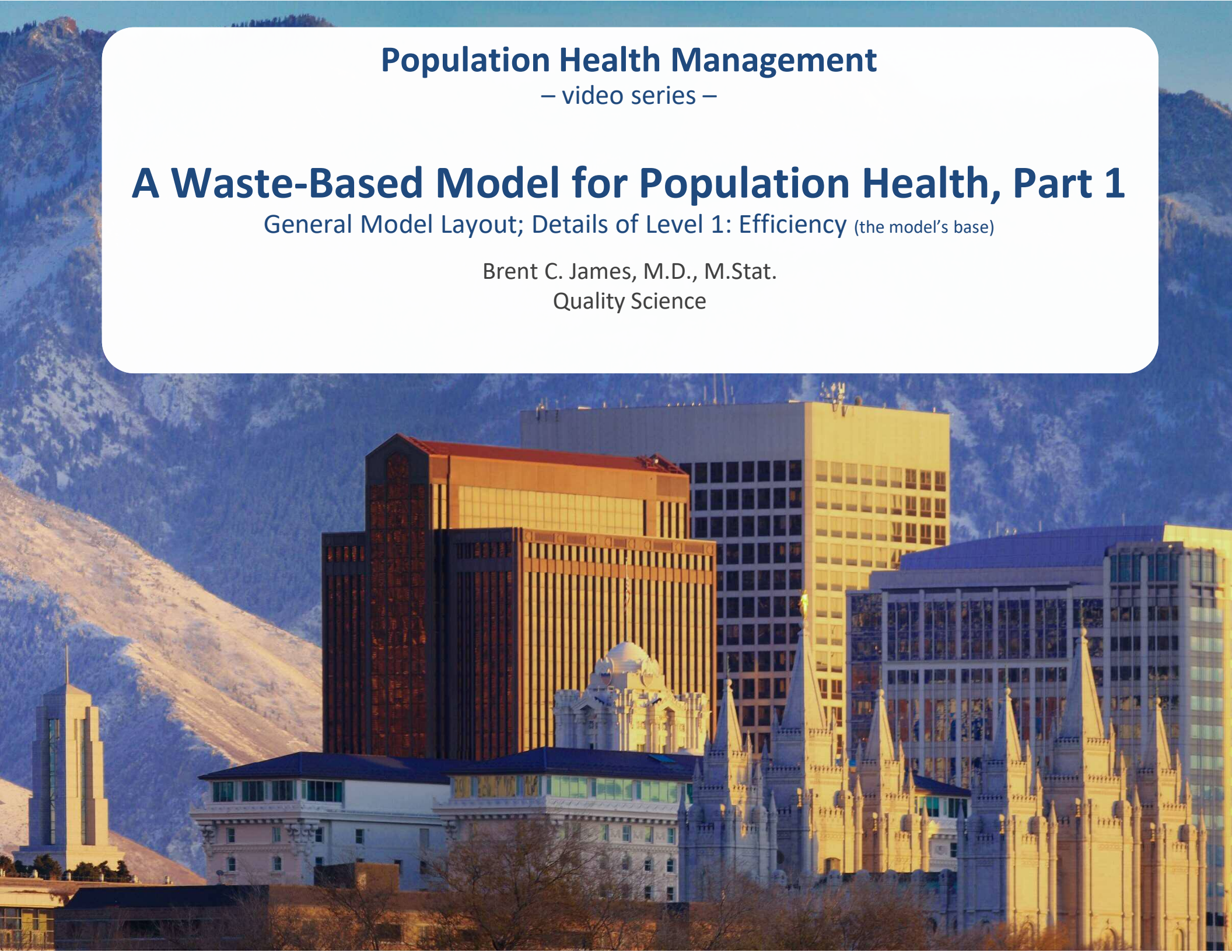


Population Health Management

– video series –

A Waste-Based Model for Population Health, Part 1

General Model Layout; Details of Level 1: Efficiency (the model's base)

Brent C. James, M.D., M.Stat.
Quality Science

Video and slides

Two subsections *in this module*

1. *Lay out a*

3-level, bottom-up, waste-based model for Population Health

2. *Expand details and examples for*

Level 1: Efficiency

(true cost per "unit of care")

Part 1: A waste-based model for Population Health

Clinical Management

3. ***Case-rate utilization***
   (# cases per population)

2. ***Within-case utilization***
   (# and type of units per case)

