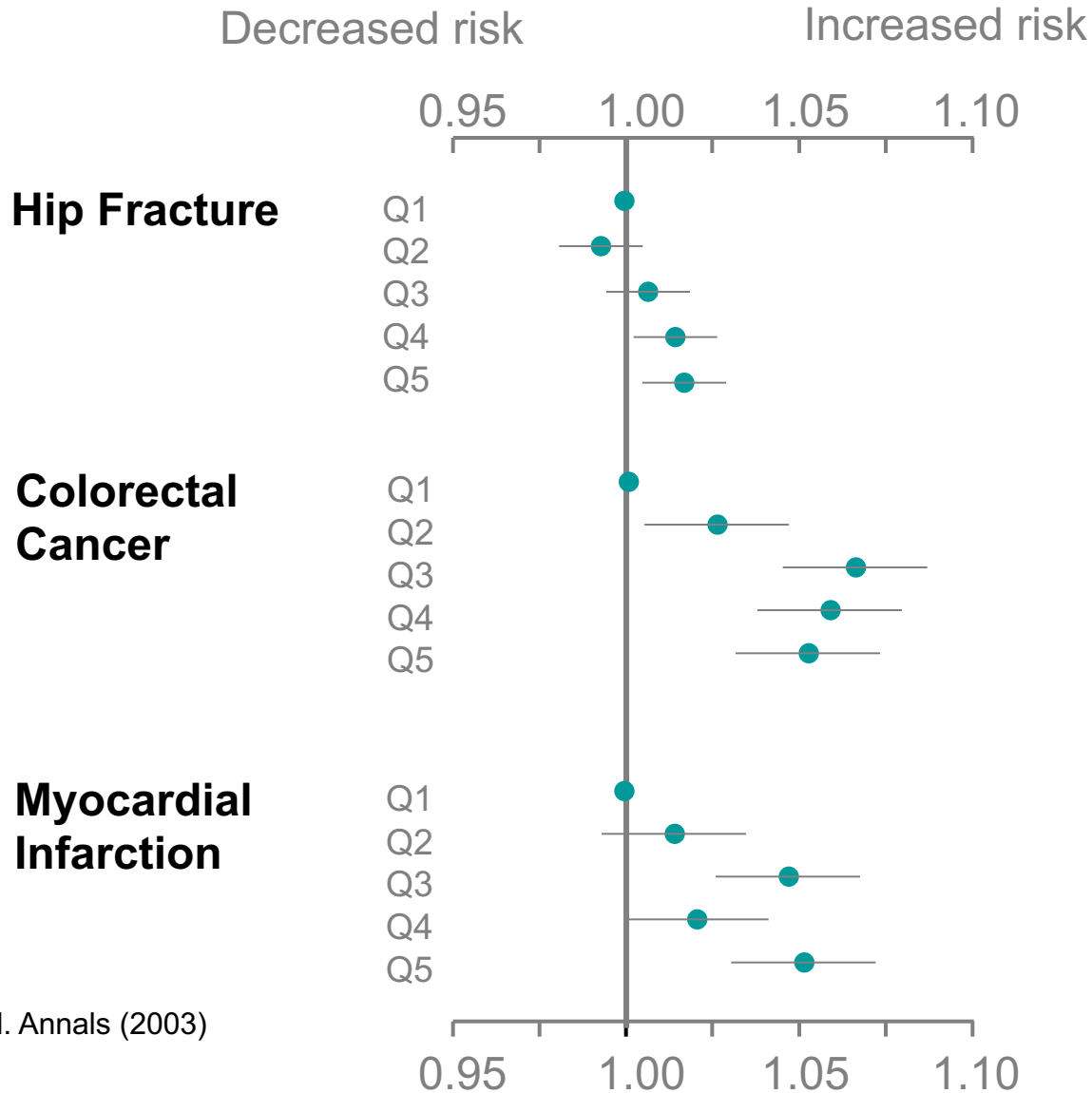
Baseline patient severity by hospital EOL-EI group: predicted 30-day mortality



Rates of hospital-driven care in US were **higher** in high-spending regions (RR>1)*

