

Institute of Medicine Roundtable on Evidence-Based Medicine  
**Engineering a Learning Healthcare System: A Look at the Future**  
The Keck Center of the National Academies, Washington, DC  
Tuesday, 29 April 2008 -- 8:45 - 9:15

## **Building Quality Health Care for the 21st Century**

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# Disclosures

***The content of this presentation does not relate to any product of a commercial entity; therefore, I have no ethical conflicts or relationships to report. I have no financial relationships beyond my employment at Intermountain Healthcare.***

# Presentation outline

- 1. ~1910: The modern structure of health care delivery emerges**
- 2. Aim defines the system** *(what are the aims of U.S. health care delivery?)*
- 3. 5 focused areas where care delivery falls short of its theoretic potential** *(opportunities)*
- 4. Why? The craft of medicine collides with clinical uncertainty (complexity)**
- 5. Early solutions, emerging frameworks, and refined challenges**

# The emergence of modern medicine

## ~1860 - 1910:

- ◆ **new high standards for clinical education**
  - Flexner Report: more than half of all U.S. "medical schools" shut down
  - new model: hospital-based 2 year course of study (integrated clinical exposure)
- ◆ **strict requirements for professional licensing**
- ◆ **clinical practice founded on scientific research**
  - shift to germ theory, rather than "an imbalance of the 4 bodily humors," as the basis for understanding disease and its treatment
  - health care's first entry into "evidence-based medicine"
- ◆ **new internal organization for hospitals**

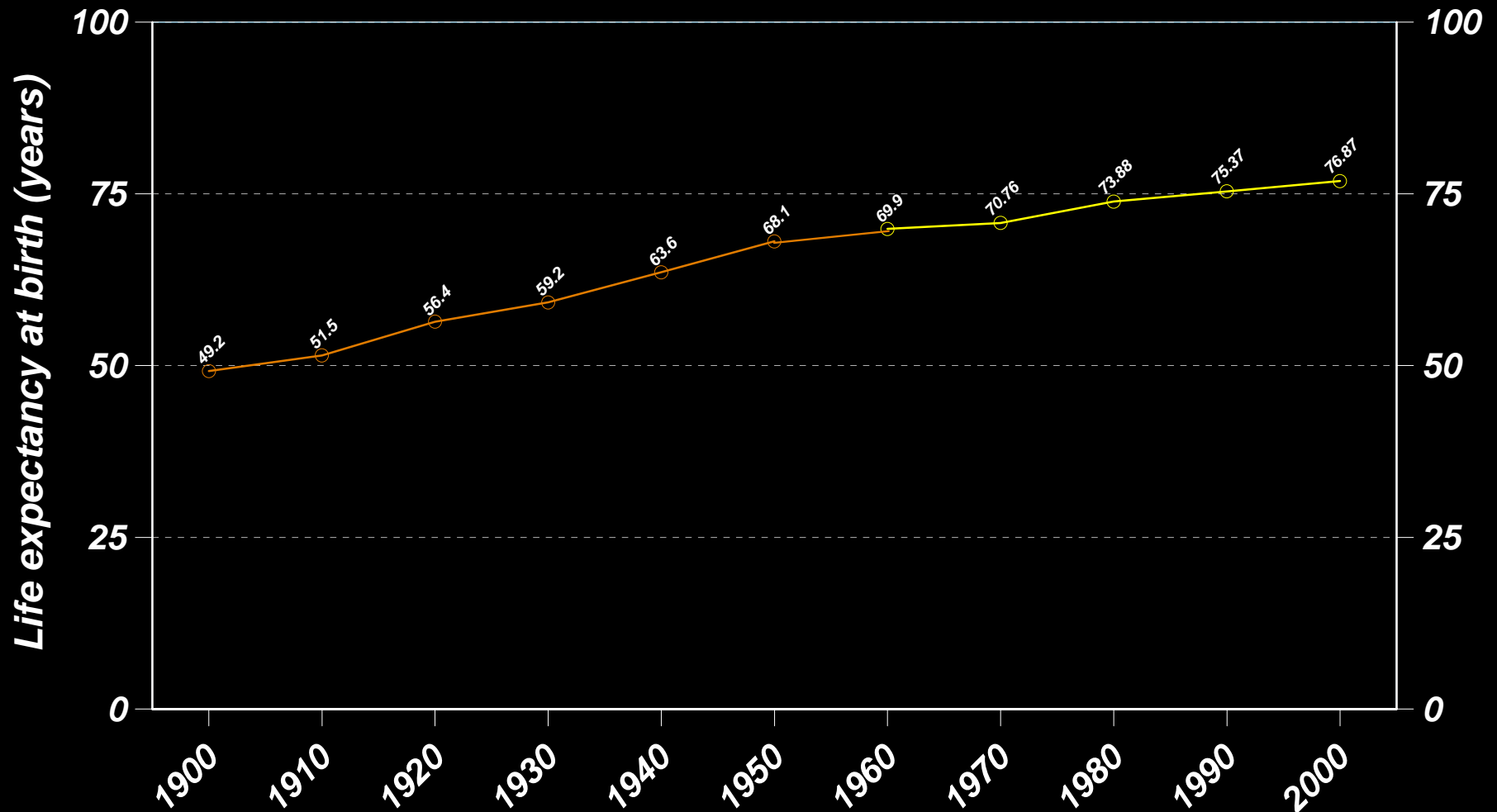
Porter, R. *The Greatest Benefit to Mankind: A Medical History of Humanity*. New York, NY: W.W. Norton and Company; 1997.

Barry, JM. *The Great Influenza: The Epic Story of the Deadliest Plague in History*. New York, NY: The Penguin Group; 2004.

Starr, P. *The Social Transformation of American Medicine*. New York, NY: Basic Books (The Perseus Books Group); 1984.

Rosenberg, CE. *The Care of Strangers: The Rise of the American Hospital System*. New York, NY: Basic Books; 1987.

# "We routinely achieve miracles"



**Since 1960, 6.97 years gained over 4 decades = 1.74 years / decade**

(from 1900-1960, 20.7 years gained over 6 decades = 3.45 years / decade)

Cutler DM, Rosen AB, Vijan S. The value of medical spending in the United States, 1960-2000. *New Engl J Med* 2006; 355(9):920-7 ( Aug 31).

# Current health care

*is the best the world has ever seen*

*A few simple examples:*

- ◆ **From 1900 to 2000, average life expectancy at birth increased from only 49 years to almost 77 years.**
- ◆ **Since 1960, age-adjusted mortality from heart disease (#1) has decreased by 56%; and** (from 307.4 to 134.6 deaths / 100,000)
- ◆ **Since 1950, age-adjusted mortality from stroke (#3) has decreased by 70%.** (from 88.8 to 26.5 deaths / 100,000)

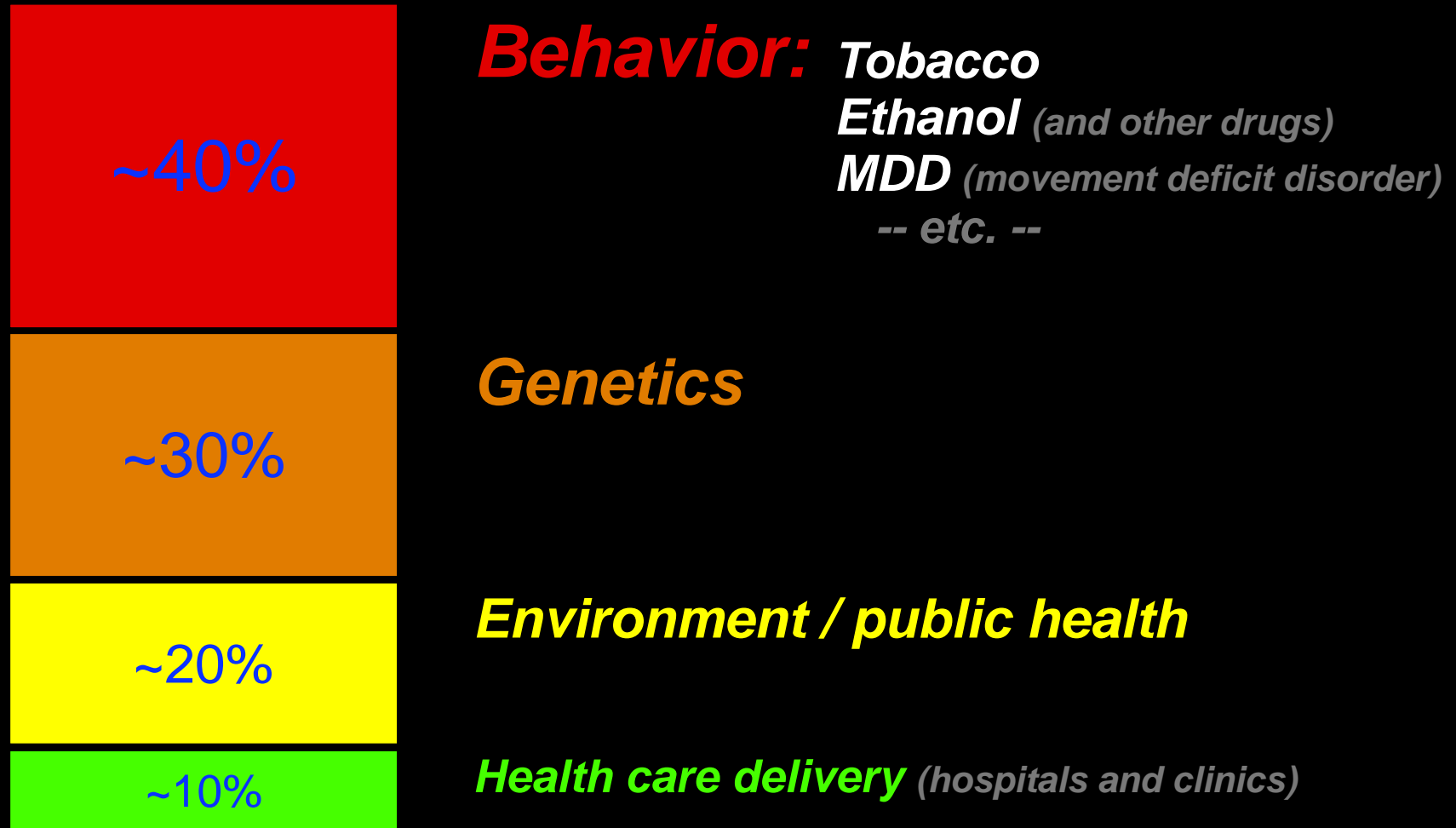
*Initial life expectancy gains almost all resulted from public health initiatives -- clean water, safe food, and (especially) widespread control of epidemic infectious disease. But since about 1960, direct disease treatment has made increasingly large contributions.*

Centers for Disease Control. Decline in deaths from heart disease and stroke--United States, 1900-1999. *JAMA* 1999; 282(8):724-6 (Aug 25).

National Center for Health Statistics. *Health, United States, 2000 with Adolescent Health Chartbook*. Hyattsville, MD: U.S. Dept. of Health and Human Services, Center for Disease Control and Prevention, 2000; pg. 7 (DHHS Publication No. (PHS) 2000-1232-1).

U.S. Department of Health and Human Services, Public Health Service. *Healthy People 2000: National Health Promotion and Disease Prevention Objectives*. Washington, DC: U.S. Government Printing Office, 1991 (DHHS Publication No. (PHS) 91-50212).

