



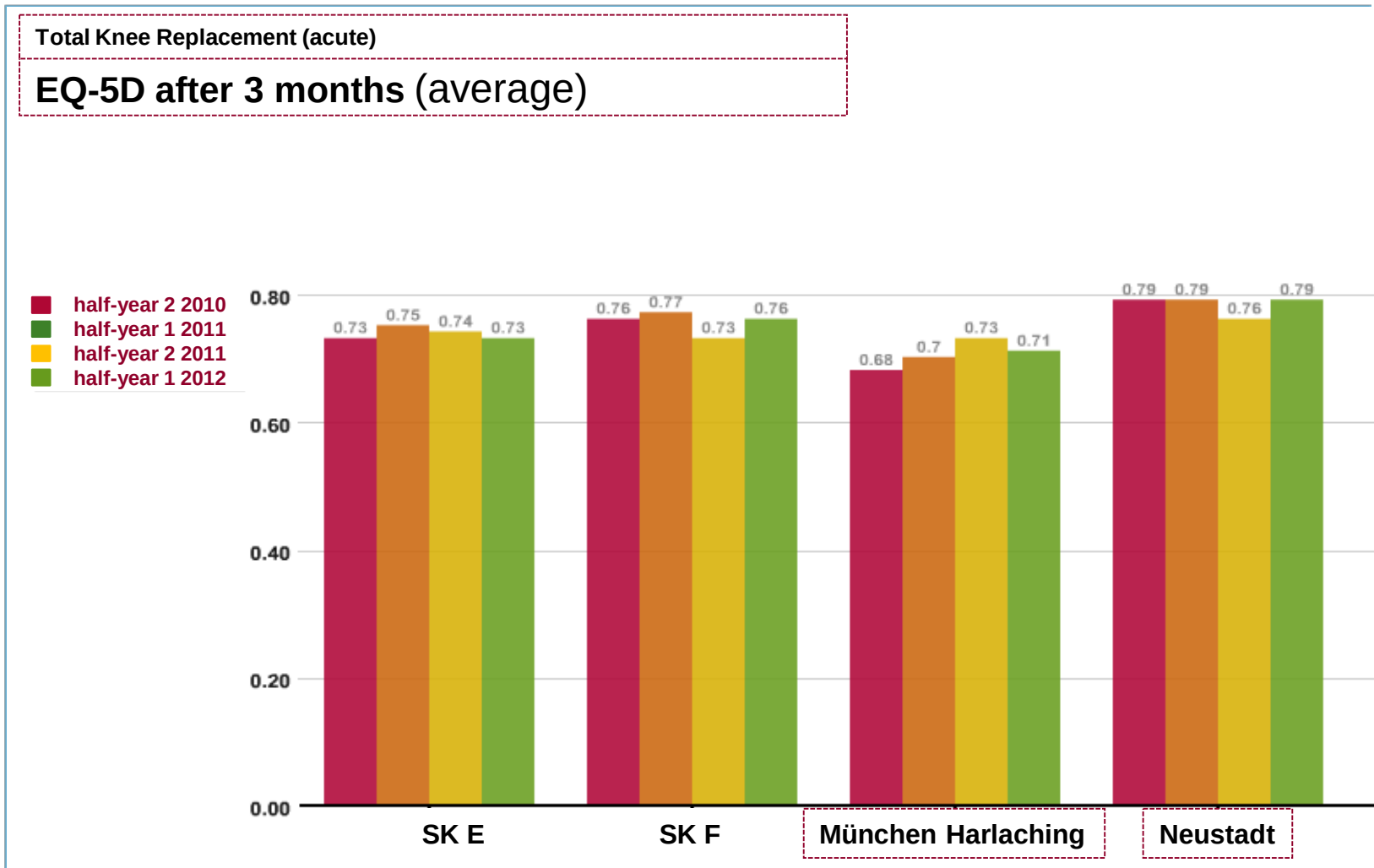
H A R V A R D | B U S I N E S S | S C H O O L

Time-Driven Activity-Based Costing in Health Care

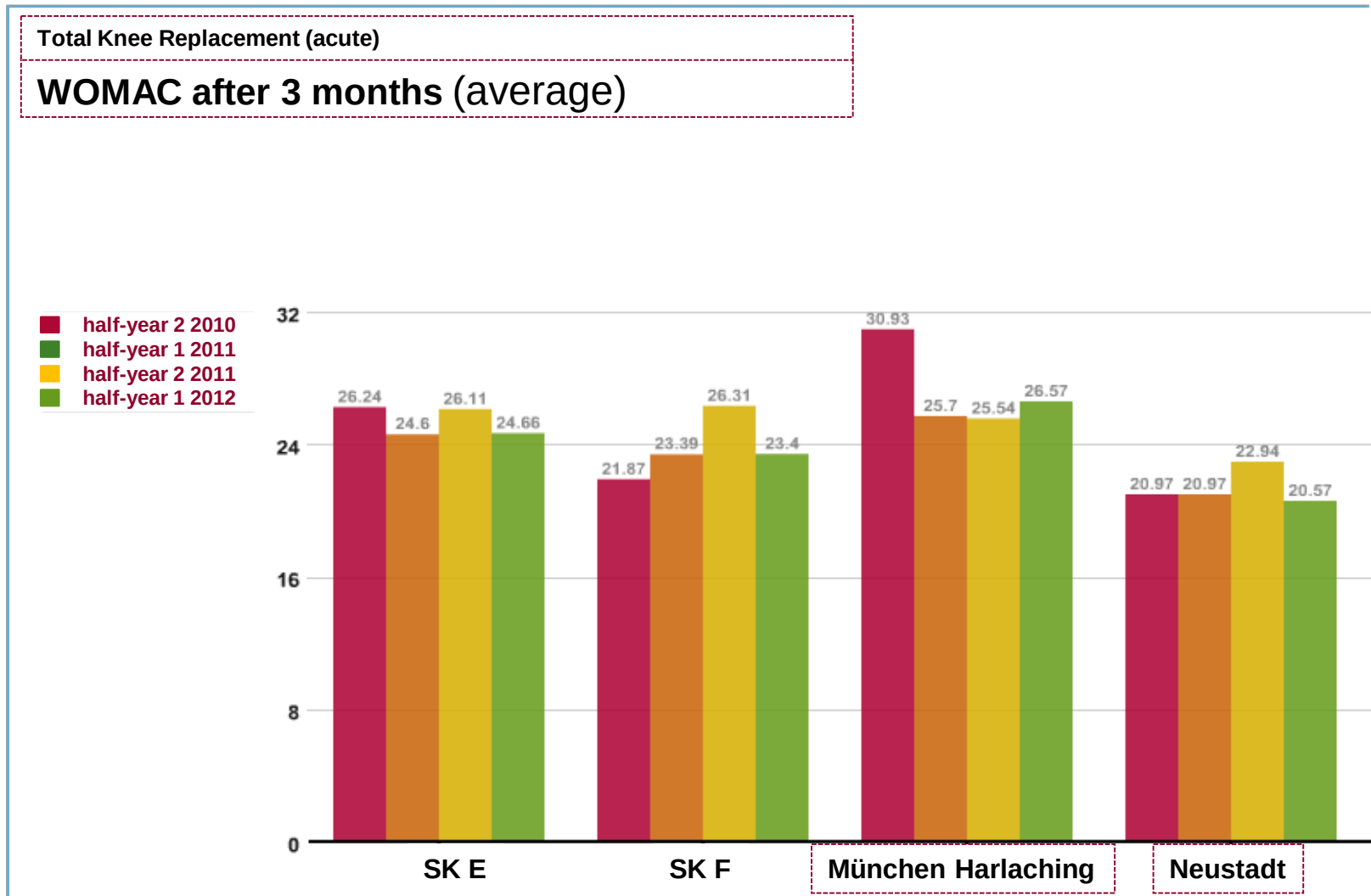
Strategy in Health Care Delivery, January 2020

Professor Robert S. (Bob) Kaplan

Outcome measurement EQ-5D (quality of life): Neustadt with significant higher level than the other Schön hospitals



Outcome measurement WOMAC (functionality): Neustadt again with significant better results