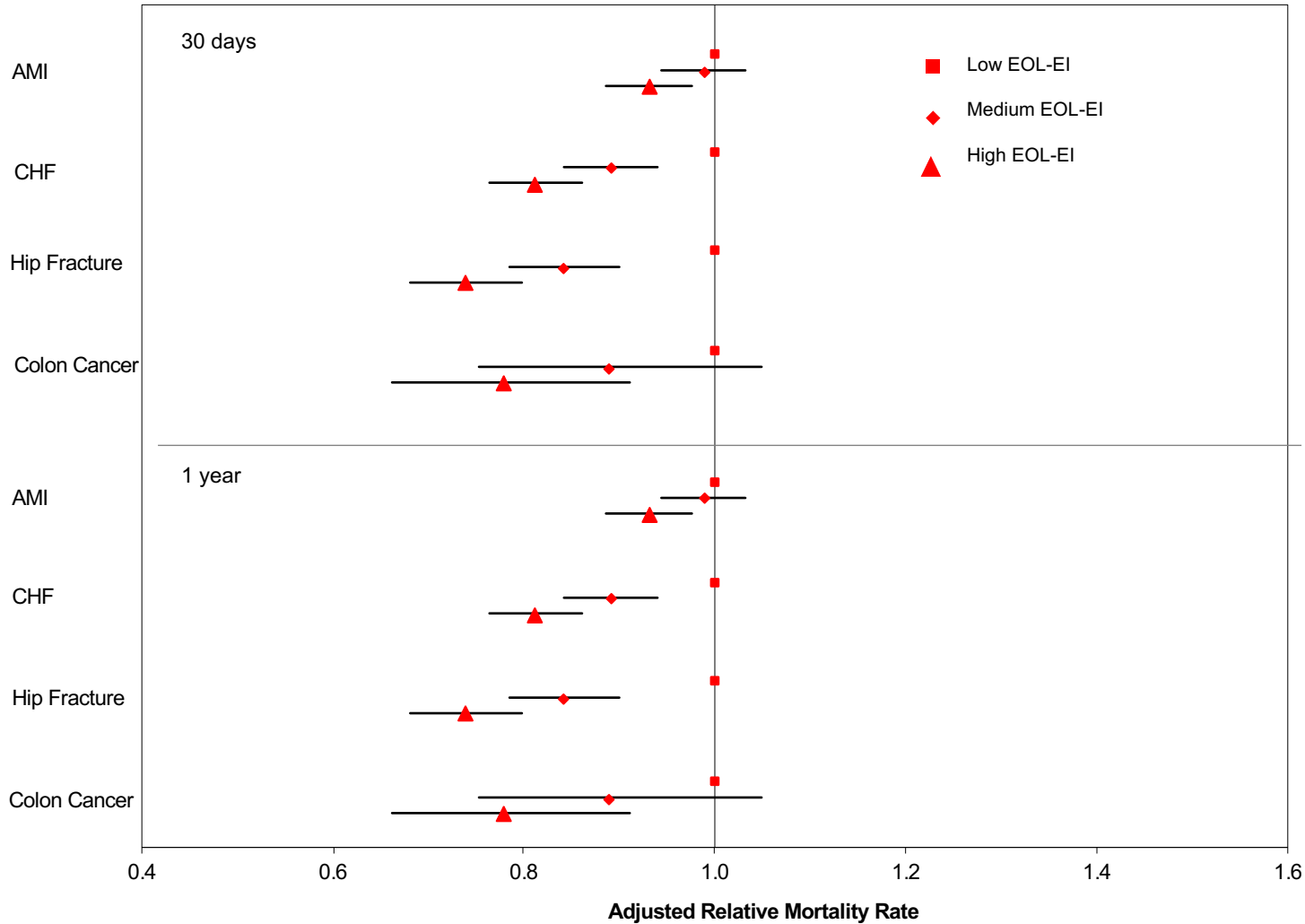


Rates of mortality in US were **no different or higher** in high spending regions