# Total health: How long, how well we live



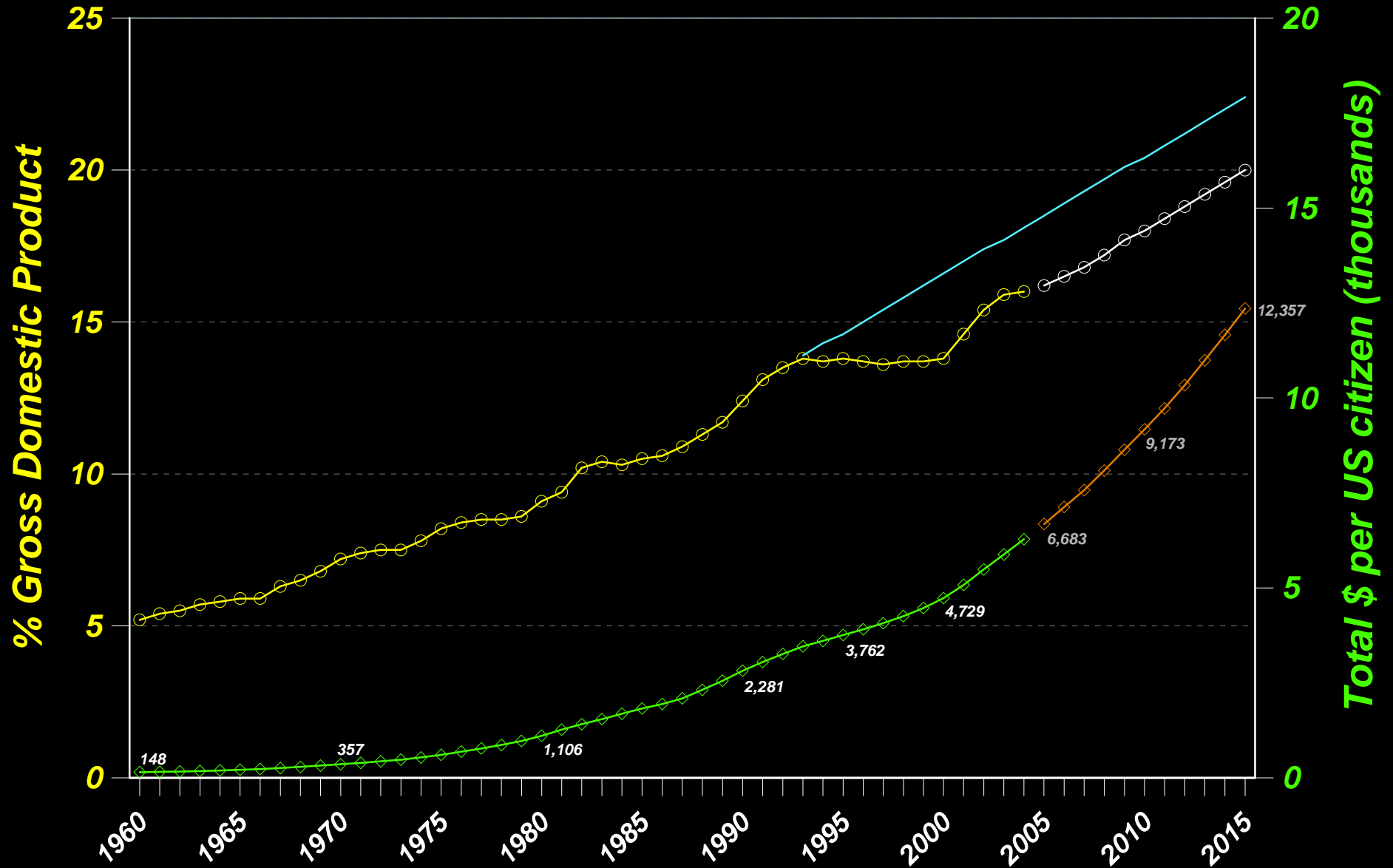
McGinnis JM & Foege WH. Actual causes of death in the United States. *JAMA* 1993; 270(18):2207-12 (Nov 10).  
McGinnis JM, Williams-Russo P, & Knickman JR. The case for more active policy attention to health promotion.  
*Health Affairs* 2002; 21(2):78-93 (Mar).

# The Great Equation:

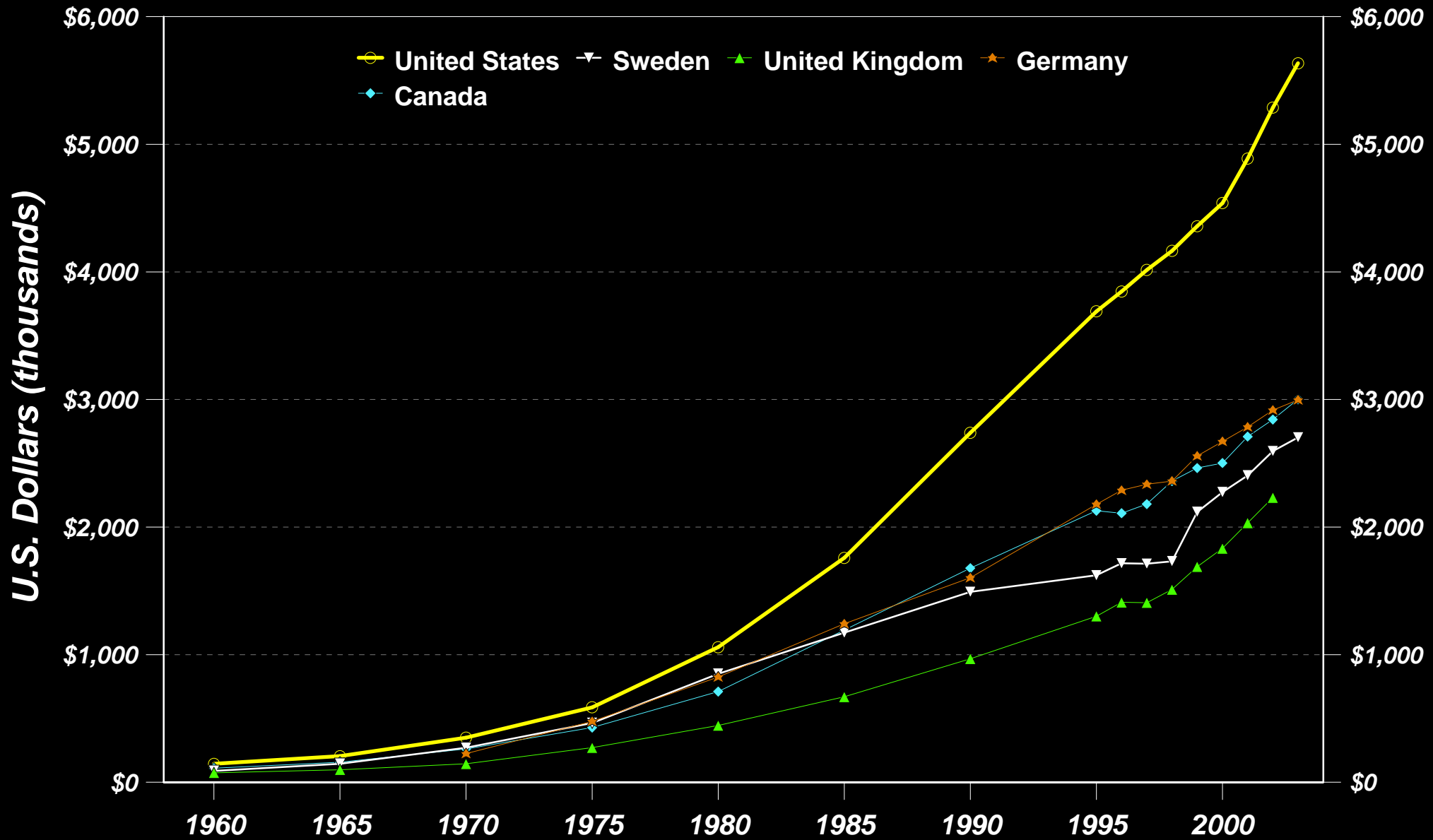
**Health** = *medical care*  
and *medical care* = "access to care"