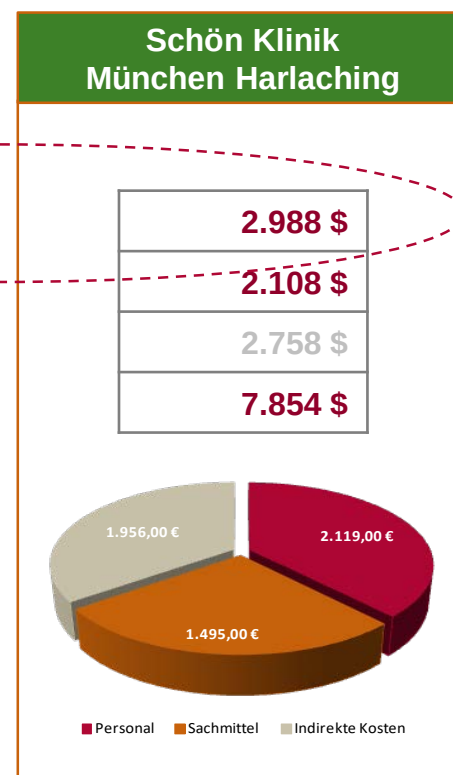
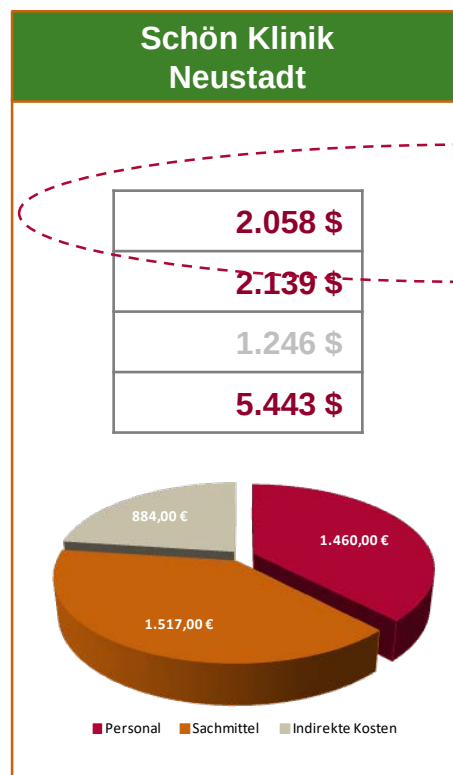


And Schön Klinik Neustadt spends considerable less resources than Schön Klinik München Harlaching

(direct costs⁽¹⁾)