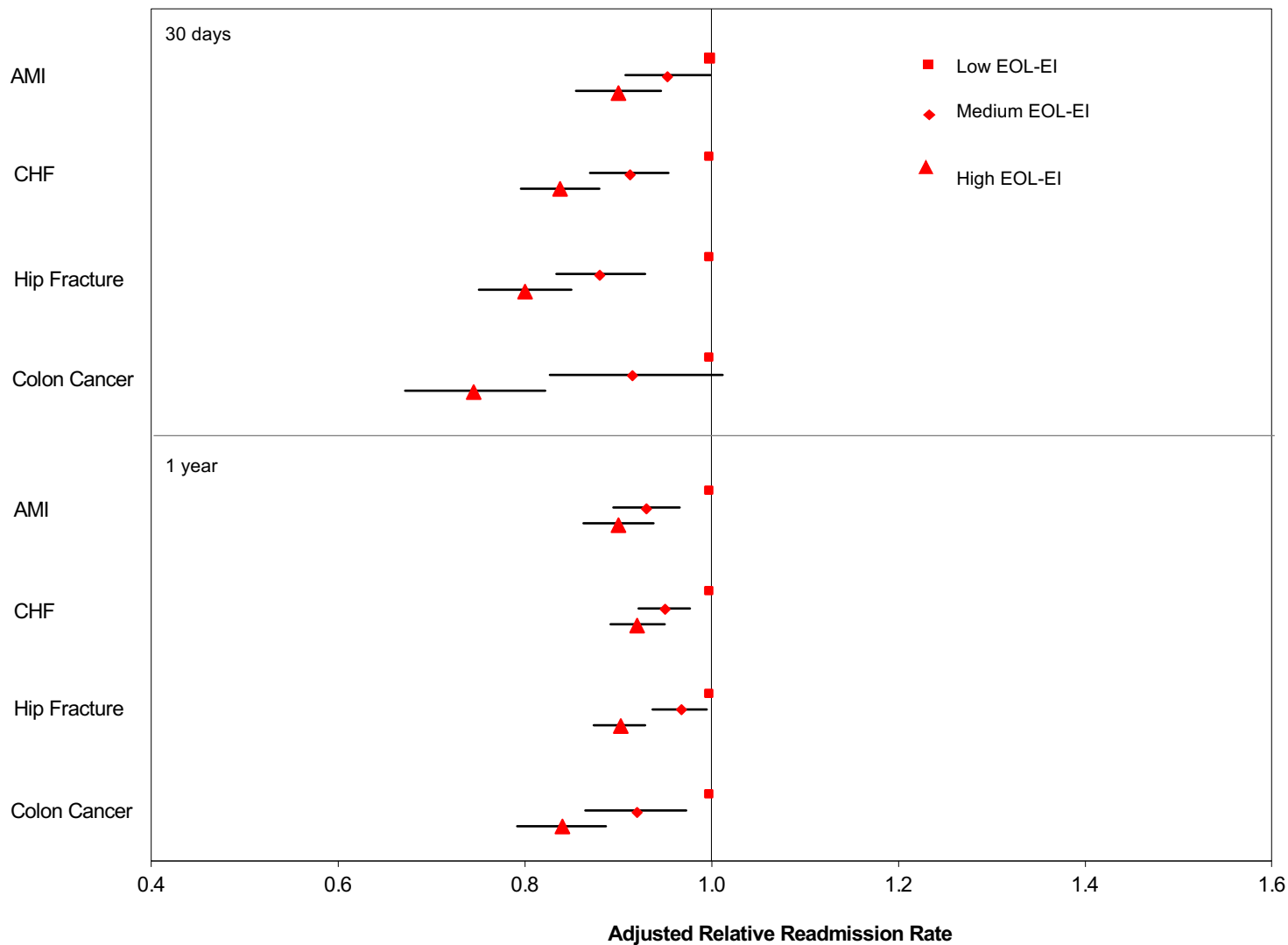


Fisher et al. Annals (2003)

Adjusted Relative 30-day and 1-year Mortality Rates for Medium and High vs. Low Hospital Expenditure Groups in Canada



Adjusted Relative 30-day and 1-year Cardiac (AMI, CHF) and All-Cause Readmission Rates for Medium and High vs. Low Hospital Expenditure Groups in Canada



AMI Evidence-Based Care

	EOL Expenditure Index Group		
	Low (<\$30K)	Medium (\$30–35K)	High (>\$35K)
Inpatient Care During Initial Episode			
Inpatient medical specialist consults (mean ± SD)	4.2 ± 5.1	5.5 ± 6.8	8.2 ± 9.6
Invasive Cardiac Therapies			
Cardiac catheterization within 30 days	33%	44%	46%
CABG or PCI within 30 days	22%	29%	31%
PCI (same day)	1%	4%	8%
Discharge Drug Prescriptions within 30 Days (among survivors 30 days post-discharge, age 65+)			
ACE inhibitors/ ARBs	63%	65%	67%
Statins	48%	53%	57%
Post-discharge Ambulatory Care (among survivors 30 days post-discharge)			
Visit to GP/FP within 4 weeks	74%	72%	72%
Visit to cardiologist within 4 weeks	9%	15%	17%
Shared care (visit GP/FP & cardiologist in 4 weeks)	7%	12%	12%
Visit to cardiologist within 1 year	35%	51%	59%