**"But the Great Equation is wrong ..."**

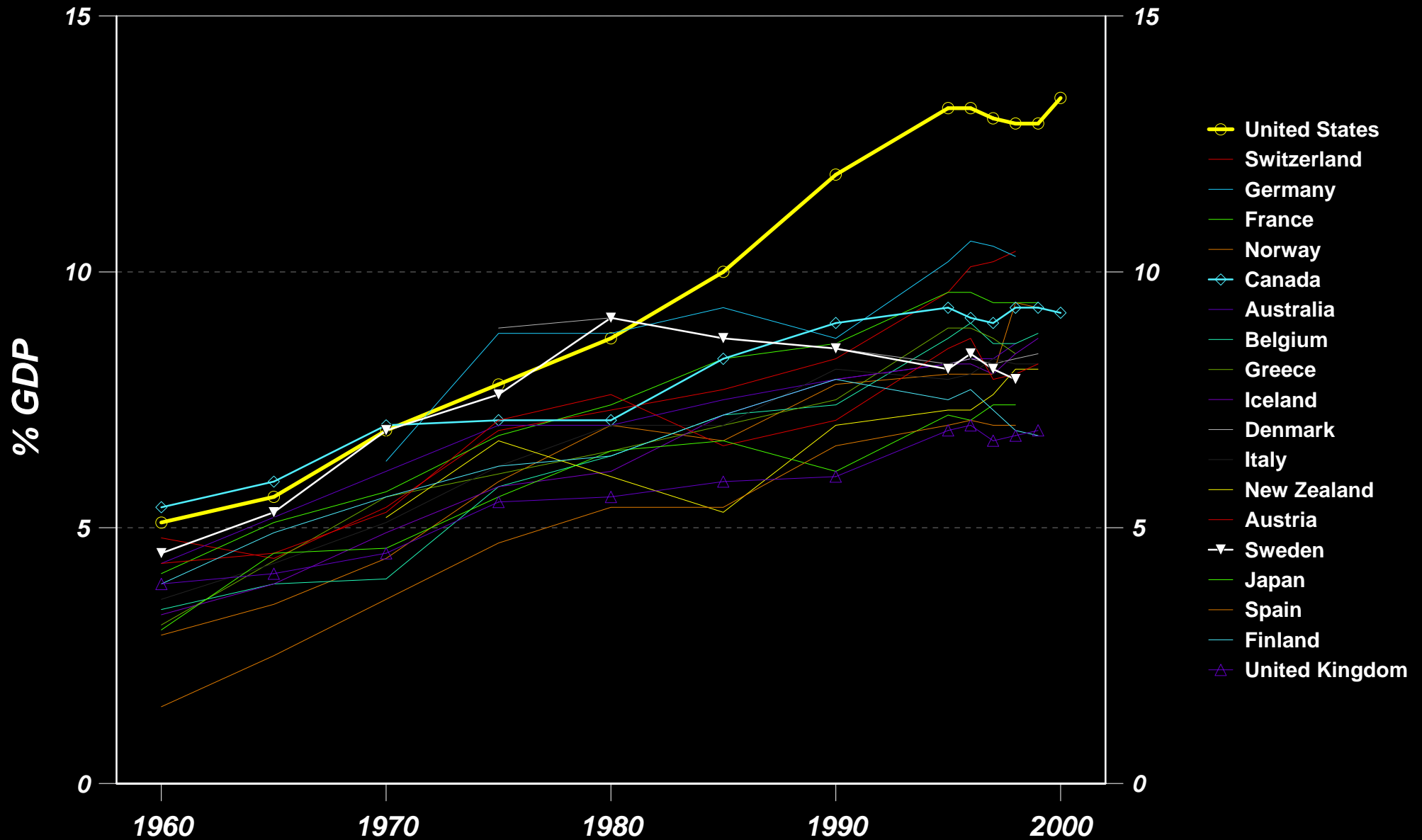
# Health spending



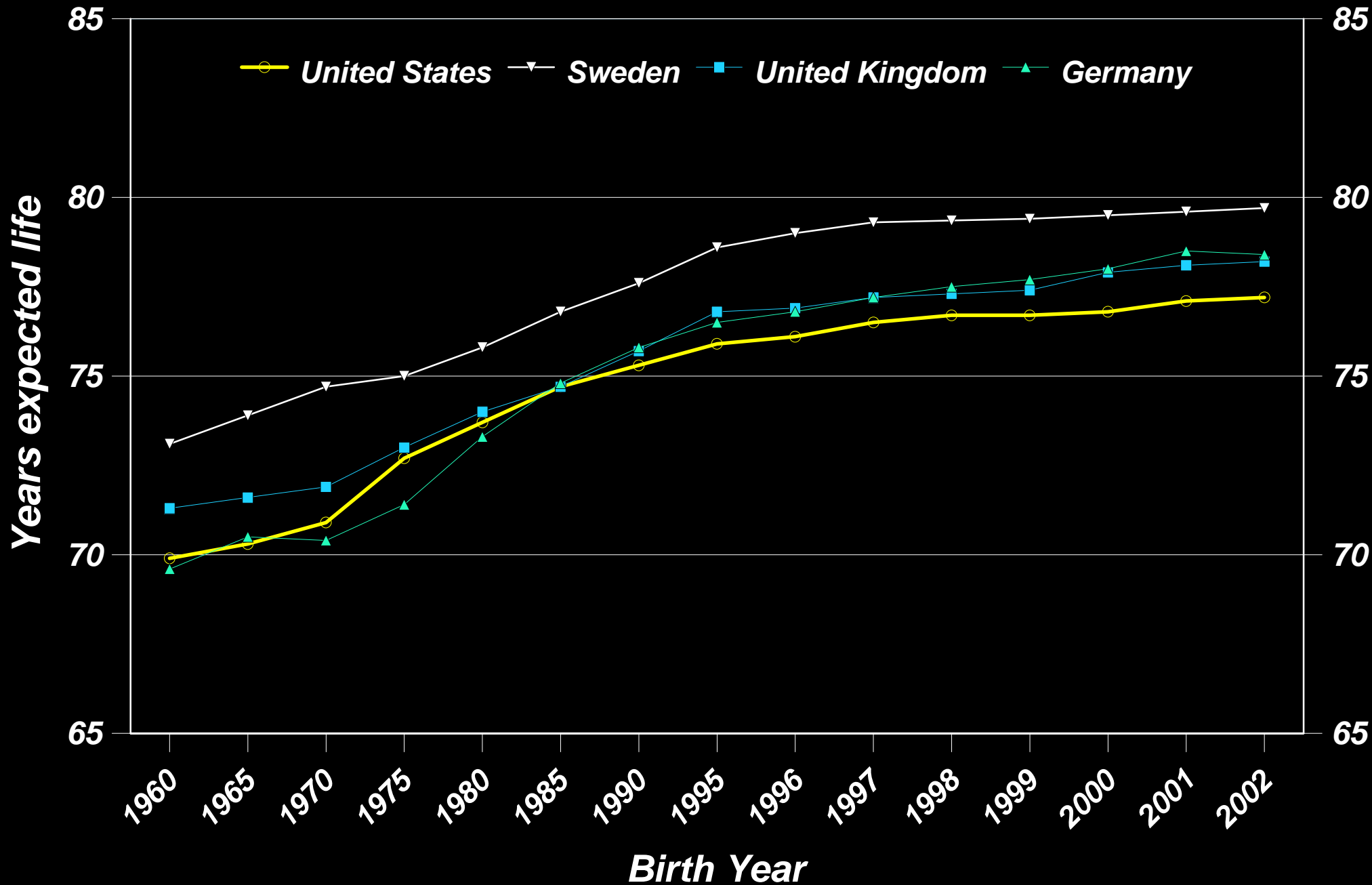
# Health cost per resident, by country



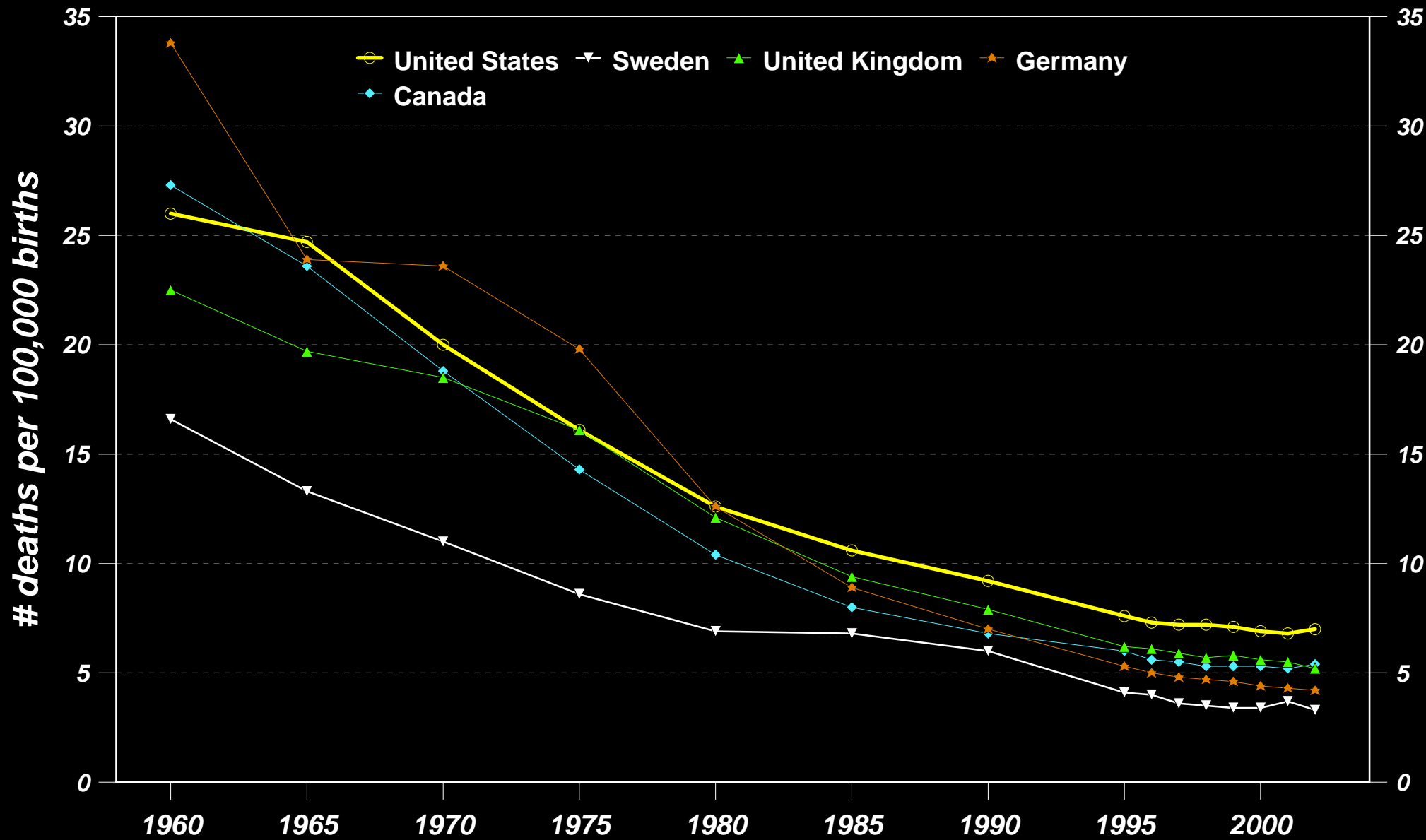
# Health care as % GDP, by country



# Life expectancy at birth, by country



# Infant mortality per 100,000 births



# What do we get for all that money?

*W. Edwards Deming: Aim defines the system ...*

## **Three possible aims of a health care delivery system:**

- 1. Total health** -- *how long and how well we live*
- 2. High touch** -- *patients value their relationship with a trusted clinical advisor more than any other element in health care delivery (the clinician-patient relationship)*

# High touch: Caring, not just curing

*A man stricken with disease today is assaulted by the same fears and finds himself searching for the same helping hand as his ancestors did five or ten thousand years ago. He has been told about the clever tools of modern medicine and somewhat vaguely, he expects that by-and-by he will profit by them, but in his hour of trial his desperate want is for someone who is personally committed to him, who has taken up his cause, and who is willing to go to trouble for him.*

**D. Emerick Szilagyi, MD:** *In Defense of the Art of Medicine, 1965*

(with thanks to Dr. Steven Kappes, Milwaukee, WI)

# High touch? Maybe not ...

*W. Edwards Deming: Aim defines the system ...*

## **Three possible aims of a health care delivery system:**

- ~~1. **Total health** -- how long and how well we live~~
- ~~2. **High touch** -- patients value their relationship with a trusted clinical advisor more than any other element in health care delivery (the clinician-patient relationship)~~
- 3. Rapid response -- the Rule of Rescue**

**Primary care vs. Secondary care**

# Rapid response: The Rule of Rescue

*Jonsen AR, 1986: The imperative people feel to rescue identifiable individuals facing (avoidable?) suffering or death.\**

- ◆ *subconscious personal identification at an emotional level;*
- ◆ *a person instead of just a number; a name and a face*
  - *The child down the well*
  - *The whales trapped in the ice*
  - *The dog on the abandoned boat*
  - *"60 Minutes" program on pertussis vaccination*

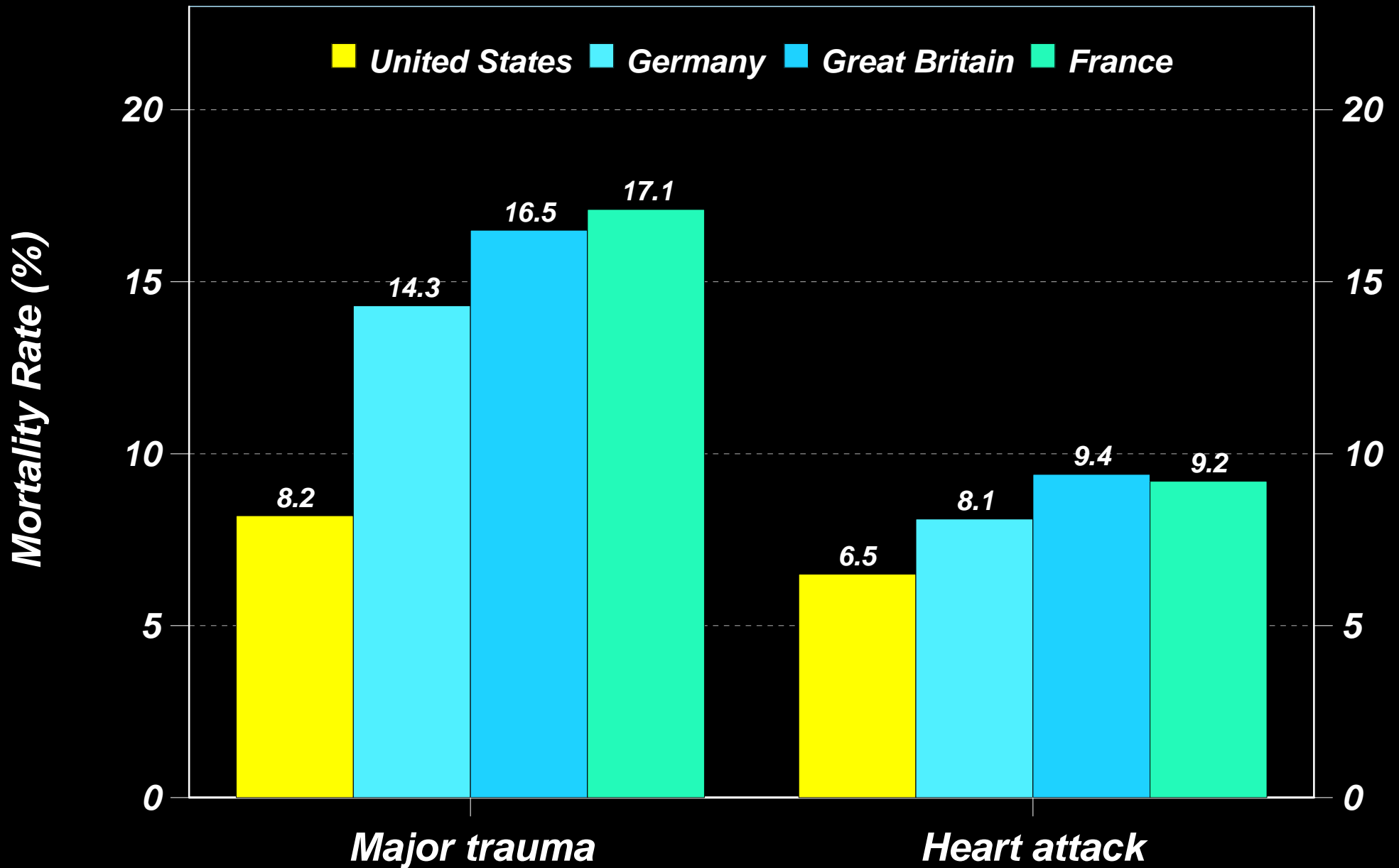
**"A single death is a tragedy, a million deaths is a statistic."**