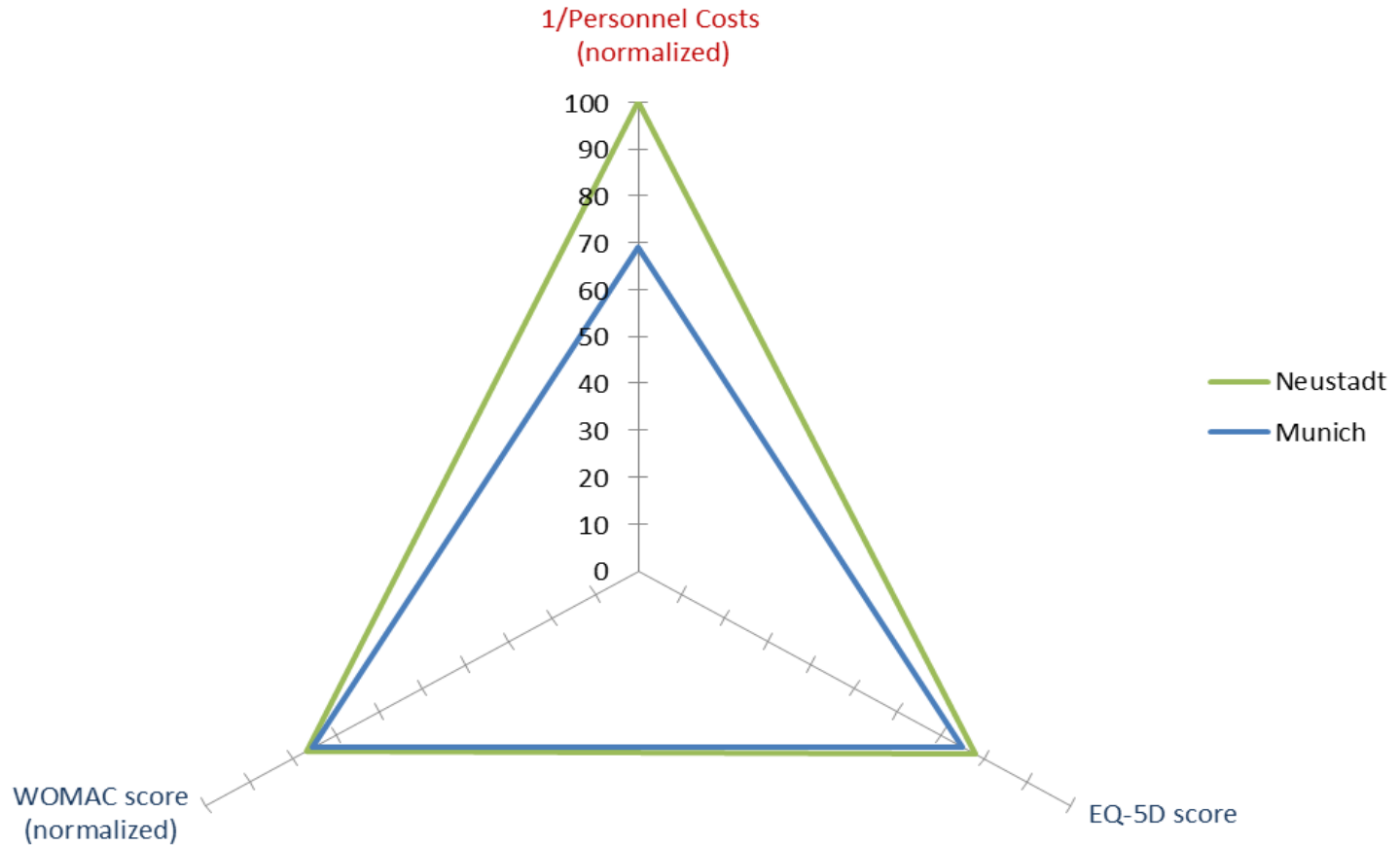
Example 3

TKR acute
Personnel costs
Material costs
Indirect costs
Sum



⁽¹⁾ numbers disguised

Total Knee Replacements at Schön Klinik: Outcomes and Cost

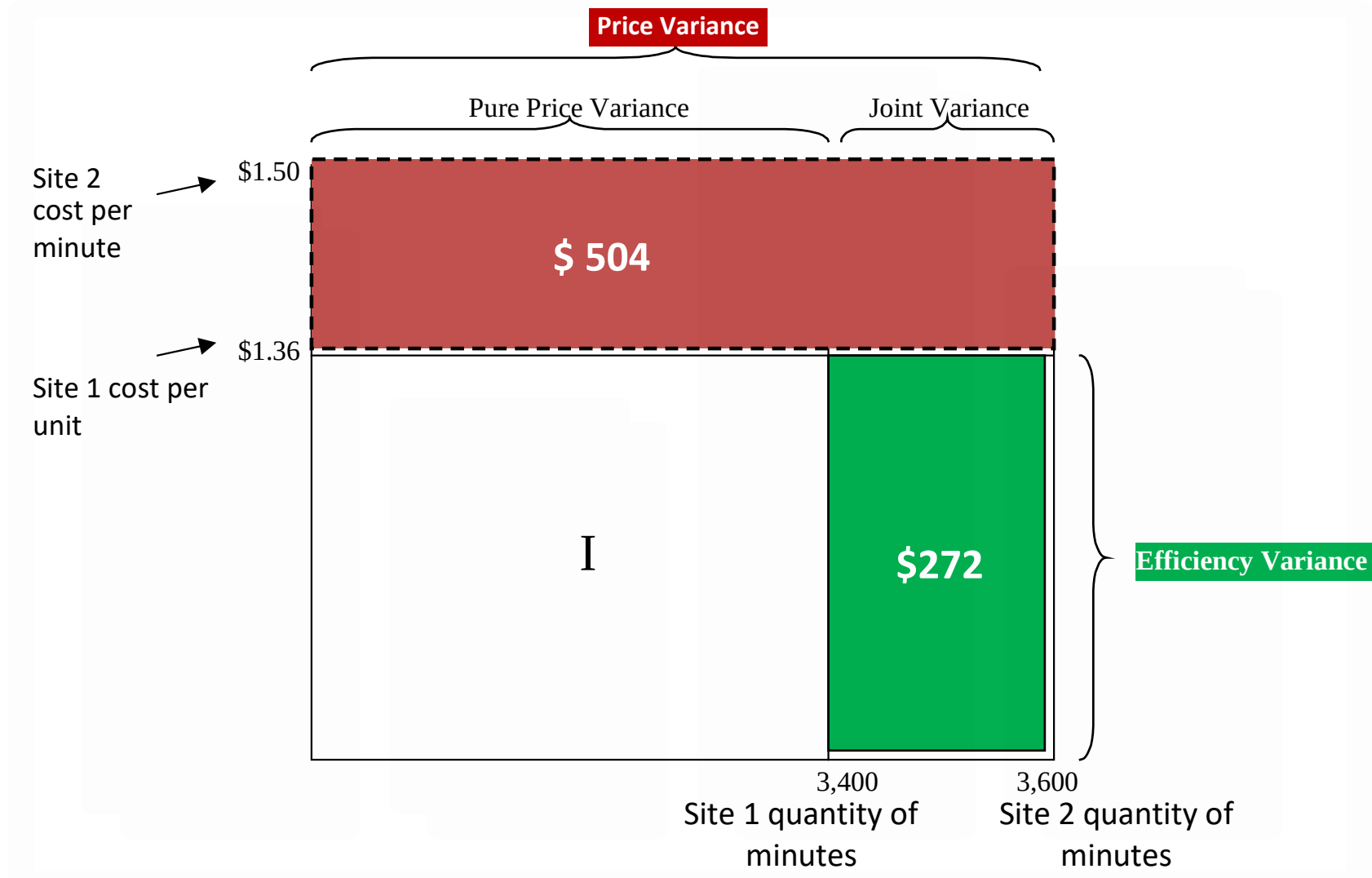


Personnel Time and Cost Variances: Neustadt versus Munich

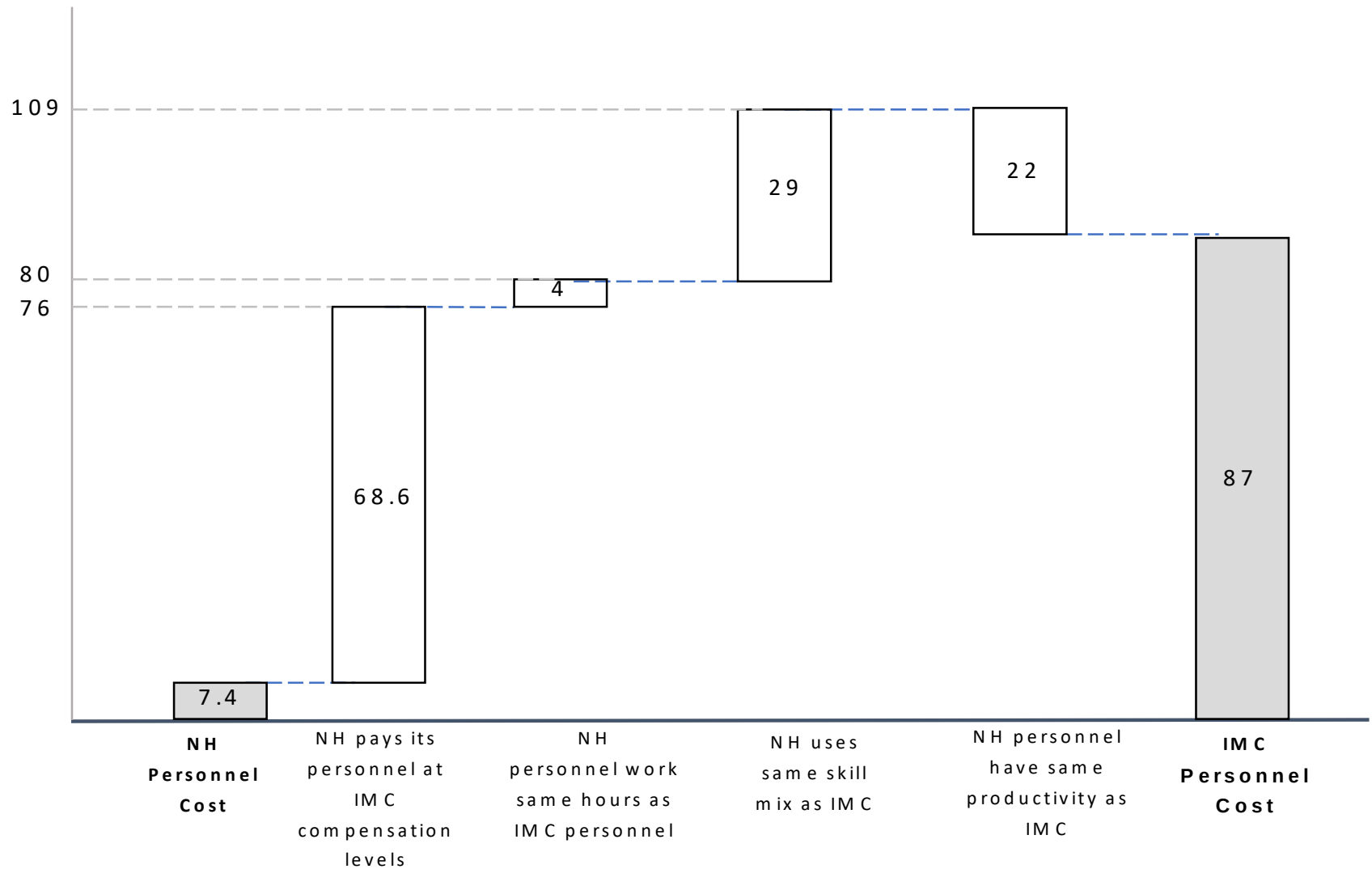
	<u>Neustadt</u>	<u>Munich</u>	<u>Variance</u>
Personnel Costs	€ 2,058	€ 2,988	€ 930. U
Personnel Minutes	1,392	2,043	€ 962.5 U
Average Cost/Minute	€ 1.48	€ 1.46	€ 32.5 F

The 45% cost difference (unfavorable cost variance of €930) is caused by the unfavorable personnel productivity variance at Munich.

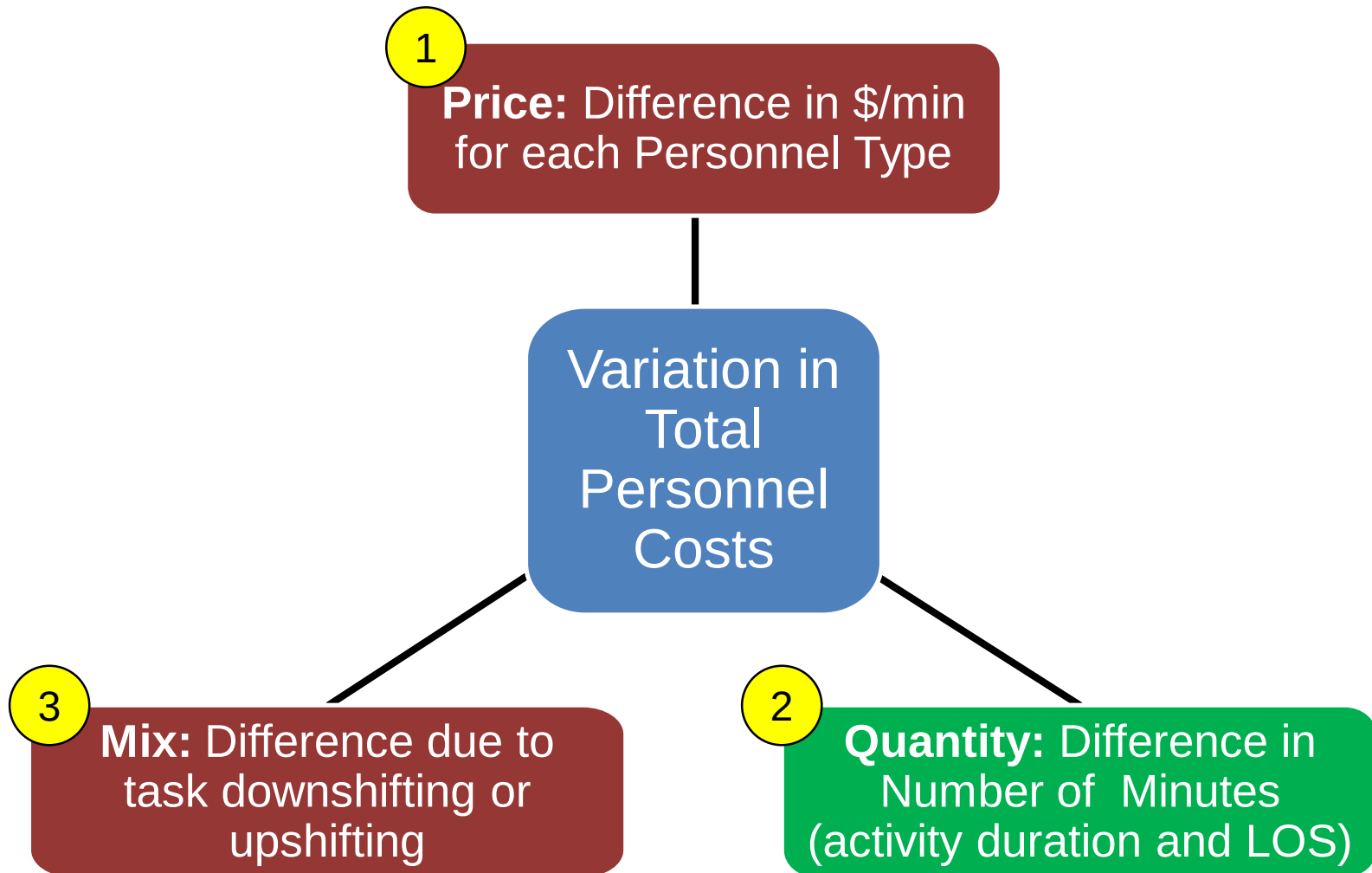
We can view the variance analysis graphically



Comparing the Personnel Costs for CABG



Benefits from Variance Analysis



Measuring Costs: We must overcome several health care costing problems.