Traditional
Administrative Management

1. ***Efficiency***
   (cost per unit of care)

The levels interact –
particularly between Level 1. Efficiency and Level 2. Within-case utilization

Quality Science

Levels link to clinical opportunities

for better care at lower costs

The opportunity *(care falls short of its theoretic potential)*

1. ***Massive variation in clinical practices*** *(beyond even the remote possibility that all patients receive good care)*
2. ***High rates of inappropriate care*** *(where the risk of harm inherent in the treatment outweighs any potential benefit)*
3. ***Unacceptable rates of preventable care-associated patient injury and death***
4. ***Striking inability to "do what we know works"***

James, B.C. Testimony to the U.S. Senate Finance Committee, February 2009

A waste-based model for Population Health

Clinical Management

3. ***Population Health*** – *case-rate utilization = # cases per population*
   - ***Inappropriate cases***
   - ***Preference-sensitive cases***
   - ***Avoidable cases*** – *inability to "do what we know works"*
2. ***Clinical variation*** – *within-case utilization = # and type of units per case*
   - ***Patient safety*** – *preventable care-associated injury and death*

Traditional

Administrative Management

1. ***Efficiency***
   (cost per unit of care)

Why this model?

- ***Comprehensive***
  - *"contains" all elements / examples of waste found in other models*

- ***Nested***
  - *eliminates overlaps between categories (e.g., must eliminate all inappropriate care, before estimating gains to be had from optimizing care execution)*
  - *that enables accurate estimates of the total amount of waste, and the relative size of different waste categories*

- ***Links to proven action***
  - *theory becomes "real" only when actual outcomes change*
  - *includes examples of successful waste elimination in every category*
  - *that's why it currently ignores Misdiagnosis – no proven solutions yet*

- ***Ties directly to payment mechanisms***
  - *the key to financial alignment*

Part 2: Efficiency *(the base level – Level 1 – in the model)*

Cost per "unit of care"

A "unit of care" is

*Any small, granular element of care delivery; 'an item, event, task, or unit of work with a specified purpose …"**