**Joseph Stalin** *(who killed more than 17 million of his own Russian people)*

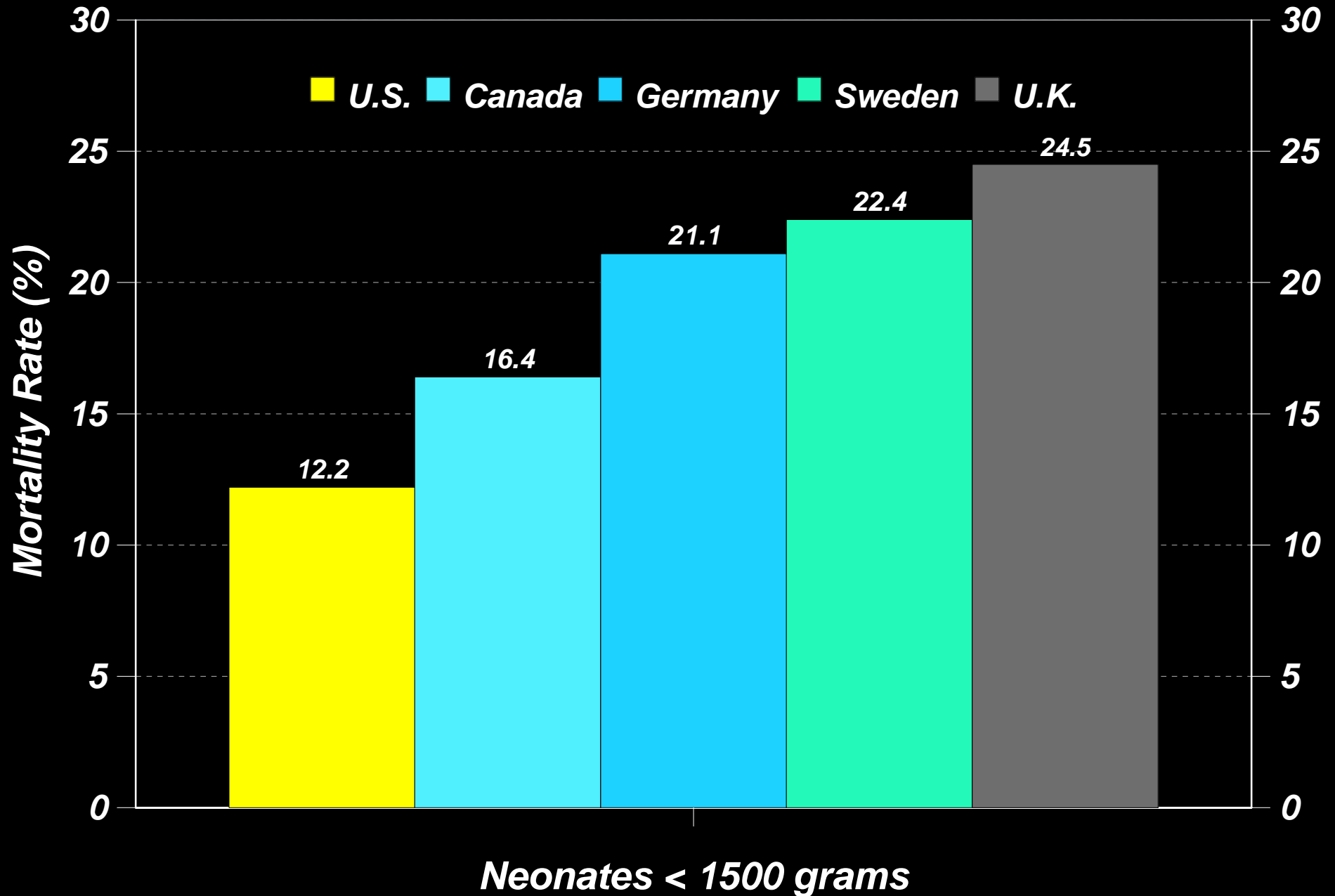
\* McKie J & Richardson J. The rule of rescue. *Soc Sci Med* 2003; 56(12):2407-19 (June).

Richardson J & McKie J. *Working Paper 112: The Rule of Rescue*. West Heidelberg, Victoria, Australia: The Centre for Health Program Evaluation; 2000.