1: Confusion of Costs with Prices (Charges)

- o Currently, provider expenses are allocated to patient care based on **charges** or “relative value units”—neither of which is a good surrogate for the actual costs incurred
- o Costs are not assigned to unbilled or unreimbursed processes and procedures

2: Wrong Unit of Analysis for Measuring Costs

- o Currently, costs are measured for organizational units, clinicians, or individual procedures and events, not for the full cycle of care to treat a patient’s medical condition.

3: Economists, administrators, and policy makers believe many health care costs are “fixed”

- o We wish! If health care costs were fixed, we wouldn’t have a health care cost crisis.

Time-Driven Activity-Based Costing (TDABC)

1

Determine
the Care
Process

- **What activities** are performed over the care cycle for a medical condition?
- **Who performs** each activity?
- **How long** does each activity take?

2

Calculate
Cost Rates

- **What is the cost per unit of time** for each type of personnel?

3

Account for
Consumables

- **What materials, supplies, and drugs** are consumed during the care cycle?

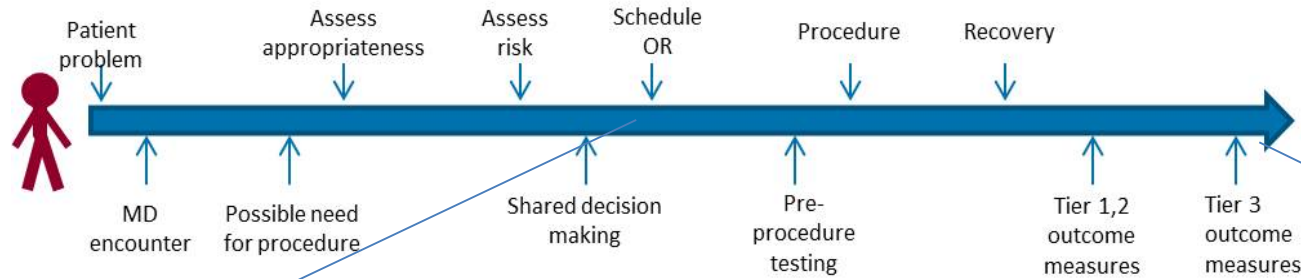
4

Allocate
Indirect Costs

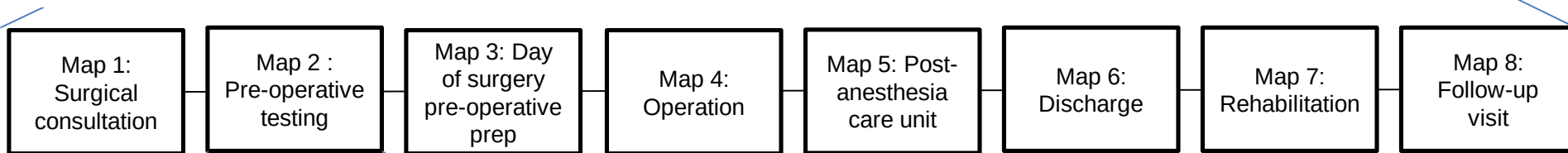
- **What are the drivers that determine the workload** for each indirect department/area?

TDABC Step 1: Develop process maps for the care cycle

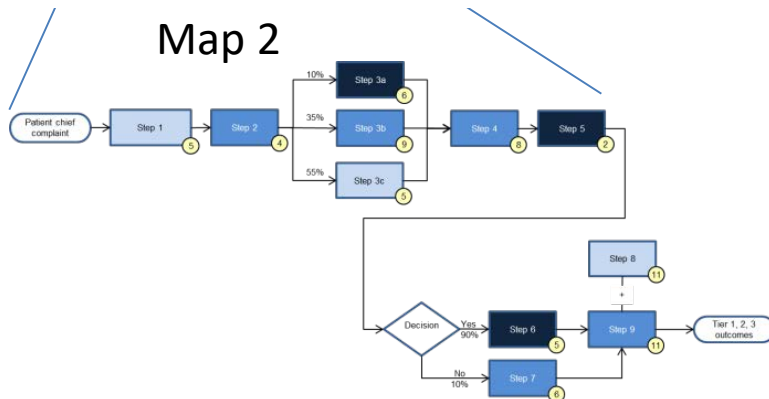
Level 1: Overall care cycle



Level 2: Study care cycle



Level 3: Process maps



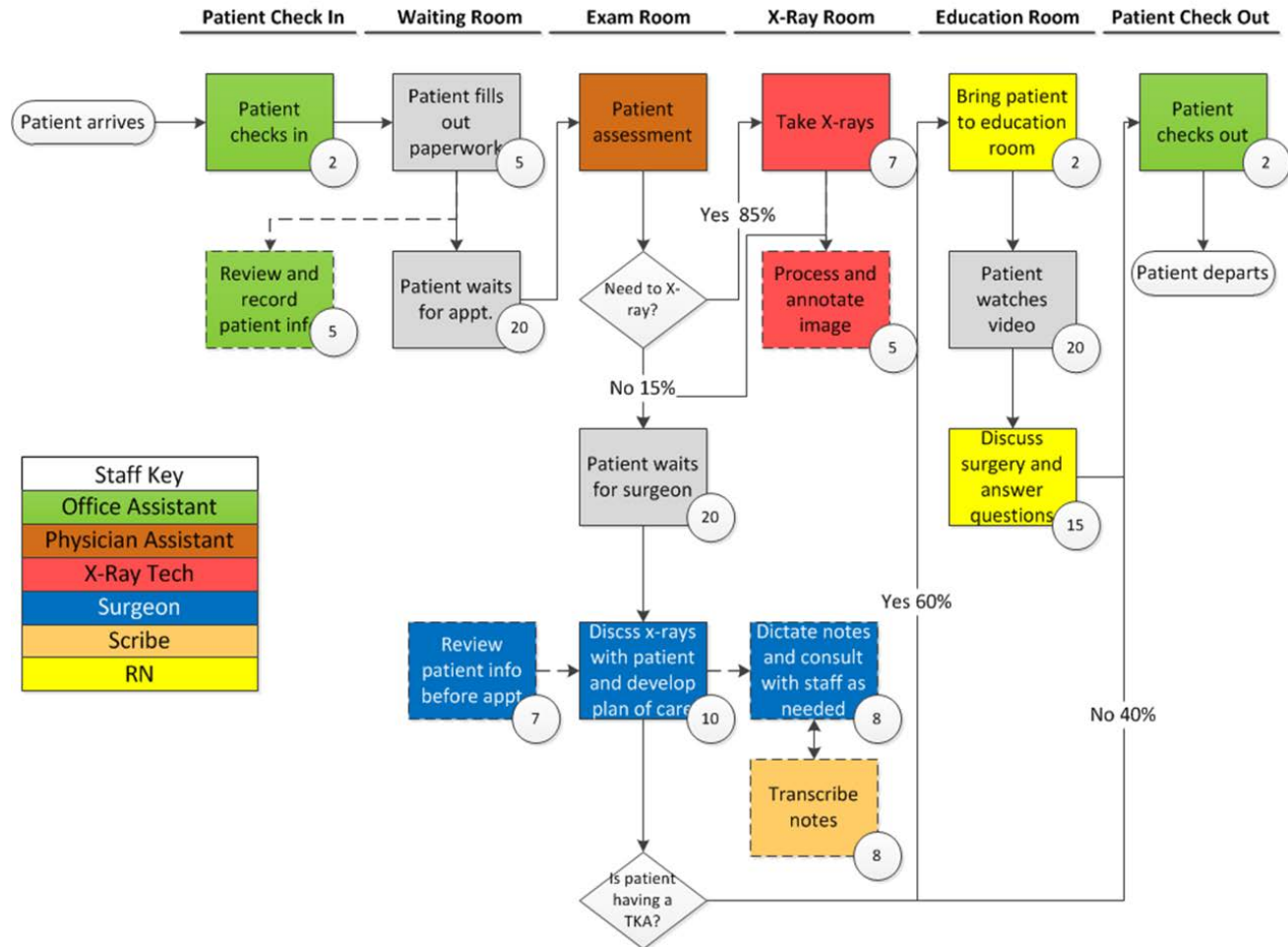
A Process Map for a Pre-Surgical Office Visit

- **Process-Steps:** All the administrative and clinical process-steps used over a patient's complete cycle of care for a medical condition