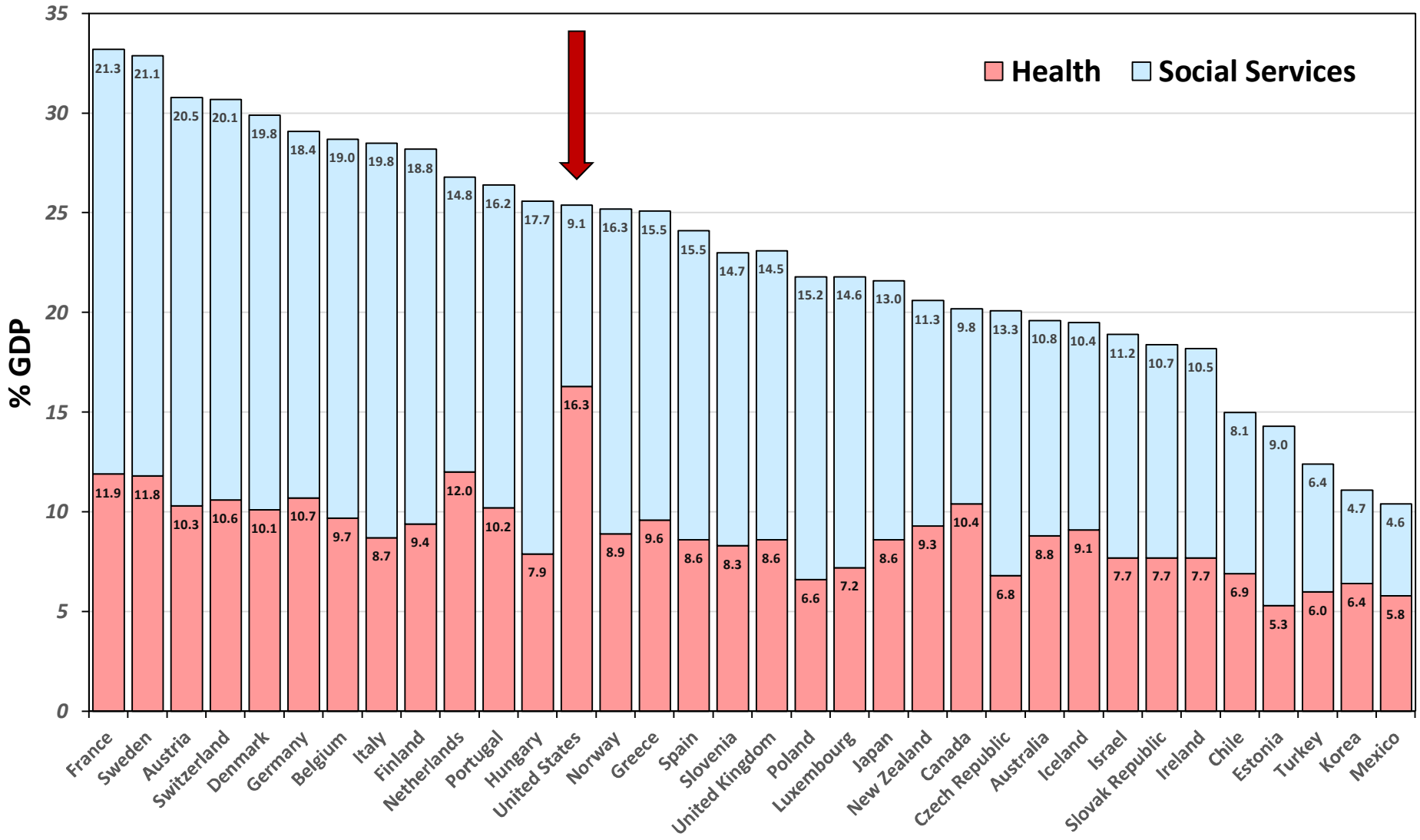
For example,

- *a single dose of a specific drug, including route of delivery*
- *a single specific lab test*
- *a single specific imaging exam (x-ray, ultrasound, CT scan, etc.)*
- *an acuity-adjusted hour of a nurse's time*
- *a 6-minute block of a physician's time, by specialty*
- *any single item from Central Supply (e.g., a bed pan; a box of tissues; the individuals elements of an artificial hip joint)*

*modified from: Horngren, Datar, and Rajan. *Cost Accounting: A Managerial Emphasis, 14th Edition.* New York, NY: Prentice Hall, 2012; pg. 146.

2007 Total Entitlement Spending by Country

for 34 first-world nations



Bradley EH, Elkins BR, Hurrin J, Elbel B. Health and social services expenditures: Associations with health outcomes. *BMJ Qual Saf* 2011; 20(10):826-31 (Oct).

Two prominent health economists

Uwe Rhinehardt, PhD
Professor of Political Economy at Princeton University – a widely and deeply respected expert on health economics.
Emigrated from Germany to Canada at the end of WWII
(b. 1937; d. 2017)

Ashish K. Jha, MD, MPH
Dean, Brown University School of Public Health; formerly K.T. Li Professor of Global Health at the Harvard T.H. Chan School of Public Health.
Born in Bihar, India, in 1970. Emigrated to Canada in 1979, then to the United States in 1983.

Uwe Rhinehardt

Unit pricing *(the cost of individual "units of care," including clinician salaries)* ***explains the differences in total health care spending long observed between the U.S. and other first-world nations*** *(e.g., Canada and nations in Europe).*

Dr. Ashish Jha – *JAMA, 2018*

Clinical Review & Education

JAMA | Special Communication

Health Care Spending in the United States and Other High-Income Countries

Irene Papanicolas, PhD; Liana R. Woskie, MSc; Ashish K. Jha, MD, MPH

Viewpoint page 977 and Editorials pages 983, 986, 988, and 990
Animated Summary Video
Supplemental content and Audio
CME Quiz at jamanetwork.com/learning

IMPORTANCE Health care spending in the United States is a major concern and is higher than in other high-income countries, but there is little evidence that efforts to reform US health care delivery have had a meaningful influence on controlling health care spending and costs.

OBJECTIVE To compare potential drivers of spending, such as structural capacity and utilization, in the United States with those of 10 of the highest-income countries (United Kingdom, Canada, Germany, Australia, Japan, Sweden, France, the Netherlands, Switzerland, and Denmark) to gain insight into what the United States can learn from these nations.

EVIDENCE Analysis of data primarily from 2013-2016 from key international organizations including the Organisation for Economic Co-operation and Development (OECD), comparing underlying differences in structural features, types of health care and social spending, and performance between the United States and 10 high-income countries. When data were not available for a given country or more accurate country-level estimates were available from sources other than the OECD, country-specific data sources were used.