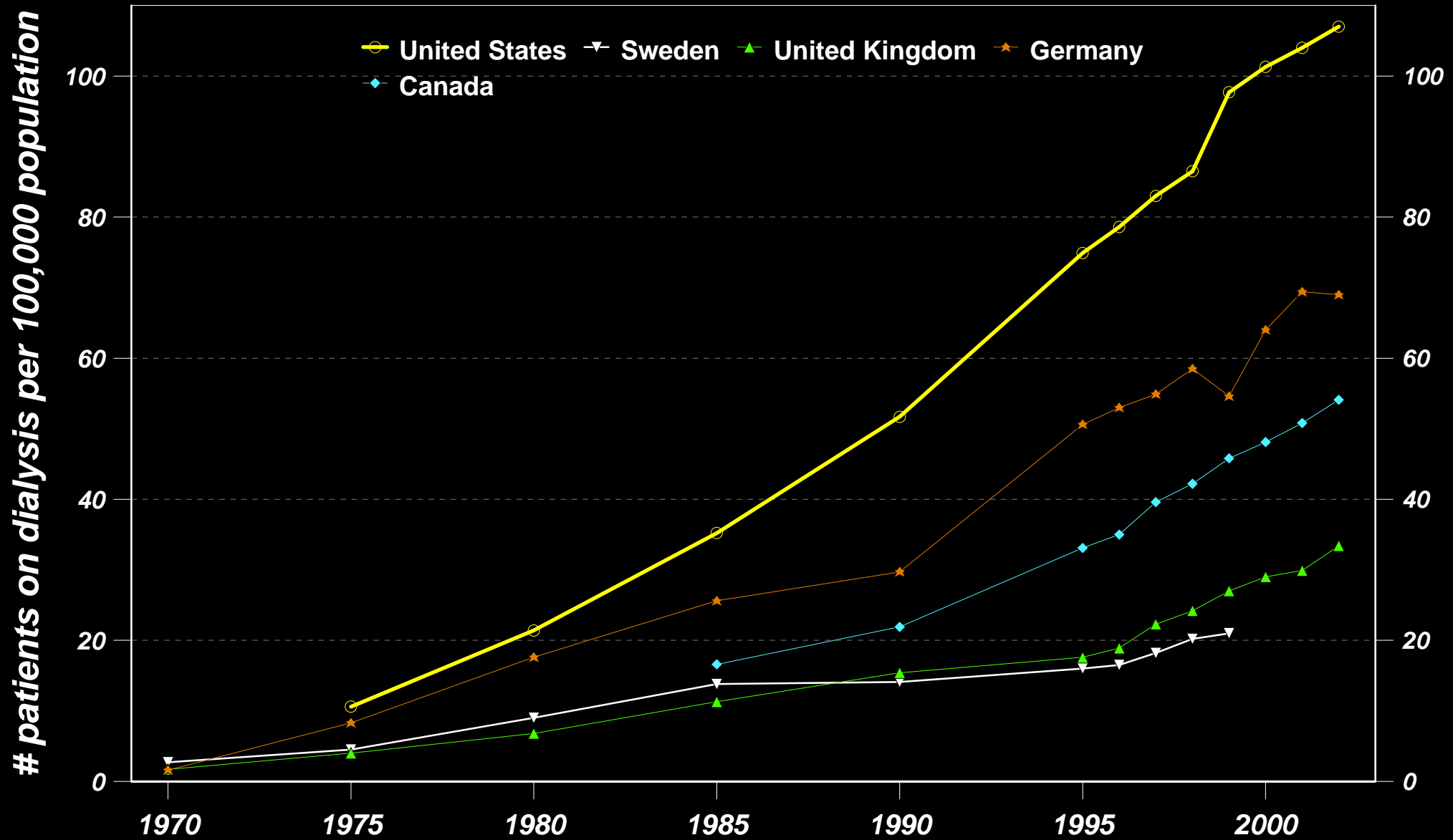
# System performance, by nation



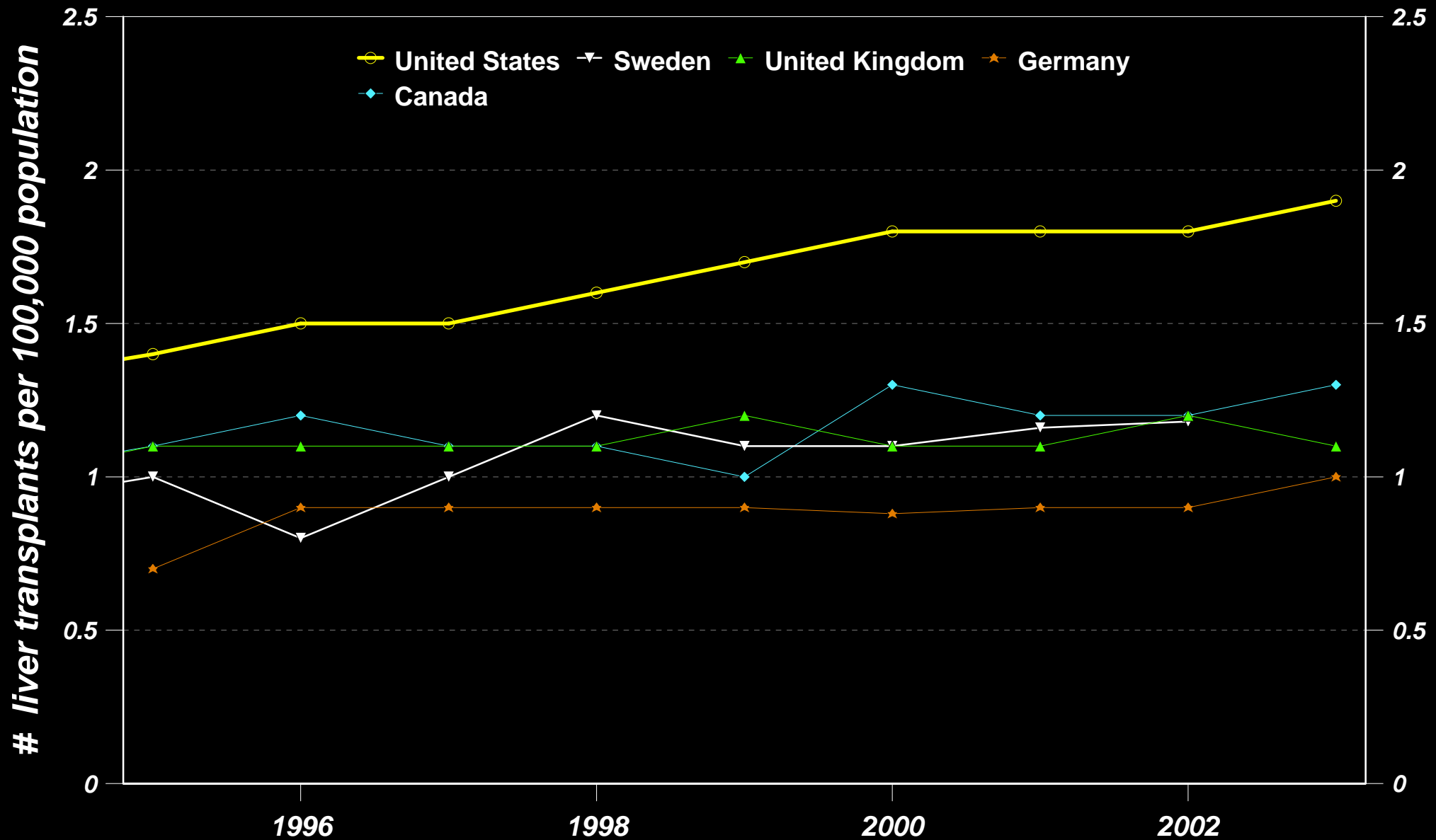
# System performance, by nation



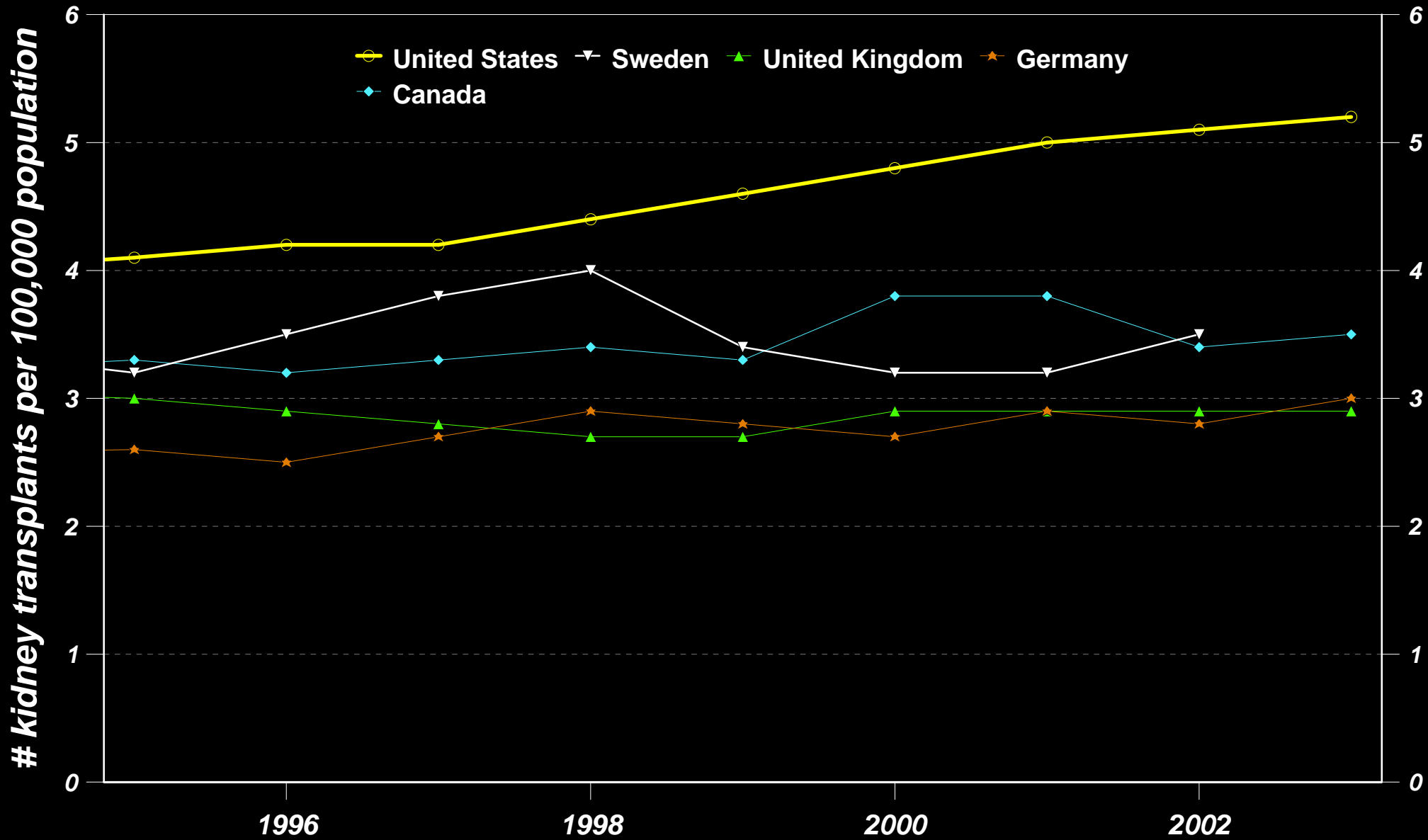
# Renal dialysis per 100,000



# Liver transplants per 100,000



# Kidney transplants per 100,000

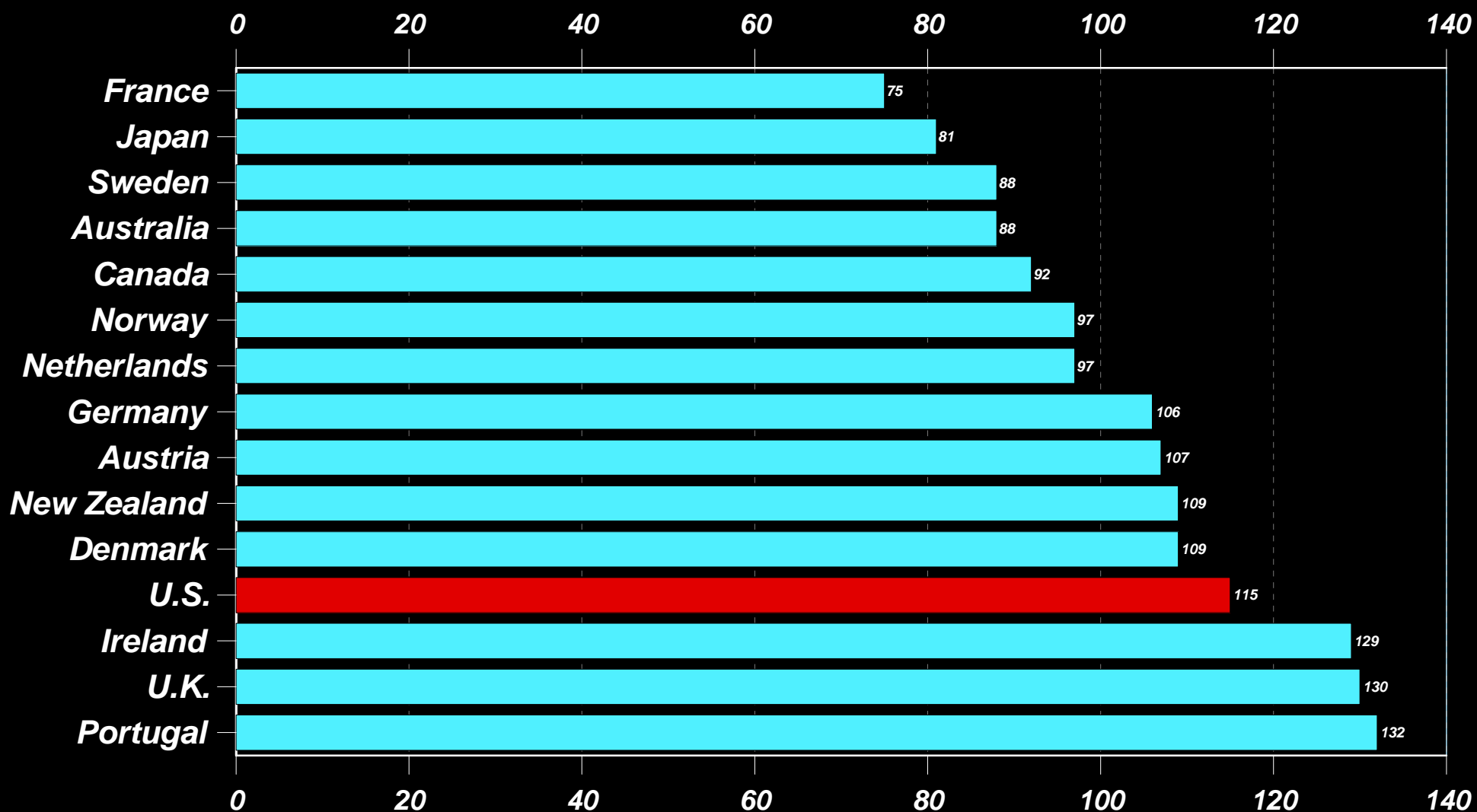


# International health comparisons

- ◆ *On a macro basis, many countries out-perform the U.S.: This is primarily attributable to healthier behaviors, better public health, and a heavy emphasis on easily accessible primary care (easy access = "high touch" = better satisfaction; primary care is relatively cost effective)*
- ◆ *the U.S. system performs significantly better for those with severe illness or injury. This is due to several factors:*
  - **Better access to technology**
  - **Less explicit and implicit rationing**
  - **Easy access to subspecialists** - better / more extensive health professional training; very much less waiting in line for specialty care (queueing)

# Mortality amenable to health care

## Deaths per 100,000 population



Source: World Health Organization, Nolte and McKee, Rutgers Center for State Health Policy Standardized for age (1998)  
Utah from 2003, normalized for general US change from 1998

# Care delivery offers opportunities

- 1. Well-documented, massive, variation in practices**  
*(beyond the level where it is even remotely possible that all patients are receiving good care)*
- 2. High rates of inappropriate care**
- 3. Unacceptable rates of preventable care-associated patient injury and death**
- 4. A striking inability to "do what we know works"**
- 5. Huge amounts of waste and spiraling prices, that limit access** *(46.6 million uninsured Americans, and still climbing)*

***Today's problems  
are often  
yesterday's solutions.***

*(We can't solve problems using the same kind  
of thinking we used when we created them)*

*(It works better if you plug it in)*

***Albert Einstein***

***He that will not apply new remedies must expect new evils;  
for time is the greatest innovator.***

***Francis Bacon (1561 - 1626); in Essays (1625), Of Innovations***

# Why? The collision of 2 factors:

(1) **Continued reliance on the "craft of medicine"**  
*(clinicians as stand-alone experts)*

***in the face of***

(2) **Clinical uncertainty**

# The craft of medicine

*Each physician an independent expert*

- ♦ *placing her patient's health care needs before any other end or goal,*
- ♦ *drawing on extensive clinical knowledge gained through formal education and experience*

*Can craft*

- ♦ *a unique diagnostic and treatment regimen customized for that particular patient.*

*Medicine's promise:*

*This approach will produce the best result possible for each patient.*

# Craft-based personal autonomy

- ◆ **Heroic individualism, with an attitude; or**  
*(what I know works for me, as opposed to formal, group knowledge)*
- ◆ **the Catholic view of health care accountability:**  
*I kneel down at my bed each night and examine my conscience,  
as a moral person who puts patients first;*

*I do an act of contrition -- it must be very gut wrenching;*

*then*

*All Is Forgiven*

*because of the goodness of my heart and the purity of my motives.*

*But ...*

*autonomy without accountability is mere license.*

*Transparent accountability = transparent autonomy*

# Clinical uncertainty

## 1. **Lack of valid clinical knowledge** regarding best treatment

*(poor evidence)*

## 2. **Exponentially increasing new medical knowledge**

*(doubling time has decreased to ~8 years; at current rates, a clinician will need to learn, unlearn, then relearn half of their medical knowledge base 4 times during a typical career)*

## 3. **Continued reliance on subjective judgment** *(subjective recall is dominated by anecdotes, and notoriously poor when estimating results across groups or over time)*

## 4. **Limitations of the expert mind when making complex decisions**

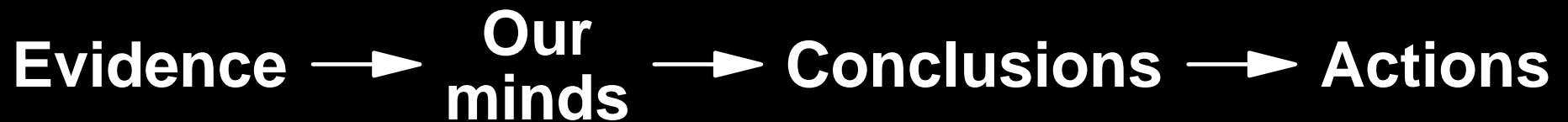
*Miller, 1956: The magic number 7, plus or minus 2: some limits on our capacity for processing information  
Eddy: "The complexity of modern medicine exceeds the capacity of the unaided human mind"*

*Which, combined with the craft of medicine, leads to:*

- ◆ **Enthusiasm for unproven methods** ... Mark Chassin, MD
- ◆ **The maxim, "If it might work, try it"** ... David Eddy, MD, PhD
- ◆ **Quality means "spare no expense"** ... Brent James, MD, MStat

# The core assumption

***"Our minds are interpreters of evidence. We can accurately convert all forms of evidence (formal evidence, observations, experiences, colleague's experiences) into conclusions, which in turn determine our actions."***



***"Therefore, no one has to tell us what to do. Just give us the evidence and we will figure it out. Besides, there are lots of other factors that need to be considered. This can only be done with clinical judgment."***

# The core assumption is untenable

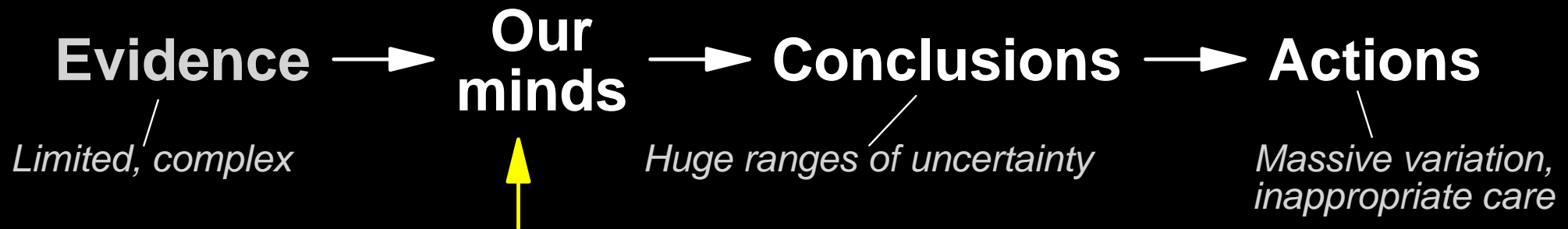
- ◆ *Poor evidence for most practices*
- ◆ *The inherent complexity of modern medicine, versus the limitations of the human mind*

*lead to*

- ◆ *Huge variations in beliefs*
- ◆ *Well-documented, massive, variations in practices*
- ◆ *High rates of inappropriate care*
- ◆ *Unacceptable rates of preventable patient injury*
- ◆ *A striking inability to "do what we know works"*
- ◆ *Massive amounts of waste*