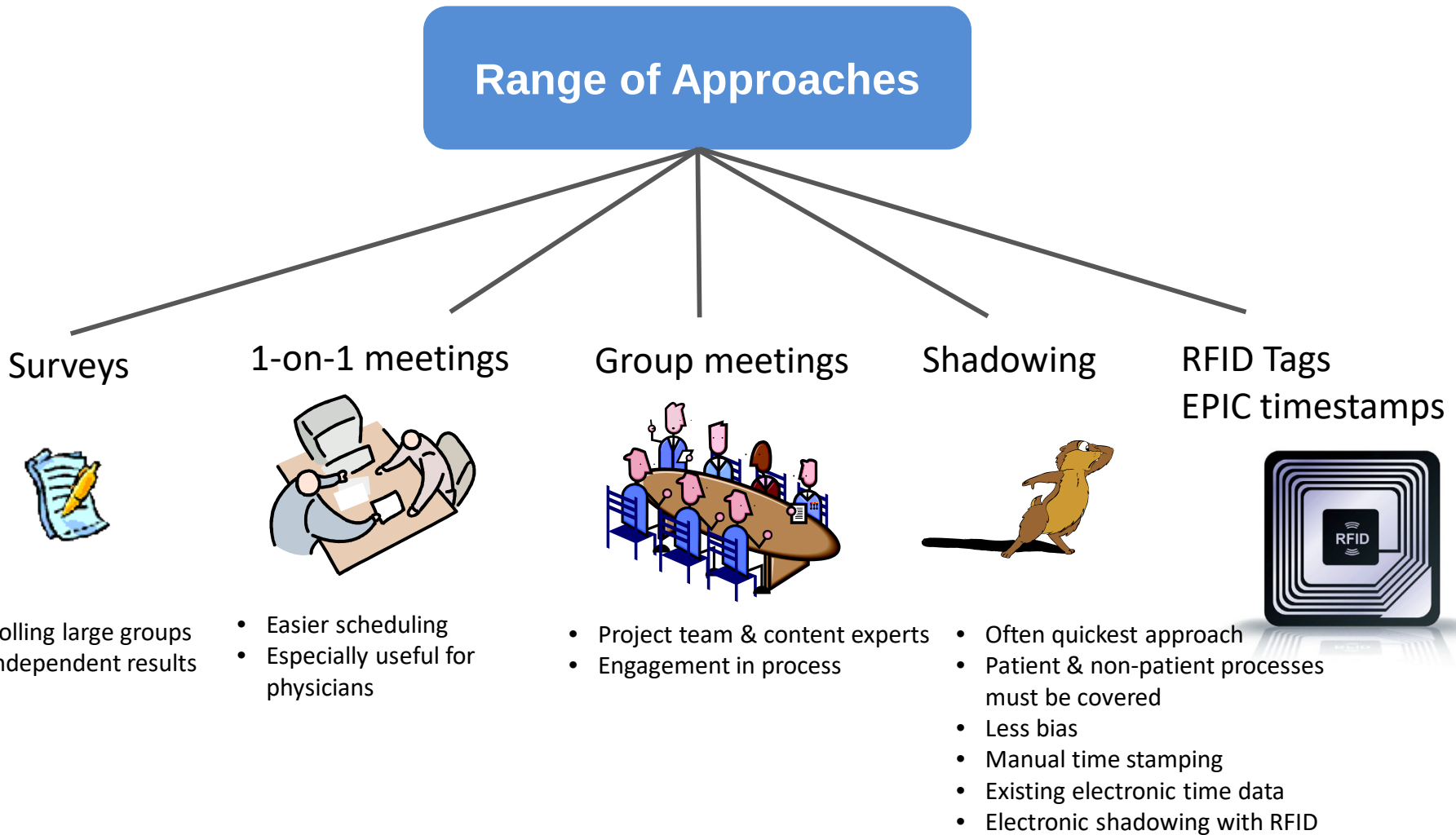
- **Resources:** Personnel, equipment, consumable medicines and supplies – used at each process step

Staff Key
Office Assistant
Physician Assistant
X-Ray Tech
Surgeon
Scribe
RN

- **Time Estimates:** The personnel and equipment time used at each process step for that patient



Developing a Process Map



Communicating about TDABC to clinicians

- The goal of the project is to better understand all of the personnel time and resources that we use today to care for a patient with a particular medical condition
- You will not be evaluated at all based on the answers that you provide (may need to say this 7 times 7 different ways)
- We are simply looking for your estimates and best guesses—it is ok if you do not know a number exactly
- While we are primarily trying to gain a better understanding of all of the work and resources that are currently involved in the care cycle, we would love to hear your ideas and suggestions for how we could be providing care more efficiently and effectively

TDABC Step 2: Calculate the Capacity Cost Rate for each type of personnel and resource

- Costs: All the costs (salary, fringe benefits, occupancy, support resources) associated with having that person (or piece of equipment) available to treat patients
- Capacity: The capacity (time) that each resource (personnel, equipment) has available for treating and caring for patients
 - Number of days person shows up, available for clinical work
...multiplied by...
 - Number of minutes available per day for patient-related work (net of breaks, meetings, training, education, etc.)
- Capacity Cost Rate (\$/minute) = Resource Cost/ Resource Capacity

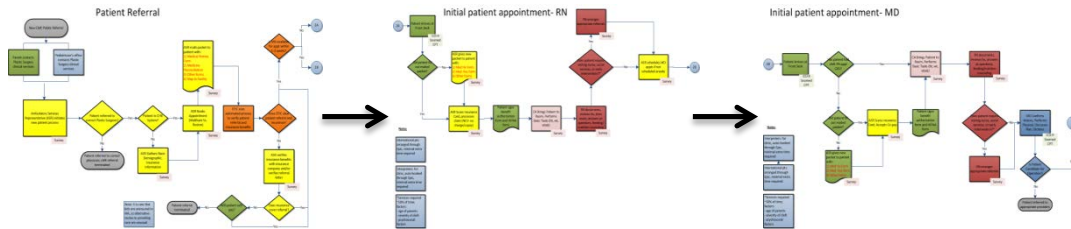
Calculate the Capacity Cost Rates (CCR)

Data are illustrative

	Surgeon	Physician Assistant	RN	X-Ray Tech	Scribe	Office Assistant
Total Clinical Costs	\$546,400	\$120,000	\$100,000	\$64,000	\$51,000	\$61,000
Personnel Capacity (minutes)	91,086	89,086	89,086	89,086	89,086	89,086
Personnel Capacity Cost Rate	\$6.00	\$1.35	\$1.12	\$0.72	\$0.57	\$0.68

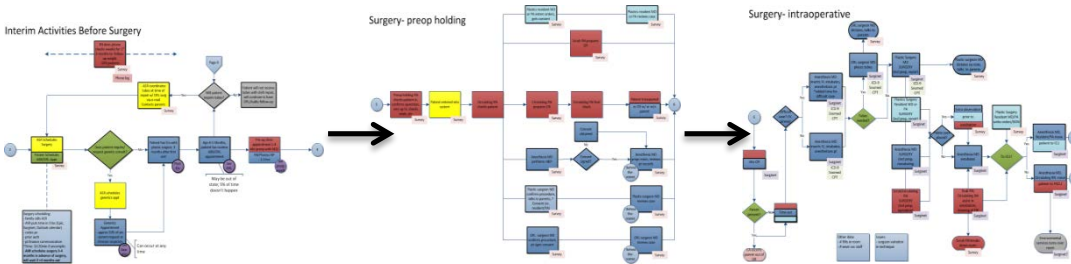
Compute total patient care costs by multiplying resource capacity cost rate by process times & summing across each patient's cycle of care

Initial consultation



	Minutes	Cost/ minute	*Total
MD	X_1	Y_1	136.13
RN	X_2	Y_2	68.04
CA	X_3	Y_3	6.17
ASR	X_4	Y_4	15.74
			\$266.08

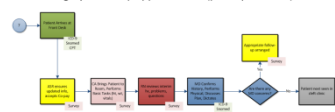
Surgical procedure



MD	X_1	Y_1	584.99
Anes.	X_2	Y_2	603.89
RN	X_3	Y_3	136.29
Tech	X_4	Y_4	97.82
OR	X_5	Y_5	329.16
			\$1752.15

Follow-up or post-operative visit

Plastics surgery follow-up appointments (post-op or other)



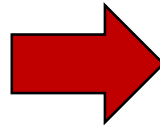
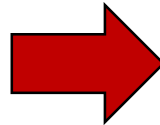
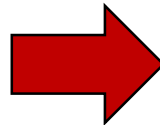
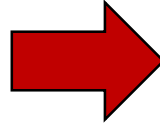
MD	X_1	Y_1	55.19
RN	X_2	Y_2	13.61
CA	X_3	Y_3	3.09
ASR	X_4	Y_4	1.77
			\$73.66

Source: Meg Abbott, MD & John Meara, MD Boston Children's Hospital

Advancing the TDABC toolkit

TDABC 1.0

- Estimates and observations
- Conducting measurement at one point in time
- Examining average patient
- Developing process maps from scratch



TDABC 2.0

- Time stamp data
- Analysis refreshed monthly with new data
- Examining patient and physician level variation
- Utilizing process map templates in software