CHF Evidence-Based Care

	EOL Expenditure Index Group		
	Low (<\$30K)	Medium (\$30-35K)	High (>\$35K)
Inpatient Care During Initial Episode			
Inpatient medical specialist consults (mean ± SD)	3.0 ± 4.9	4.7 ± 6.9	8.6 ± 11.2
Discharge Drug Prescriptions within 30 Days (discharged alive, age 65+)			
ACEI/ARB	62%	62%	61%
Beta blockers	32%	36%	40%
Statins	18%	23%	26%
Drugs harmful for CHF (*NSAIDs, Type 1 AADs, 1 year)*	19%	18%	16%
Post-discharge Ambulatory Care Post-discharge Ambulatory Care (among survivors 30 days post-discharge)			
Visit to GP/FP within 4 weeks	69%	67%	66%
Visit to cardiologist within 4 weeks	5%	12%	16%
Shared care (visit to GP/FP & cardiologist)	4%	10%	11%
Visit to cardiologist within 1 year	18%	34%	42%

Hip Fracture Evidence-Based Care

Hip Fracture Care	EOL Expenditure Index Group		
	Low (<\$30K)	Medium (\$30-35K)	High (>\$35K)
Time to surgery < 2 days	78%	84%	82%
Inpatient medical specialist consults (mean \pm SD)	2.5 \pm 4.7	3.0 \pm 5.7	5.7 \pm 9.1
Inpatient rehabilitation	17%	28%	40%
Surgical infection within 30 days	18%	10%	8%

Colon Cancer Evidence-Based Care

Colon Cancer Care	EOL Expenditure Index Group		
	Low (<\$13K)	Medium (\$13–14.5K)	High (>\$14.5K)
Pre-operative consult with surgeon	45%	43%	49%
Pre-operative consult with anesthetist	18%	27%	36%
CT scan prior to surgery for pre-operative staging	32%	33%	45%
Inpatient medical specialist consults (mean ± SD)	2.0 ± 4.9	2.0 ± 5.2	3.3 ± 7.9
Surgical infection within 30 days	9%	9%	7%

Hospital System Characteristics by EOL-EI group

	EOL Expenditure Index Group		
	Low (<\$30K)	Med (\$30-35K)	High (>\$35K)
Hospital Characteristics			
High-volume teaching hospital (>200 AMI)	0%	5%	33%
High-volume teaching hospital (>200 CHF)	0%	4%	30%
High-volume teaching hospital (>150 hip)	0%	7%	35%
High-volume teaching hospital (>135 colon)	0%	6%	49%
Onsite CATH lab	4%	32%	40%
Onsite CABG capability	2%	13%	35%
Availability of CT scanner	59%	90%	92%
Availability of MRI scanner	6%	51%	79%
Regional cancer centre (colon cancer)	9%	30%	45%
Nursing Care			
Inpatient nursing hours per weighted patient day (mean ± SD)	7.7 ± 1.4	8.8 ± 1.2	10.1 ± 2.1
Inpatient nursing hours per acute care bed (mean ± SD)	2,405 ± 557	2,849 ± 544	3,268 ± 813

Attending Physician Characteristics by EOL-EI group

Attending Physician Characteristics	EOL Expenditure Index Group		
	Low (<\$30K)	Med (\$30-35K)	High (>\$35K)
High AMI volume (>24 patients/year)	29%	52%	45%
Cardiology (AMI)	9%	30%	60%
High CHF volume (>13 patients/year)	27%	39%	46%
Cardiology (CHF)	4%	15%	33%
Orthopedic surgeon (hip fracture)	82%	85%	90%
High colon cancer volume (>35 patients/year)	30%	44%	57%

Conclusions

- Higher hospital system spending **intensity** is associated with better outcomes, higher quality for acute care patients in Canada but not in the US
- Benefits appear quickly → acute-phase hospital effect → high volume, teaching hospitals; specialist care; evidence-based care.
- How to improve low-performing hospitals?
 - **Increase evidence-based (EB) care, not increase spending**
 - Export specialist knowledge, not specialists
 - Access to specialists through telemedicine or specialist outreach
 - Regionalized centers of excellence (e.g., hip fracture)

Conclusions

Canada vs U.S.

- Canada is on the lower end of the spending and specialist supply curve – or on a totally different curve – than the US.
- Characteristics of Canadian health care system:
 - Universal healthcare
 - Global hospital budgets
 - Dx test equipment (CT, MRI) owned by hospitals, CON required