# Other factors affect our decisions

*If our minds can't do the work very well, there are all sorts of other things to fill the void:*



- ◆ **Professional interests**
- ◆ **Financial interests**
- ◆ **Clinician preferences and personal tastes**
- ◆ **Desire to have something to offer** (*Rule of Rescue*)
- ◆ **Love for the work**
- ◆ **Wishful thinking**
- ◆ **Selective memory**
- ◆ **Pressure from patients and family** (*direct to consumer advertising*)
- ◆ **Legal considerations** (*defensive medicine*)

# We have found proven solutions

## **Shared baselines** *(a form of Lean Production) -*

*A multidisciplinary team of health professionals:*

- 1. Select a high priority care process**
- 2. Generate an evidence-based "best practice" guideline**
- 3. Blend the guideline into the flow of clinical work**
  - ◆ *staffing*
  - ◆ *training*
  - ◆ *supplies*
  - ◆ *physical layout*
  - ◆ *educational materials*
  - ◆ *measurement / information flow*
- 4. Use the guideline as a shared baseline, with clinicians free to vary based on individual patient needs**
- 5. Measure, learn from, and (over time) eliminate variation arising from professionals; retain variation arising from patients** *("mass customization")*

# Practical limitations on protocol use

*When abstract guidelines hit real patient care, experience clearly shows that (with very rare exceptions)*

**No protocol fits every patient;**

*more important,*

**No protocol (perfectly) fits any patient.**

# Methods to manage complexity

**Subspecialize** (*analytic method; reductionism; 'divide and conquer'*)  
(old joke: **Know more and more about less and less until you know everything about nothing**)

**Mass customize** (*a shared baseline: focus on that relatively small subset of factors that are unique by and for each individual patient [typically 5-15%], concentrating your most important resource -- the trained human mind -- where it can have the greatest impact*)

# The healing professions are changing

## From **craft-based practice**

- ◆ **individual physicians, working alone** (housestaff ::= apprentices)
- ◆ **handcraft a customized solution for each patient**
- ◆ **based on a core ethical commitment to the patient and**
- ◆ **vast personal knowledge gained from training and experience**

## To **profession-based practice**

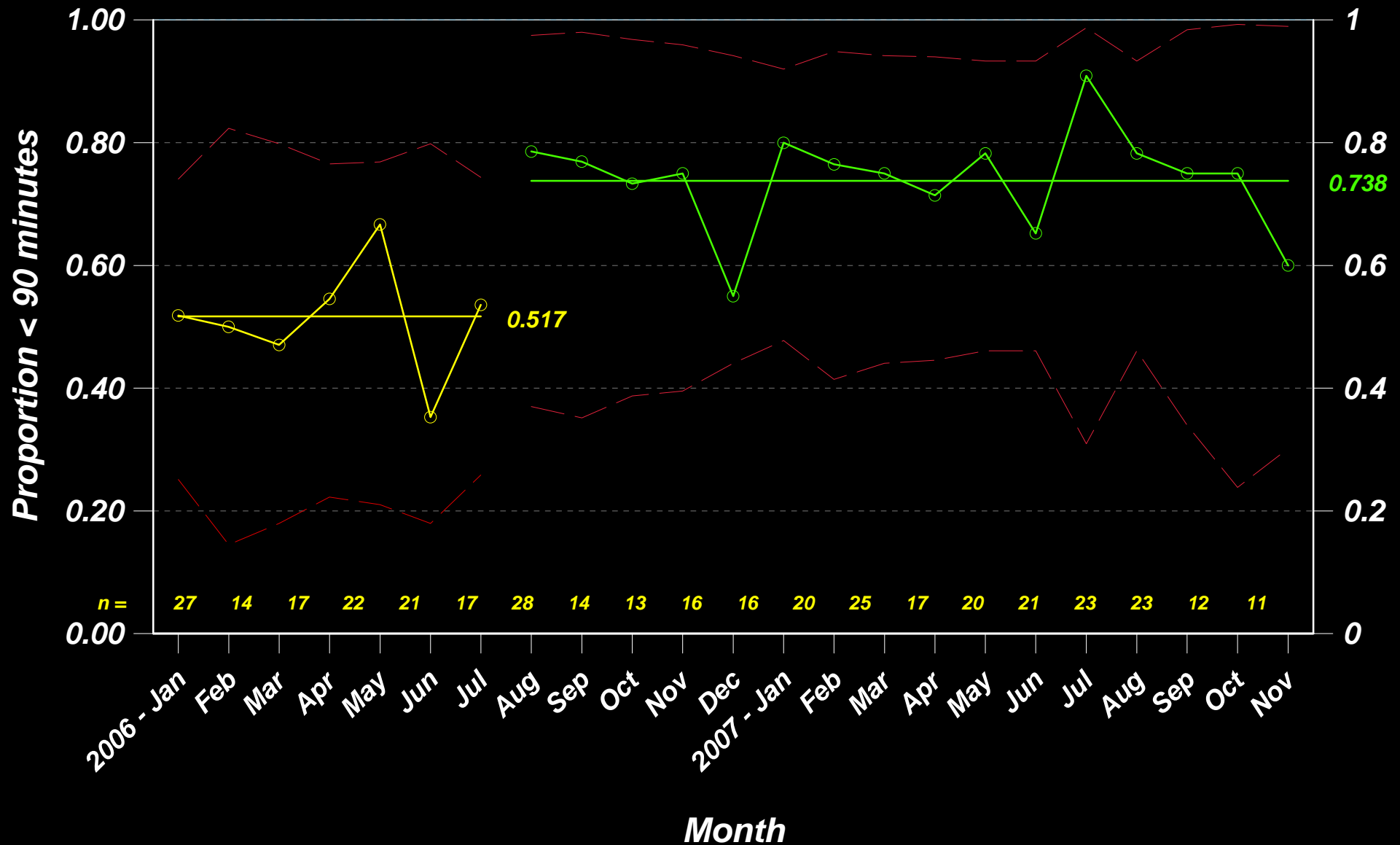
- ◆ **groups of peers, treating similar patients in a shared setting**
- ◆ **plan coordinated care delivery processes** (e.g., standing order sets)
- ◆ **which individual clinicians adapt to specific patient needs**
- ◆ **early experience shows**
  - ▶ **less expensive** (facility can staff, train, supply and organize to a single core process)
  - ▶ **less complex** (which means fewer mistakes and dropped handoffs, less conflict)
  - ▶ **better patient outcomes**

# Why "profession-based" practice?

- 1. It produces better outcomes for our patients*
- 2. It eliminates waste, reduces costs, and increases available resources for patient care*
- 3. It puts the caring professions back in control of care delivery*
- 4. It is the foundation for useful shared electronic data -- an important next step in care delivery improvement*

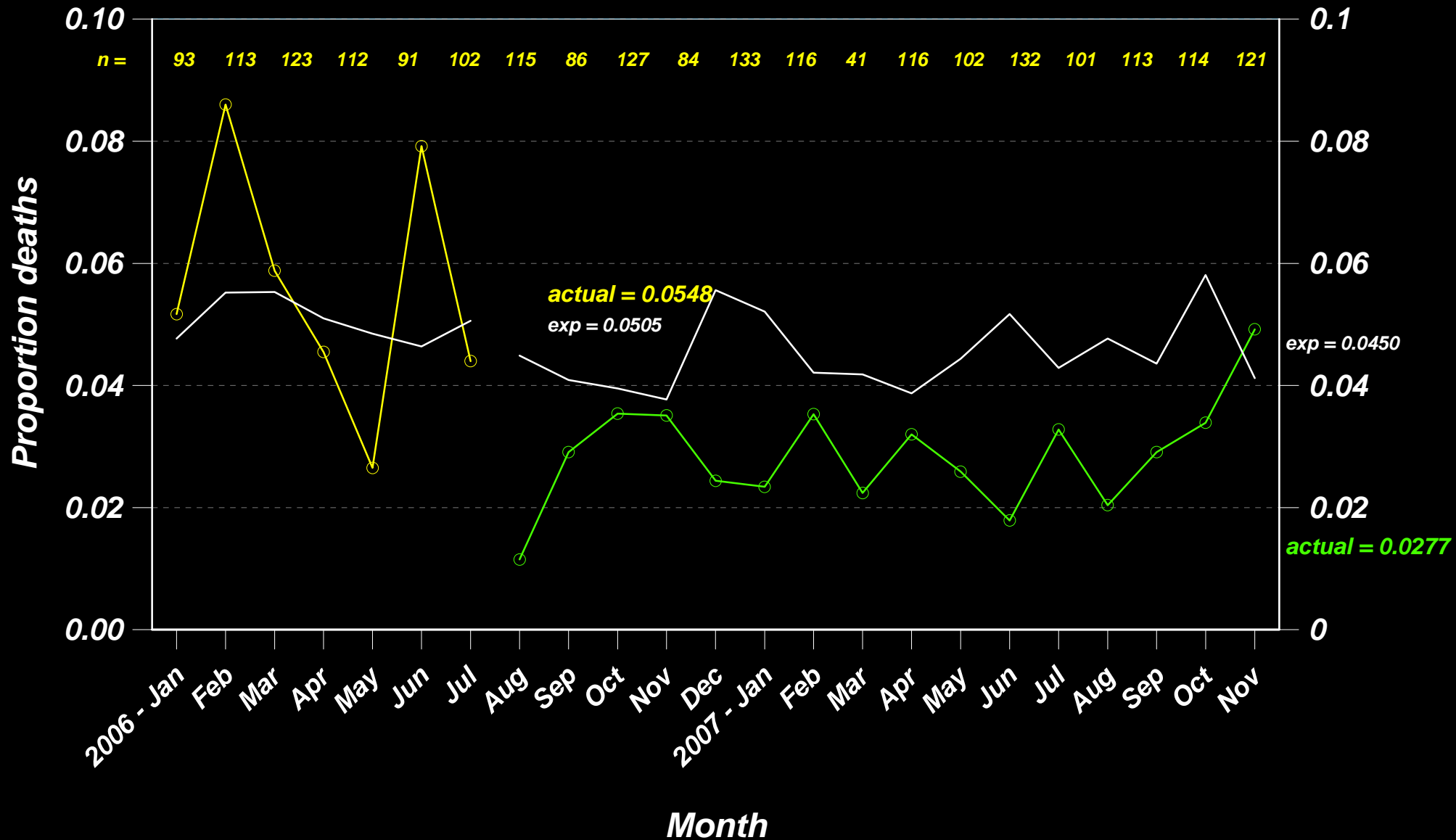
# STEMI: Door to PCI < 90 minutes

Entire system - among patients receiving PCI



# STEMI: Mortality rate

Entire system - among all STEMI patients (CMS AMI-9)



# What are our challenges?

- ◆ **Addressing clinical complexity**
- ◆ **Knowledge management in a learning system**  
*(ongoing application of best evidence, through real-time and process-level decision support; information systems; generation of new evidence embedded into daily operations)*
- ◆ **Care delivery through groups** *(as opposed to independent experts)*
- ◆ **Health care designed as a coordinated system of production** *(system analysis, design, and control)*

# ***Supplemental materials #1***

# Dr. John Wennberg (seminal article: Science, 1973)

- ★ ***Geography is destiny*** (*"Who you see is what you get" \**)
- ★ ***There is no health care "system"***
- ★ ***Supply-induced demand:***
  - ◆ *Field of Dreams approach: Build it and they will come*
  - ◆ *James T. Kirk: Do something, Bones! She's dying!*
  - ◆ *Boston City / Boston University Hospital, 1998:*
    - ▶ *Same housestaff on both services*
    - ▶ *More beds / easier access to resources on Boston University service*
    - ▶ *Boston University readmit rate ~50% higher*

\* *Richard Deyo, MD, MPH - in: Cherken, Deyo, Wheeler and Ciol. Physician variation in diagnostic testing for low back pain. Arth & Rheum 1994; 37(1):15-22 (Jan).*

**November 30, 1999:**

*The Institute of Medicine*

***Committee on Quality of Health Care in America***

*announces its first report:*

***To Err is Human: Building a Safer Health System***

# Care-associated injuries in hospitals

*account for*

***44,000 - 98,000 preventable deaths per year  
in the United States***

***More people die from hospital-based preventable medical injuries  
than from breast cancer or AIDS or motor vehicle accidents***

Brennan et al. *New Engl J Med* 1991

Thomas et al. 1999

***Injuries drive direct health care costs totaling  
\$9 - 15 billion per year***

Thomas et al. 1999

Johnson et al. 1992

**November 20, 2003:**

*The Institute of Medicine*

***Committee on Patient Safety Data Standards***

*announces a major follow-on report:*

***Patient Safety: Achieving a New Standard for Care***

***Injuries of commission***

*versus*

***Injuries of omission***

***American health care  
"gets it right"  
54.9%  
of the time.***

McGlynn EA, Asch SM, Adams J, *et al.* The quality of health care delivered to adults in the United States. *N Engl J Med* 2003; 348(26):2635-45 (June 26).