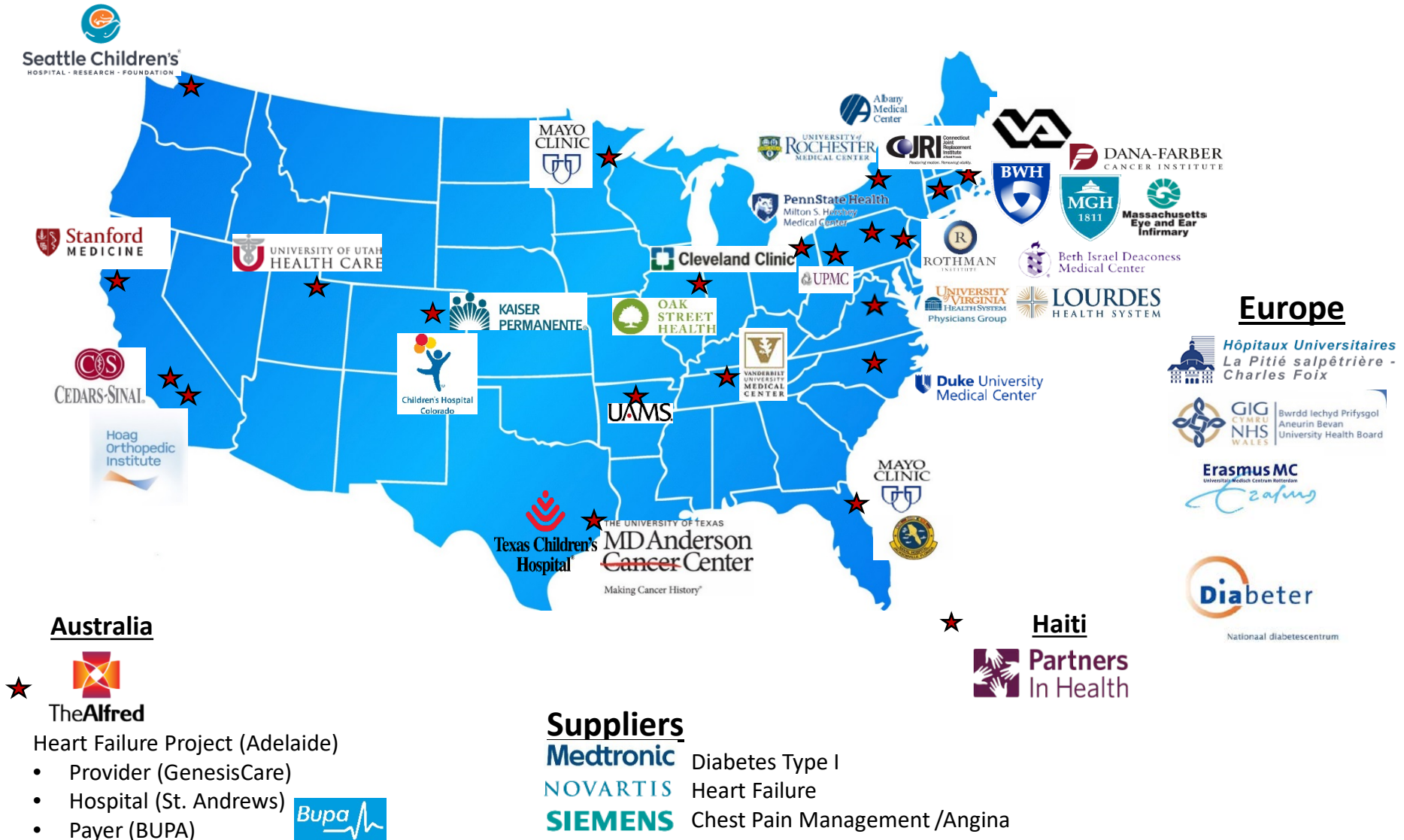
How does TDABC help providers manage their costs

Process Improvement and Redesign



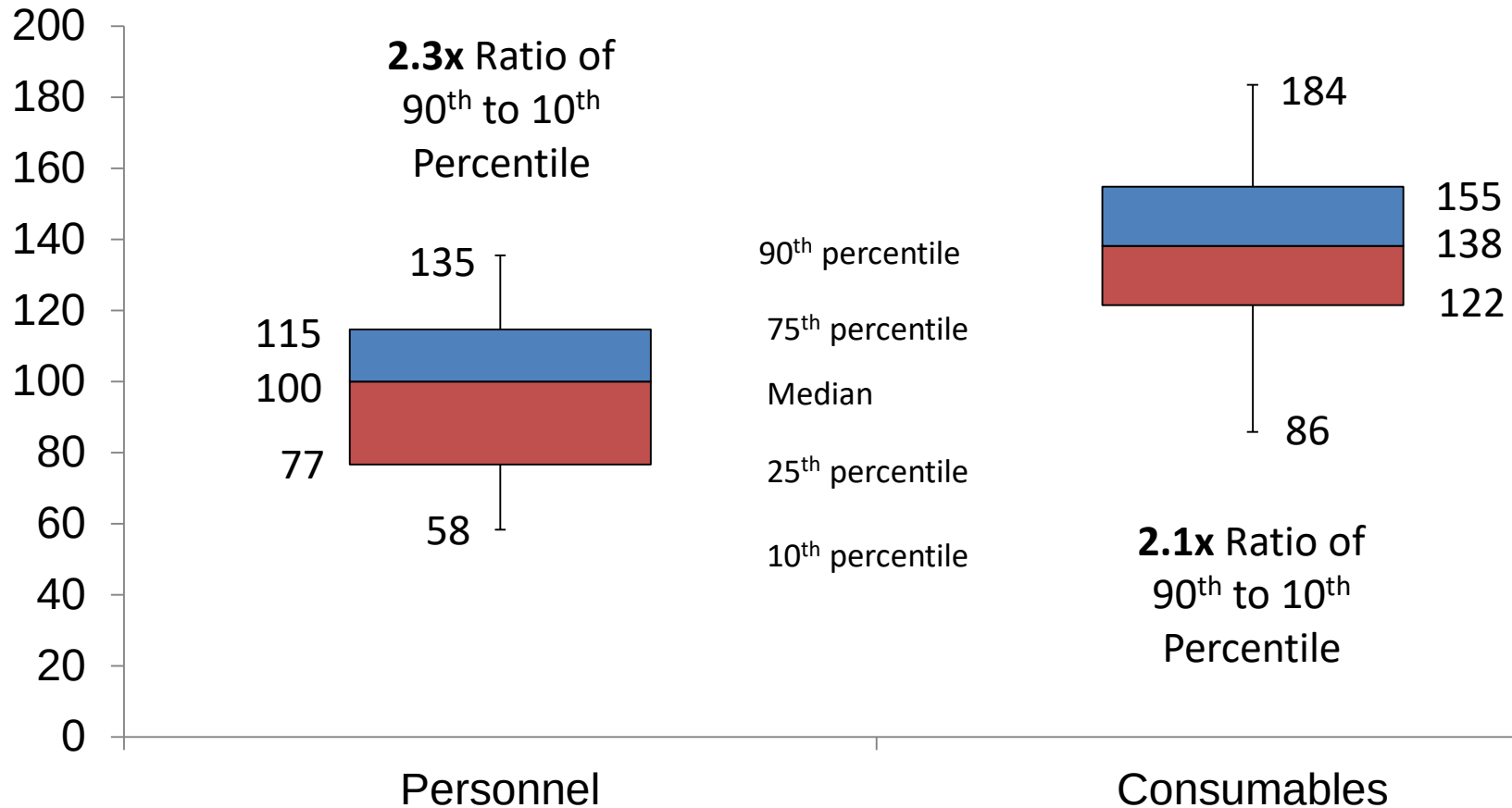
- **Eliminate** process steps and variations that **do not** contribute to improved patient outcomes
- **Redesign** processes to **reduce waste and idle time**
- **Optimize** processes and interventions over a **complete cycle of care**
- All clinicians work at the “top-of-their license”
- Understand costs over the full care cycle to prepare for **bundled payment** contracts

TDABC projects supported by HBS team



Joint Replacement Learning Community: Range in total personnel and consumable costs for Total Knee Arthroscopy (TKA)

Indexed TKA Total Personnel and Consumable Costs at U.S. Organizations



N = 27; scope of care is decision for surgery through discharge plus follow-up visits within 90 days

The financial opportunity from using best practices to move to the next bracket.