FINDINGS In 2016, the US spent 17.8% of its gross domestic product on health care, and spending in the other countries ranged from 9.6% (Australia) to 12.4% (Switzerland). The proportion of the population with health insurance was 90% in the US, lower than the other countries (range, 99%-100%), and the US had the highest proportion of private health insurance (55.3%). For some determinants of health such as smoking, the US ranked second lowest of the countries (11.4% of the US population ≥15 years smokes daily; mean of all 11 countries, 16.6%), but the US had the highest percentage of adults who were overweight or obese at 70.1% (range for other countries, 23.8%-63.4%; mean of all 11 countries, 55.6%). Life expectancy in the US was the lowest of the 11 countries at 78.8 years (range for other countries, 80.7-83.9 years; mean of all 11 countries, 81.7 years), and infant mortality was the highest (5.8 deaths per 1000 live births in the US; 3.6 per 1000 for all 11 countries). The US did not differ substantially from the other countries in physician workforce (2.6 physicians per 1000; 43% primary care physicians), or nursing workforce (11.1 nurses per 1000). The US had comparable numbers of hospital beds (2.8 per 1000) but higher utilization of magnetic resonance imaging (118 per 1000) and computed tomography (245 per 1000) vs other

CONCLUSIONS AND RELEVANCE **The United States spent approximately twice as much as other high income countries on medical care, yet utilization rates in the United States were largely similar to those in other nations. Prices of labor and goods, including pharmaceuticals, and administrative costs appeared to be the major drivers of the difference in overall cost between the United States and other high-income countries.** As patients, physicians, policy makers, and legislators actively debate the future of the US health system, data such as these are needed to inform policy decisions

Papanicolas I, Woskie LR, Jha AK. Health care spending in the United States and other high-income countries. *JAMA* 2018; 319(10):1024-39 (Mar 13).

Level 1 *(Efficiency)* has 3 subcategories

1. ***Supply chain*** *– purchase of external products and services*
2. ***Operational efficiency***
   - *Clinical engineering: ready availability of reliable, fully functional tools and equipment*
   - *Digital support: uninterrupted fully functional telecommunications and computer services*
   - *TPS Lean Observation: non-value adding front-line work*
3. ***Indirect costs***
   - *Administrative overhead* *(non-revenue generating groups with their subcosts, such as senior executives, Finance, Legal, Human Resources, Travel, Quality Management, etc.)*
   - *Regulatory burden* *(compliance training and reporting)*
   - *Billing adjudication with payers* *(contracting, pre-authorization, claims denials, etc.)*
   - *Utilities*
   - *Liability and other insurance*
   - *etc.*

Base state of purchasing

- *$1.3 billion non-labor annual spend* *(~20% med/surg supplies, 80% non-clinical services – banks, insurance companies, auditors, etc.)*
- *12,000+ vendors*
- *Purchasing and negotiations dispersed across system*
- *Few purchasing standards*
- *Casual relationship with Group Purchasing Org* *(GPO)*
- *Product redundancy* *with wildly different prices*
- *Supplier redundancy:* *30% – 40% overlap for similar products*
- *Multiple contracts for same item,* *poor deals, high pricing*
- *High processing costs on inventory*
- *Inefficient use of purchased products and services*
- *Limited methods to make products / services better*

2005 – Supply Chain Organization

Brought in Brent Johnson

- *Decades of supply chain experience outside healthcare*
- *Later, founding President and CEO of Intalere – a GPO*

Expectations:

- *$20 million / year in real savings, for at least 5 years*
- *Coordinate supply chain operations with clinical quality management*

What is Supply Chain?