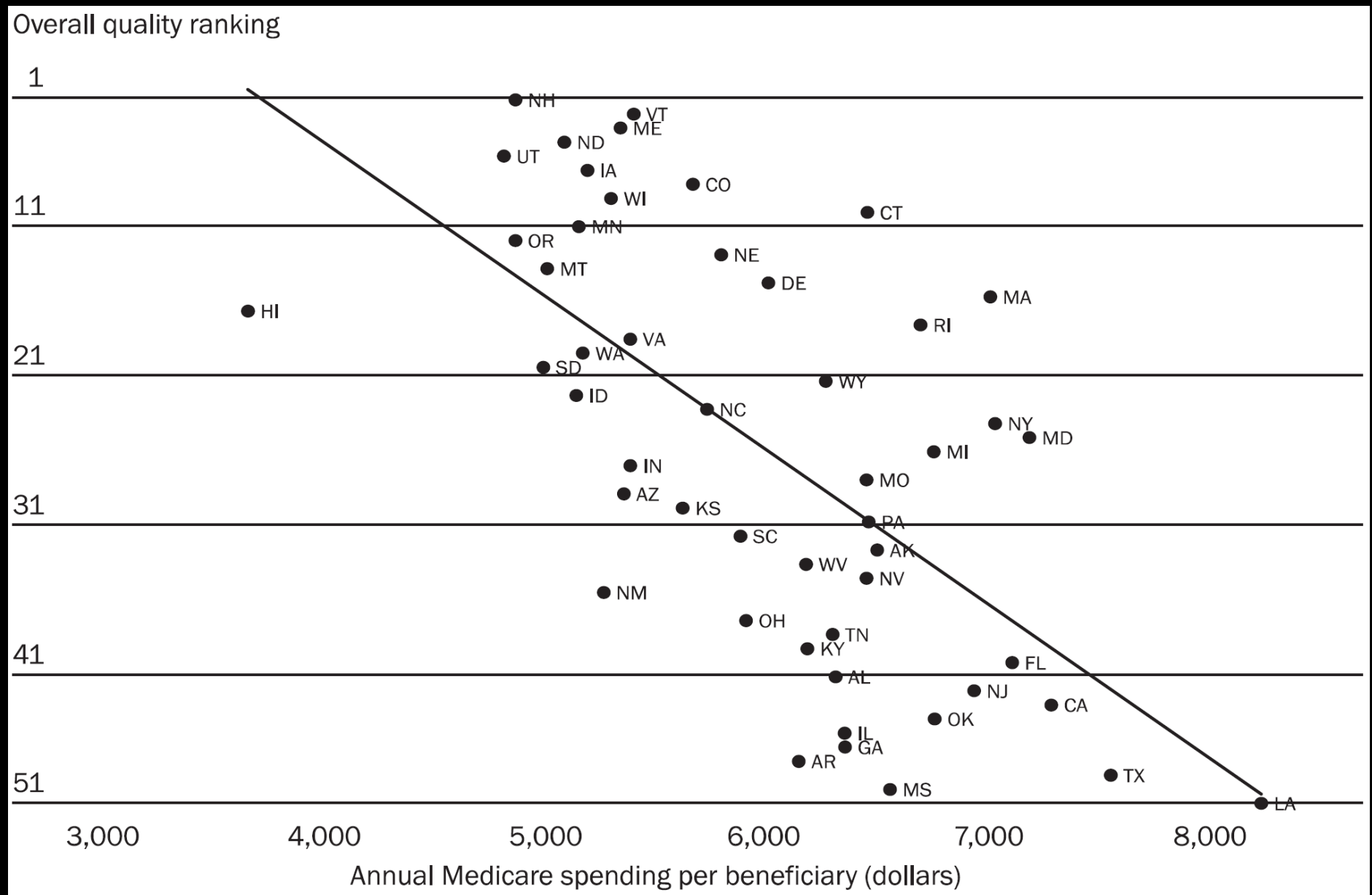
**45+% of all resource expenditures in hospitals is quality-associated waste:**

- ◆ *recovering from preventable foul-ups*
- ◆ *building unusable products*
- ◆ *providing unnecessary treatments*
- ◆ *simple inefficiency*

# **Looming financial crisis** *(U.S. version):*

- ◆ ***Unsupportable increases in government spending***
- ◆ ***Employers exiting health insurance***  
*(and transferring cost increases to employees)*
- ◆ ***Increasing numbers of under- and uninsured***
- ◆ ***Medical tourism*** *(off-shore treatment)*

# Medicare cost versus quality



Baicker, K and Chandra, A. Medicare spending, the physician workforce, beneficiaries' quality of care. *Health Affairs Web Exclusive* 7 April 2004; W4-184-97.

## ***Supplemental materials #2***

# Evidence based medicine

***Sackett, DL & Rosenberg, WM. The need for evidence-based medicine. J Royal Soc Med 1995; 88(11):620-4 (Nov).***

***Ellis, J, Mulligan, I, Rose, J, et al. Inpatient general medicine is evidence based. Lancet 1995; 346(8972):407-10 (Aug 12).***

- ♦ ***London teaching hospital, internal medicine service***
- ♦ ***direct evidence of efficacy for 53% of treatments***
- ♦ ***convincing non-experimental evidence for 29% of treatments***

# The science of medicine

► *Of what we do in routine medical practice, what proportion has a basis (for best practice) in published scientific research?*

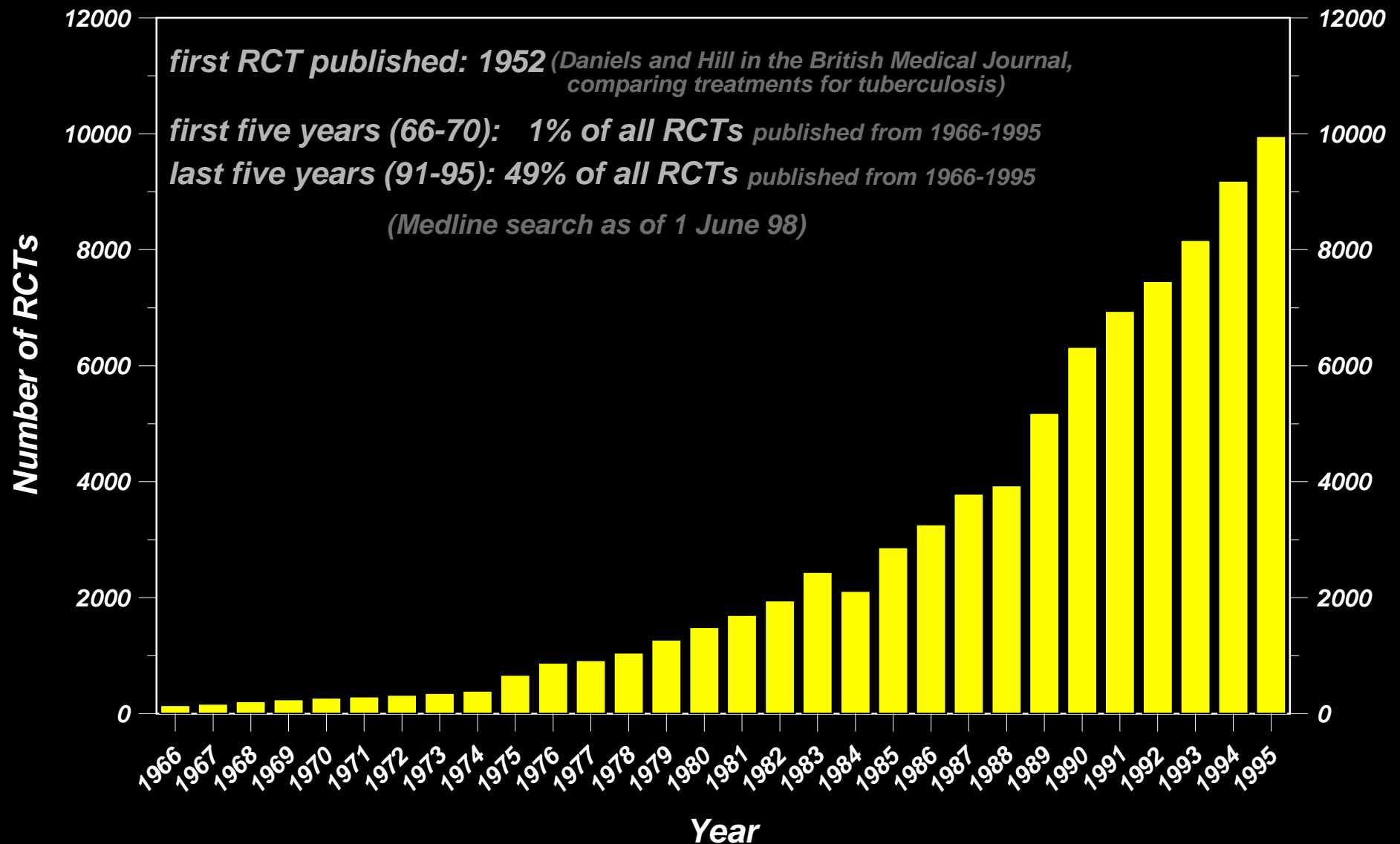
- Williamson (1979): < 10%
- OTA (1985): 10- 20%
- OMAR (1990): < 20%

► *The rest is **opinion***

- *That doesn't mean that it's wrong -- much of it probably works*
- *but it may not represent the best patient care*

Williamson *et al.* Medical Practice Information Demonstration Project: Final Report. Office of the Asst. Secretary of Health, DHEW, Contract #282-77-0068GS. Baltimore, MD: Policy Research Inc., 1979).  
Institute of Medicine. *Assessing Medical Technologies*. Washington, D.C.: National Academy Press, 1985:5.  
Ferguson JH. Forward. Research on the delivery of medical care using hospital firms. Proceedings of a workshop. April 30 and May 1, 1990, Bethesda, Maryland. *Med Care* 1991; 29(7 Suppl):JS1-2 (July).

# The evidence base is expanding



***During 2004, the U.S. National Library of Medicine added almost 11,000 new articles per week to its on-line archives.***

***That represented about 40% of all articles published, world-wide, in biomedical and clinical journals.***  
*(1,500 - 3,500 completed references per day, 5 days per week)*

***National Library of Medicine: Fact Sheet MEDLINE. 28 Mar 2006.  
<http://www.nlm.nih.gov/pubs/factsheets/medline.html>***

# Exploding knowledge base

- ◆ **3 to 4 years after board certification, internists -- both generalists and subspecialists -- begin to show "significant declines in general medical knowledge" ...**
- ◆ **14 to 15 years postcertification, ~68% of internists would not have passed the American Board of Internal Medicine certifying exam ...**
- ◆ **To maintain current knowledge, a general internist would need to read**
  - **20 articles per day,**
  - **365 days of the year**

***an impossible task ...***

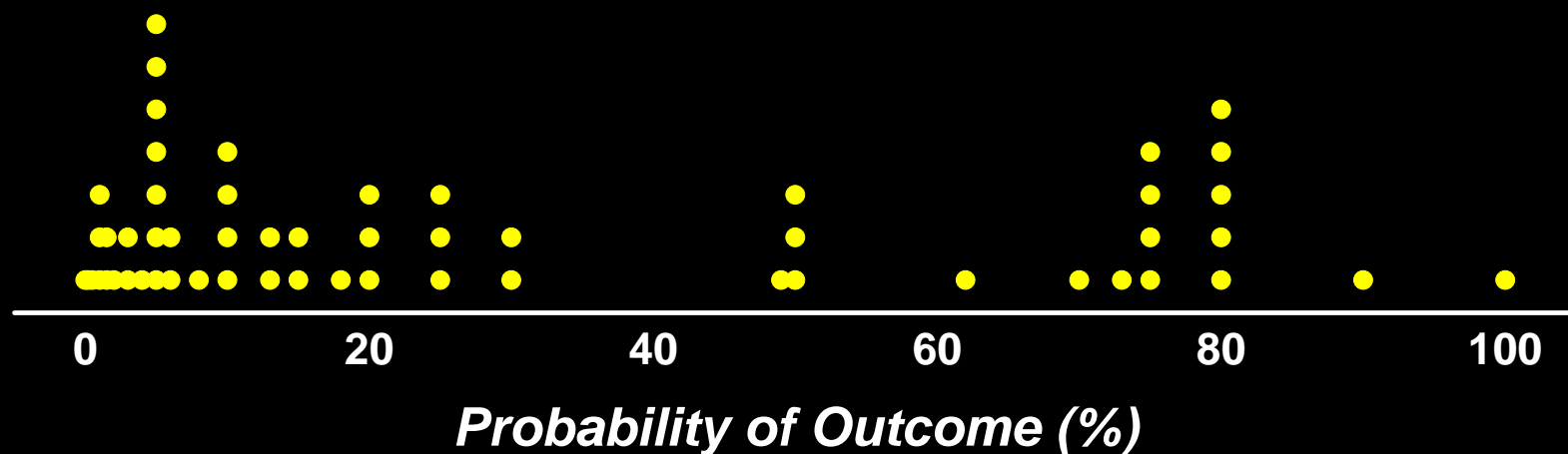
***Until now, we have believed that the best way to transmit knowledge from its source to its use in patient care is to first load the knowledge into human minds ... and then expect those minds, at great expense, to apply the knowledge to those who need it. However, there are enormous 'voltage drops' along this transmission line for medical knowledge.***

***Lawrence Weed***

(Weed LL. New connections between medical knowledge and patient care. *BMJ* 1997; 315(7102):231-5 (Jul 26).