Total Personnel and Consumable Costs

	Percentage Savings	
<u>Improvement</u>	<u>TKA</u>	<u>THA</u>
90th to 75th	15%	14%
75th to 50th	8%	16%
50th to 25th	13%	13%
25th to 10th	12%	12%

Moving to next bracket produces an annual savings of > \$1 million for an organization performing 800 TJRs

Examples of Current and Recent Projects

- Opioid Use Disorders at MGH Bridge Clinic, and Century Health in Hancock County, Ohio for integrated care, using MAT and behavioral and social services interventions
- Veterans Administration Tennessee region; Behavioral Health Interdisciplinary Program (BHIP). Goal to reduce suicide-related patient events by 28% with simultaneous reduction in costs by up to 16%.
- Comparing ECMO outcomes and costs at three centers, Cedars-Sinai (Los Angeles), Paris, and Melbourne
- Cost of an IPU for Pediatric Aerodigestive Disorders (co-locate ENT, G/I, Pulmonologist and Speech and Swallow)
- Suppliers (Medtronic, Siemens Healthineers) to estimate improvements in patient outcomes and costs from use of their products/services



Two of our students studied the cost of TB Care in Zimbabwe

“We worked with The Global Fund to Fight AIDS, Tuberculosis, and Malaria (the Global Fund) and Ministry of Health and Child Care in Zimbabwe to pilot the concept of TDABC to estimate time and costs associated with diagnosis and treatment for TB patients and assess the applicability of this approach to low-resource settings.”



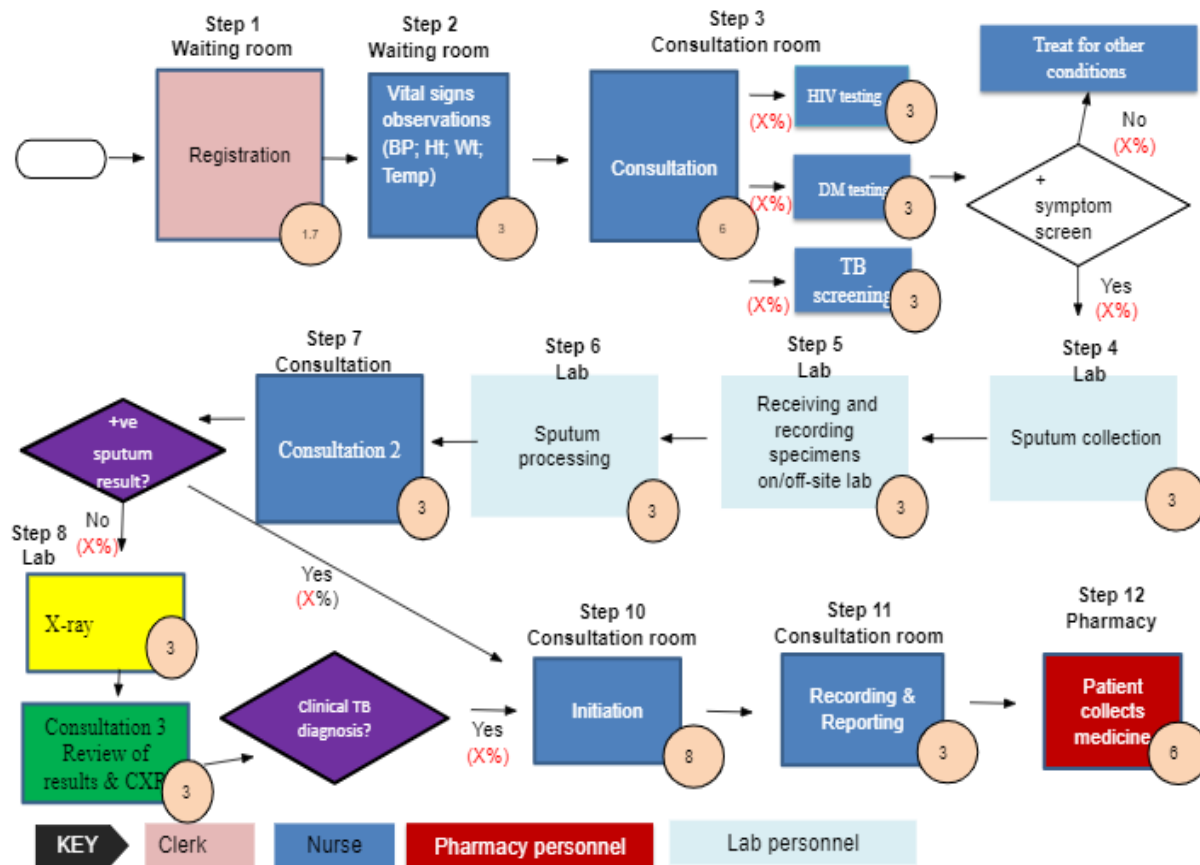
Bodnar, Katharine
MBA/MPA 2019



Desai, Prathna
MBA/MPA 2019



Process map for diagnosis of potential TB patient

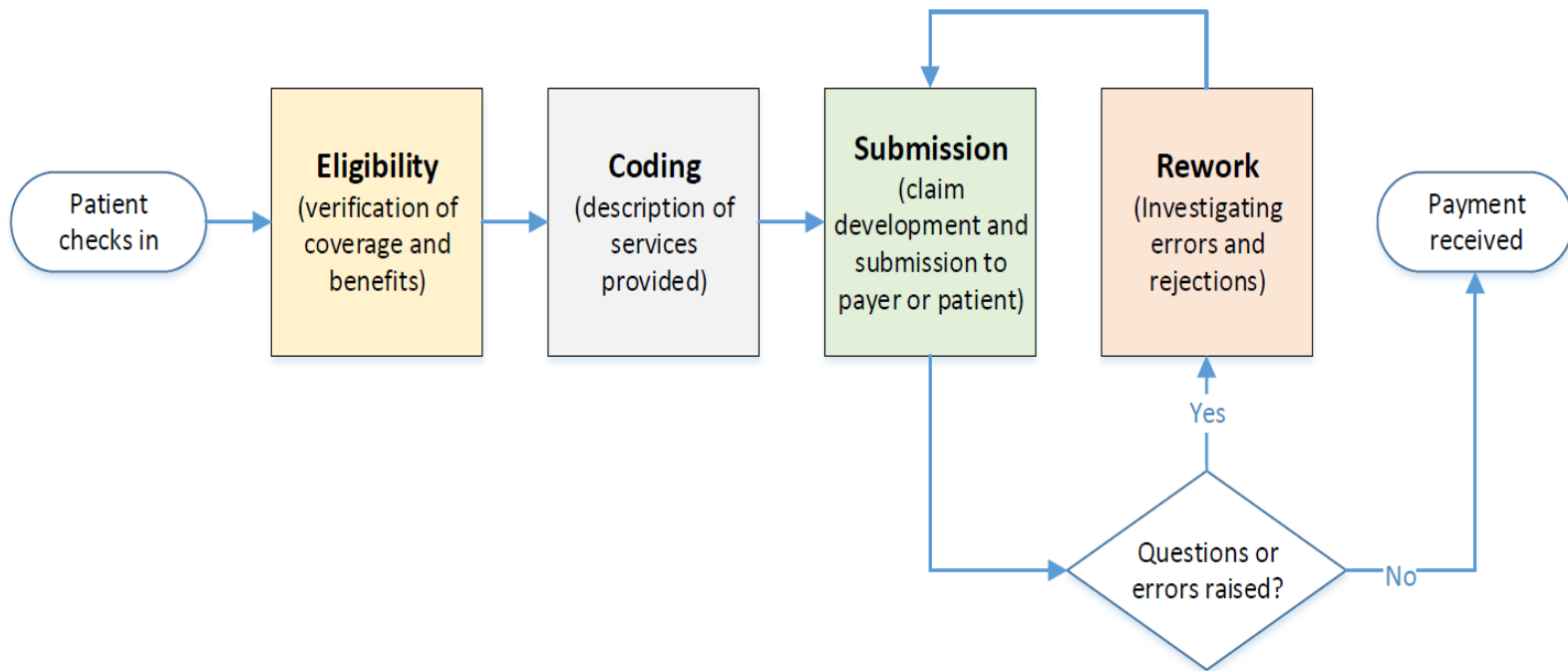


3

Applying TDABC to the Billing Process

Simplified Billing Process Map - Illustration

Most hospital billing processes involve four categories of tasks – eligibility, coding, submission, and rework



Estimated Billing and Insurance-Related Administrative Costs

Encounter	Pre- and Intra-Encounter Costs, \$		Post-Encounter Costs, \$		Process Time, min	Overhead, \$	Total Cost, \$
	Registration	Physician Time	Professional Billing	Hospital Billing			
Primary care visit	3.82	6.26	4.22	—	13	6.10	20.39
Emergency department visit ^a	5.58	10.97	11.72	13.70	32	19.57	61.54
Ambulatory surgery	16.48	51.20	45.55	17.44	75	39.72	170.40
Inpatient surgery	16.48	51.20	45.55	44.43	100	57.43	215.10
General inpatient stay	16.48	13.29 ^b	4.22 ^b	44.43	73	45.84	124.26

Source: Tseng, Kaplan, Richman, Shah, and Schulman, “Administrative Costs Associated with Physician Billing and Insurance-Related Activities at an Academic Health Care System,” *JAMA* (February 20, 2018).

Currently, we are extending this billing cost study to hospitals in Australia, Singapore, Germany, Ireland, UK, Netherlands, and Canada

T.H.R.I.V.E.