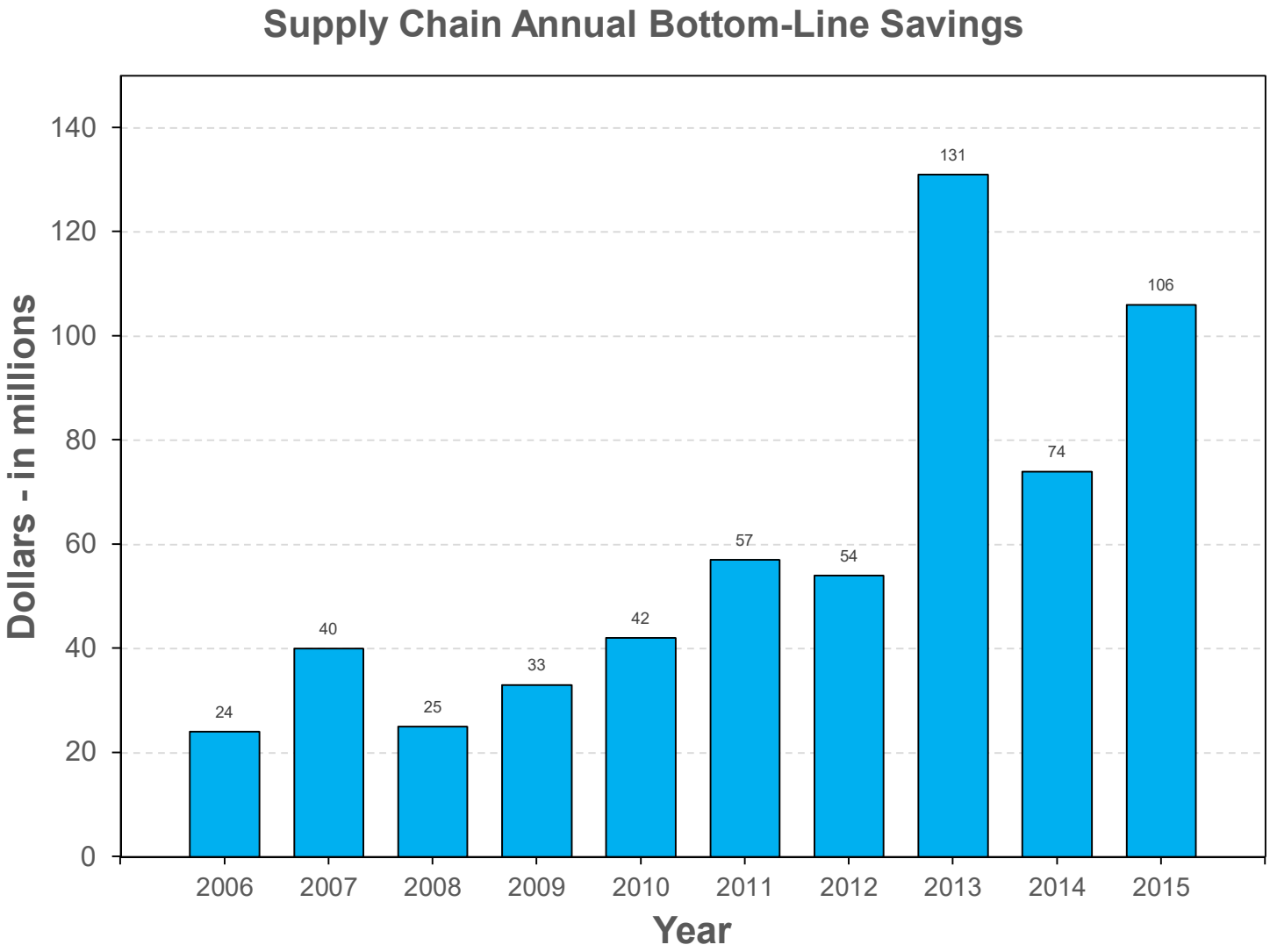
a disciplined, systematic process of analyzing organizational expenditures and developing strategies to reduce the total costs of externally purchased materials and services

It involves integrating the supply system:

- *What we buy* *(overlapping products with wildly different prices)*
- *Who we buy from* *(supplier redundancy: 30% – 40%)*
- *How we buy* *(multiple contracts for same thing, poor deals, high pricing)*
- *What we inventory* *(high processing costs)*
- *How we use the products and services we buy*
- *How we can make those products and services better*

Strategic sourcing

- ***Reduced number of suppliers*** *(and maybe some new ones)*
- ***Lowered prices*** *(consolidated buying, rigorous negotiations)*
- ***Standardized product specifications***
- ***Strengthened supplier relationships*** *(longer term contracts, better service levels)*
- ***Eliminated redundancies***
- ***Eliminated some complete business processes***
- ***Applied principles of continuous improvement***
- ***Built a formalized system to track savings***



Total savings: $586 million across 10 years

TPS Lean observation *(front-line worker use of time)*

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LETTER TO THE EDITOR

Estimating waste in frontline health care worker activities

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Keywords
inefficiency, lean health care, quality, waste

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To the Editor

US health care system spending is projected at $3.6 trillion by 2014 [1], and payroll costs – the largest hospital operating expense – increased at an annual rate of 6% per capita in 2004, versus 0.9% per capita in 1994 [2]. US health care outcomes are no better than in countries with less spending [3,4]. The Agency for Health Care Research and Quality* funded a larger investigation designed to provide hospitals with individual estimates of waste; we report the results of a sub-study intended to estimate the cost of waste and document problems encountered in frontline hospital worker activities. Our hypothesis was that waste in frontline hospital work is common and unrecognized [5,6].