# Expert consensus?

"The practitioners, all experts in the field, were then asked to write down their beliefs about the probability of the outcome" ... "that would largely determine his or her belief about the proper use of the health practice, and the consequent recommendation to a patient."

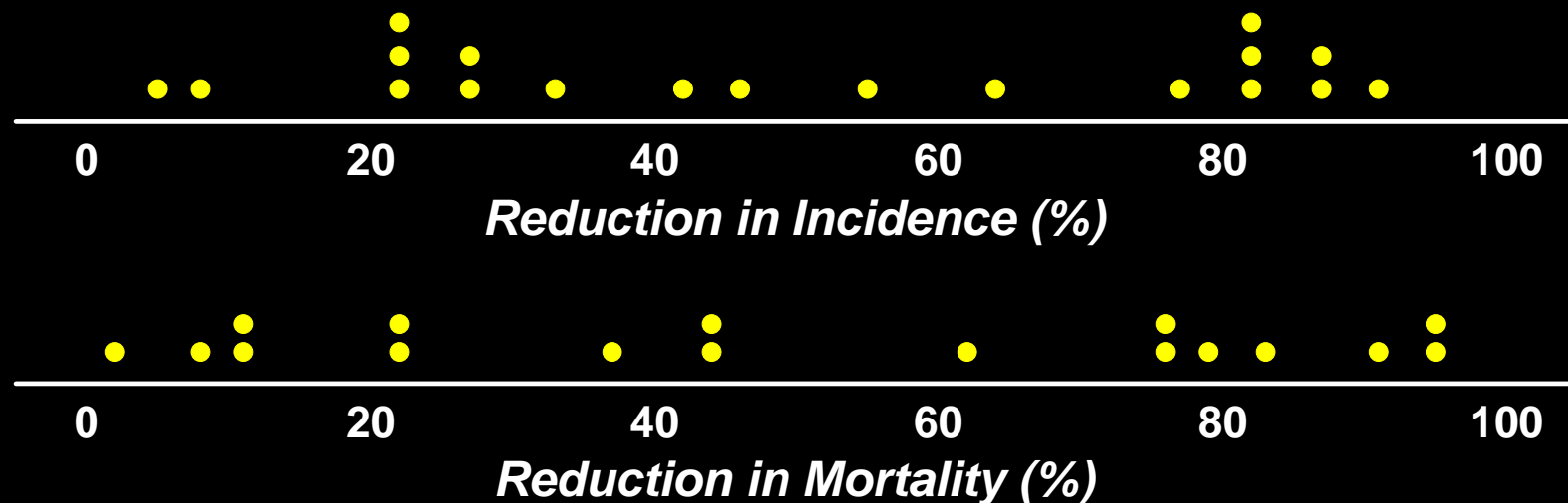


Eddy. *A Manual for Assessing Health Practices & Designing Practice Policies: The Explicit Approach*. Philadelphia, PA: The American College of Physicians, 1992; pg. 14.

*Eddy: "You can find a physician who honestly believes (and will testify in court to) anything you want."*

# Expert consensus?

"At a recent meeting of experts in colorectal cancer detection ... the attendees were asked ... 'What is the overall reduction in cancer incidence and mortality that could be expected ...' The answer to this question is obviously central to any estimate of the value of fecal occult blood testing ..." and flexible sigmoidoscopy.



Eddy. Variations in physician practice: the role of uncertainty. *Health Affairs*. 1984; 3:74.

# Implementing guidelines

- ▶ Carefully-developed repeat C-section guideline
- ▶ Distributed by professional society
- ▶ Physician survey:
  - "agreed with content": **87- 94%**
  - "changed practice": **33%**
- ▶ Measurement:
  - test on guideline contents: **67%** understood
  - actual repeat C-section rates: **15- 49%** above reported
  - "slight change in actual practice"

**Miller, G.A.**

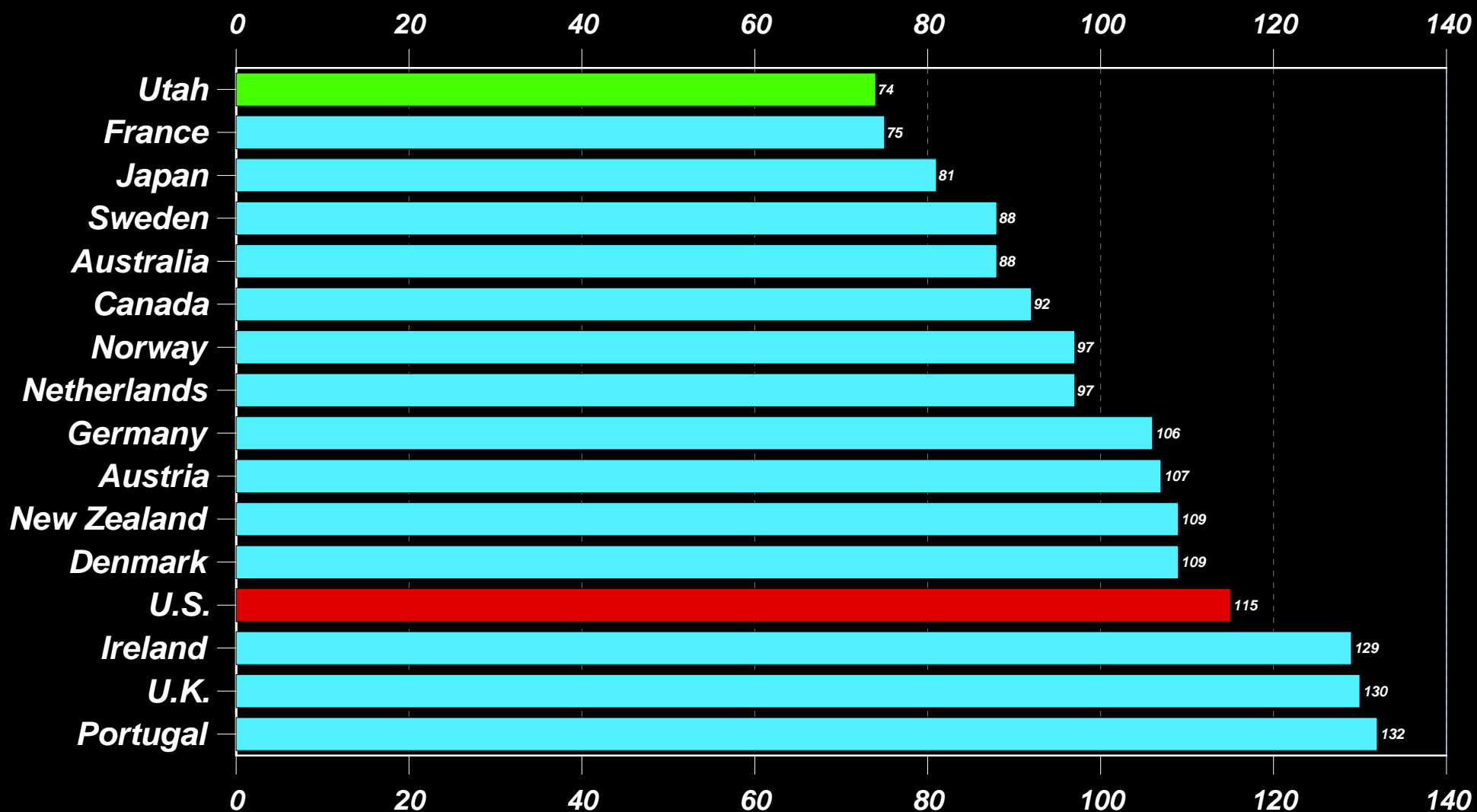
***The magic number seven, plus or minus two:  
some limits on our capacity for processing information.***

***Psychological Review 1956; 63(2):81-97***

# ***Supplemental materials #3***

# Mortality amenable to health care

## Deaths per 100,000 population



Source: World Health Organization, Nolte and McKee, Rutgers Center for State Health Policy Standardized for age (1998)  
Utah from 2003, normalized for general US change from 1998

# Wells Fargo inflation summary, 1988-2006

December 2006

**WELLS  
FARGO**

## COST OF LIVING INDEX

	Wasatch Front			National			
	Index Mar. 1988=100	% Change 6 Mos.*	(Non-Seas. Adj.) 1 Mo. Prior	Index Mar. 1988=100	% Change 6 Mos.*	(Non-Seas. Adj.) 1 Mo. Prior	(Seas. Adj.) 1 Mo. Prior
<b>All Categories</b>	<b>154.6</b>	<b>-0.1%</b>	<b>0.2%</b>	<b>173.4</b>	<b>2.7%</b>	<b>0.1%</b>	<b>0.5%</b>
Housing	182.8	2.7	0.1	175.6	3.8	0.1	0.4
Transportation	120.2	-11.4	-1.4	163.9	0.8	0.9	1.8
Health Care	157.4	0.1	-0.1	249.5	3.9	0.0	0.1
Food at Home	201.2	3.3	3.1	170.6	1.8	0.0	-0.3
Clothing	113.2	-1.6	0.6	102.9	0.2	-2.5	0.6
Food Away	162.2	0.0	0.0	168.7	3.2	0.3	0.3
Utilities	128.7	-1.0	0.0	175.4	3.1	1.1	1.2
Recreation	139.1**	5.8	0.0	109.8 <sup>†</sup>	1.3	-0.4	-0.3
Education & Comm.	124.6**	5.6	0.0	116.2 <sup>†</sup>	2.5	-0.1	0.2
Other Goods & Svcs.	104.3**	0.0	0.0	243.3	2.6	0.7	0.8

\*Last six-month percentage change compared with same period one year ago.  
\*\*(Feb. 1998=100 base)

National Data Source: U.S. Bureau of Labor Statistics  
†(Dec. 1997=100 base)

# The Wall Street Journal

## Perverse Incentives in Health Care

April 5, 2007

John C. Goodman, President, National Center for Policy Analysis

Research at Dartmouth Medical School suggests that if everyone in America went to the Mayo Clinic, our annual health-care bill would be 25% lower (more than \$500 billion!), and the average quality of care would improve. If everyone got care at Intermountain Healthcare in Salt Lake City, our healthcare costs would be lowered by one-third.

Of course, not everyone can get treatment at Mayo or Intermountain. But why are these examples of efficient, high-quality care not being replicated all across the country? The answer is that high-quality, low-cost care is not financially rewarding. Indeed, the opposite is true. Hospitals and doctors can make more money providing inefficient, mediocre care.

***"I am sorry for you, young men (and women) of this generation. You will do great things. You will have great victories, and standing on our shoulders, you will see far, but you can never have our sensations. To have lived through a revolution, to have seen a new birth of science, a new dispensation of health, reorganized medical schools, remodeled hospitals, a new outlook for humanity, is not given to every generation."***

***-- Sir William Osler***

*At the opening of the Phipps Clinic in England, near the end of his career. Cited in*

*Reid, Edith Gittings. The Great Physician: A Life of Sir William Osler. New York, NY: Oxford University Press, 1931 (p. 241).*