*Transforming Healthcare Results by
Investing in Value & Excellence*



**HARVARD
BUSINESS SCHOOL**

Institute for Strategy &
Competitiveness

*A collaborative to promote solutions
for value-based healthcare*

Project Overview



Project Description

Implement comparable outcome and cost measurement sets in select conditions at leading providers throughout the U.S. and create risk adjusted benchmarks to generate systems improvement and reward high value providers.

Conditions

- 3 Surgical Conditions
 - Colon Cancer
 - Breast Cancer
 - Morbid Obesity
- Full cycle of care (including key surgical, medical, behavioral and social elements of care)

Sites

- 10-15 Sites per condition
- Leading Centers of Excellence across the U.S.

Measurement

- Measure outcomes and cost at the condition level
- Create playbook for implementation
- Develop scalable approach for risk adjusted benchmarking and systems improvement
- Inform value-based payments



AMERICAN COLLEGE OF SURGEONS
*Inspiring Quality:
Highest Standards, Better Outcomes*



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Competitiveness

Elements of the ideal partner organization

Strong Leadership Support

- Senior leadership is committed to improving the value of care that it delivers and to pursuing value-based payment mechanisms
- Finance organization recognizes the potential benefits from adopting TDABC for measuring costs over a complete care cycle
- Clinical leader excited to understand cost drivers and explore performance improvement opportunities

Exceptional Project Team

- Project leader, respected by both Finance and clinicians; strong project management skills are essential; basic familiarity with medical condition
- Financial analyst who has ability to access necessary data
- Clinical operations/ performance improvement person familiar with the medical condition
- Physician adviser

Alignment of Goals

Partner organization

- willing to act on TDABC information to reduce costs, improve outcomes, redesign processes, and introduce value-based (bundled) payments.
- excited to collaborate with HBS to achieve its clinical and management objectives
- interested in collaborating with HBS to produce publications and cases

Publications with HBS team on applying TDABC in Practice: 2014-present

"How **Cleveland Clinic** Used TDABC to Improve Value" HFM (June 2014)

"Using Time-Driven Activity-Based Costing to Identify Value-Improvement Opportunities in Health Care," *Journal of Healthcare Management* 59:6 (2014): 399-413

"The **Mayo Clinic Model** for Running a Value-Improvement Program." <https://hbr.org/2015/10/the-mayo-clinic-model-for-running-a-value-improvement-program>

"Health Care Providers Need a **Value Management Office**" <https://hbr.org/2015/12/health-care-providers-need-a-value-management-office>

"Time-driven activity-based costing: a driver for provider engagement in costing activities and redesign initiatives" *Neurosurgical Focus* (Nov 2014).

"Time-Driven Activity-Based Costing in **Emergency Medicine**," *The Practice of Emergency Medicine/Concepts*. 2015.

"Time-Driven Activity-Based Costing in **Interventional Radiology**," *Journal of Vascular and Interventional Radiology* (December 2015) **26**:12. 1827-1831.

"Time-driven activity-based costing of multi-vessel **coronary artery bypass grafting** across national boundaries to identify improvement opportunities," *BMJ Open*. 2015

"Defining the Value Framework for **Prostate Brachytherapy** using Patient-Centered Outcome Metrics and Time-Driven Activity-Based Costing" *Brachytherapy* 2016

"Drivers of the Variation in Prosthetic Implant Purchase Prices for **Total Knee and Total Hip Arthroplasties**" *J Arthroplasty* **Volume 31, Issue 1**, January 2016.

"Variation in the cost of care for **primary total knee arthroplasties**," *Arthroplasty Today* (2016), <http://dx.doi.org/10.1016/j.artd.2016.08.001>

"Time-Driven Activity-Based Costing of a **Post-acute Care Transitions** Program in a Primary Care Practice," *HFM Magazine* (July 2016).

"Communicating Value in Healthcare using **Radar Charts**: A Case Study of **Prostate Cancer**," *Journal of Oncology Practice* (September 2016).

"Time-driven activity-based costing to identify opportunities for cost reduction in **pediatric appendectomy**," *Journal of Pediatric Surgery* 51 (2016) 1962-1966.

"Time-driven activity-based costing for **surgical episodes**," *JAMA Surgery* (online November 2, 2016)

"Dissecting Costs of **CT Study**: Application of TDABC in a Tertiary Academic Center," *Academic Radiology*. 24:2 (February 2017). 200-208.

"Time-Driven Activity-Based Costing to Estimate Cost of Care at Multidisciplinary **Aerodigestive Centers**," *The Laryngoscope* (21 June 2017)

"Activity-based costing of **health-care delivery, Haiti**," *WHO Bulletin* (2018)

"**ECMO** Appropriateness - an Interdisciplinary Consensus Based Approach," *Anesthesia and Analgesia* (2017).

"Financial Analysis of **Pediatric Resident Physician Primary Care** Longitudinal Outpatient Experience," *Academic Pediatrics* (2018).

"Defining, measuring and improving value in **spine care**," *Seminars in Spine Surgery* (June 2018) **30**(2): 80-83.

"TDABC Cost Analysis of Ocular Disorders in an **Ophthalmology Emergency Department** versus Urgent Care: Clinical Experience at Massachusetts Eye and Ear," *Journal of Academic Ophthalmology* (2018; 10:e55-e60).

"Hospital Budget Systems are Holding Back Innovation," *HBR Insight Center* (March 29, 2018).

"Administrative Costs Associated with **Physician Billing and Insurance-Related Activities** at an Academic Health Care System," *JAMA* (February 20, 2018).

"Lessons from Mayo Clinic's Redesign of **Stroke Care**," *HBR Insight Center* (October 2018). <https://hbr.org/2018/10/lessons-from-mayo-clinics-redesign-of-stroke-care>

"Financial Analysis of **Pediatric Resident Physician Primary Care** Longitudinal Outpatient Experience," *Academic Pediatrics* (2018). <https://doi.org/10.1016/j.acap.2018.05.001>

"Defining, measuring and improving value in **spine care**," *Seminars in Spine Surgery* (June 2018) **30**(2): 80-83.

"TDABC Cost Analysis of Ocular Disorders in an **Ophthalmology Emergency Department** : Clinical Experience at MEE," *Journal of Academic Ophthalmology* (2018; 10:e55-e60).

"**Hospital Budget Systems** are Holding Back Innovation," *HBR Insight Center* (March 29, 2018)

"**Navy Medicine** Introduces Value-Based Health Care," *Health Affairs* (August 2019) 38:8

"Evaluation of Economic and Clinical Outcomes Under Centers for Medicare & Medicaid Services **Mandatory Bundled Payments for Joint Replacements**." *JAMA Internal Medicine* June 2019,

"A Time-Driven Activity-Based Costing Analysis of **Emergency Department Scribes**," *Mayo Clinic Proceedings: Innovations, Quality & Outcomes* (3:1) March 2019: 30-34.

"Time-Driven Activity-Based Cost Analysis for **Outpatient Anticoagulation Therapy**: Direct Costs in a Primary Care Setting," *Journal of Medical Economics*. 2019.

"Achieving Value in Highly Complex Acute Care: Lessons from the Delivery of **Extra Corporeal Life Support**," *NEJM Catalyst* (October 2019).

"Using Time-Driven Activity-Based Costing to Demonstrate Value in **Perioperative Care**: Recommendations from the Society for Perioperative Assessment and Quality Improvement," *Journal of Medical Systems* (December 2019).

Initial project timeline

- 1-2 months to prepare for project
 - Set objectives, scope, and timeline; ensure relevant parties bought in
 - Staff project team
- 3-4 months to execute on project
 - Aim for about 1 week per process that is being mapped
 - Schedule midpoint and final meetings in advance

Charter Template for a TDABC Project

Project Name:	(please use italics for responses)
Description	What is the overview of the project?
Medical Condition	Unit of analysis is a medical condition (or an indirect department)
Problem Statement	What is the opportunity?
Outcomes	How will outcomes be maintained or improved as we change the process?
Reference Point	Comparing multiple sites or different treatment pathways helps create case for change. .
Care Cycle Scope	Which treatments, and how much of the care cycle for each is within scope? .
Scope of Types of Costs	Which types of costs are in scope? Personnel costs are typically larger than consumables costs, which are typically larger than facility costs.
Level of Detail	The level of detail depends on the problem you are solving. The primary choice is between the process (higher) level of detail and activity (lower) level of detail..
Implementation	What are the actionable steps? How will it be implemented? <i>Form project team in XX/XXXX; conduct data collection and analysis XXXX-XXXX. Implement TDABC approach in XXXX</i>
Publication	What is being published? Where is it being presented?
Project Leadership and Team	
Executive Sponsor	
Steering Committee	
Project Manager/Leader	
Physician Lead	
Finance Analyst	
Process Mapper/Process Engineer/Value Engineer	
Additional Team Members	

Questions

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