Reports of waste estimates in a cross section of frontline hospital staff were unavailable, although many observational studies of hospital workers report fragmented workflow and substantial time spent on non-patient care activities [5,7–11]. We shadowed health care workers for 72 hours at two tertiary referral centres and three community hospitals in two excellent US health systems, Intermountain Healthcare and the University of North Carolina Health System. Sixty-one caregiver roles (8 doctors, 26 nurses, 2 respiratory therapists, 1 social worker, 4 pharmacists and 1 physical therapist) and technical roles (6 laboratory, 6 nursing, 3 procedural, 3 pharmacy and 1 radiology) were included. Most workers were experienced; 44 (72%) had more than 3 years of employment in their role. Institutional reviewers approved the study as minimal risk, and participation was voluntary.

We chose time-and-motion methods to allow a description of low-frequency events [11] and problems encountered. The principi- periods of 1 to 2 hours. We developed a tool† that included definitions for 11 general activity categories (social and personal activities were excluded) grouped into six mutually exclusive classes (Table 1). The activity classes were structured using concepts of waste from the Toyota Production System (TPS) [12], which separates activities into those that do and do not produce value as defined by the customer. We also measured frequency of interruptions, location changes and captured problems in detailed field notes. Post-observation debriefings with the observed worker included a review of time spent in each activity category, waste estimates, interruptions and location change frequency, and problems encountered. Reliability estimates (intraclass correlation), computed using simultaneous, independently collected observation data sets from eight different observers compared with the principal observer's observation data, ranged from 0.67 to 0.88 ($P < 0.054$ to 0.007).

The following rules were used to estimate waste: (1) time spent with patients or on job-specific tasks (operations) was 0% waste; (2) time spent on defects, errors, locating, waiting and 'other' activities was 100% waste; (3) time spent clarifying, processing, stocking and travelling occupies a range of recoverable waste (20% is low, 50% is medium, and 80% is high). To estimate the cost of waste per hour of observation, conservative estimates of hourly base salaries plus 30% fringe benefits (doctor salaries did not include fringe) were made. Waste estimates were computed as the product of the percentage of estimated waste and total hourly salary. Problems, defined as undesirable states that hinder a worker's ability to deliver service or satisfy patient needs [6], were inductively analysed after observations were completed.

Wallace CJ, Savitz L. Estimating waste in frontline health care worker activities. *J Eval Clin Pract* 2008; 14(1):178-80 (Feb).

TPS Lean observation

- ***Initially developed at Toyota*** *(TPS = Toyota Production System)*
- ***Adapted for health care settings*** *– AHRQ grant, led by Jane Wallace, RN PhD, and Lucy Savitz, PhD MBA*
- ***Paper assesses 2 tertiary + 3 community hospitals*** *in 2 large systems; later work applied method to many more hospitals in 4 additional large integrated systems*
- ***Nurse researcher observed 61 hospital workers***
  - *8 hospitalist doctors*
  - *2 respiratory therapists*
  - *4 pharmacists*
  - *19 technicians (lab, pharmacy, radiology, procedure rooms, etc.)*
  - *26 nurses (full range of nursing roles)*
  - *1 social worker*
  - *1 physical therapist*
- ***Classified 72 total hours of work time***

Waste ranged from 20 - 70% *of total work time*

Conservative overall waste: 35% *of total work time*

Did not include EMR inefficiencies around regulatory compliance and billing *(see Sinsky and others).*

Nested sources of waste

Waste class	% of all waste	Waste subclasses
1. Efficiency *(cost per unit of care)*		a) Supply chain *(external products & services)* b) Operational efficiencies *- TPS Lean observation - clinical engineering* *- current EMR functions - communications + IT* c) Indirect costs *- administration - billing adjudication* *- regulatory burden - utilities - etc.*