THE PERIOPERATIVE SURGICAL HOME: WHY EVERYONE WINS

Thomas R. Vetter, MD, MPH
Maurice S. Albin Professor of Anesthesiology and Perioperative Medicine
Professor of Gerontology, Geriatrics and Palliative Care
Professor of Pediatrics
Professor of Health Care Organization and Policy
University of Alabama at Birmingham

MY PRESENTATION OBJECTIVES

➢ Describe the details of a prototypic Perioperative Surgical Home model
➢ Foster the conversation about the various topics central to the rationale, implementation, and validation of a Perioperative Surgical Home model

My Conflicts of Interest: I have nothing to disclose.

WHAT IS VALUE IN HEALTH CARE?
HEALTH CARE VALUE EQUATION

VALUE = QUALITY + SAFETY + SATISFACTION

$ TOTAL COSTS OF CARE

“Burning Platform” of Changing Reimbursement Models

Goal of the Department of Health and Human Services is to increase the proportion of federal payments related to value to 30% by the end of 2016 and to 50% by the end of 2018


Vetter TR, Jones KA: Perioperative Surgical Home: Perspective II. In Value-Based Care, Anesthesiology Clinics (Fleisher LA, Guest Editor) 2015 [In press].
THE DRIVERS OF VALUE-BASED HEALTHCARE

MEDICARE ACCESS AND CHIP REAUTHORIZATION ACT OF 2015 (MACRA)
• Eliminated the Sustainable Growth Rate (SGR) formula
• Consolidates and expands pay-for-performance (P4P) incentives within the fee-for-service system, creating the new Merit-Based Incentive Payment System (MIPS) that combines the current:
  – Physician Quality Reporting System (PQRS)
  – Value-Based Modifier (VBM)
  – Electronic Health Record (EHR) Meaningful Use (MU)
• Applies to physicians, nurse practitioners, clinical nurse specialists, physician assistants, and certified registered nurse anesthetists

MERIT-BASED INCENTIVE PAYMENT SYSTEM (MIPS) FEE-FOR-SERVICE ADJUSTMENTS
• Adjusts Medicare payments based on performance on a single budget-neutral payment beginning in 2019
• Losers ➔ Negative Adjustments to Payments
  – 2019: Up to – 4%
  – 2020: Up to – 5%
  – 2021: Up to – 7%
  – 2022: Up to – 9%
• Winners ➔ Positive Adjustments to Payments
  – 2019: Up to + 12%
  – 2020: Up to + 15%
  – 2021: Up to + 21%
  – 2022: Up to + 27%
THE IOM’S CEO CHECKLIST FOR HIGH-VALUE HEALTH CARE: 5 SELECTED ITEMS

• Infrastructure Fundamentals
  ☑ Information technology best practices: automated, reliable information to and from the point of care
  ☑ Evidence protocols: effective, efficient, and consistent care

• Care Delivery Priorities
  ☑ Integrated care: right care, right setting, right providers, right teamwork
  ☑ Shared decision making: patient–clinician collaboration on care plans
  ☑ Targeted services: tailored community and clinic interventions for resource-intensive patients


INCREASING THE VALUE OF SURGICAL CARE
Perioperative Surgical Home must translate, implement, sustain, and document quality, safety, and satisfaction improvement and cost reduction strategies:

– Decrease practice variability – including unit of service cost for anesthesia services
– Increase practice efficiency – including the maximum use of advanced practice nurses
– Patient risk stratification and mitigation – including open dialogue about futile surgery
– Perioperative optimization of patient co-morbidities – including optimal timing of surgery
– Patient education and counseling – including “What can I do to improve the outcomes that are most important to me?”

Vetter TR, Jones KA. Perioperative Surgical Home: Perspective II. In Value-Based Care, Anesthesiology Clinics 2015 [In press].

ONE DEFINITION OF THE PERIOPERATIVE SURGICAL HOME

➤ Patient-centered, institution-led, interdisciplinary, team-based, coordinated, standardized care model
➤ Guides the patient through the entire surgical continuum, from the decision for surgery to post-hospital discharge care
➤ Seeks to enhance surgical experience and outcomes and to add measurable value to the highest cost segment of healthcare
➤ Multiple effective variants based upon institutional infrastructure, resources, and internal/external forces

IDEALLY, A HIGHLY COLLABORATIVE AND THUS SYMBIOTIC RELATIONSHIP...

Can we all play nice in the sandbox?
Let's hope so...
For everyone's sake.

ROBUST INTEGRATION OF THE ENTIRE PERIOPERATIVE CONTINUUM OF CARE

Three Key Design Elements
1. Strong Patient and Family Centeredness and Shared Decision-Making
2. Robust Team Member Collaboration Across the Continuum
3. Seamless Health Information Exchange and Shared Care Plans

"Perioperative Surgical Home"

Enhanced Recovery after Surgery (ERAS®) Protocols
Perioperative Risk Optimization and Management Planning Tools
Reduce Practice Variation, Optimize Patient Outcomes, Maximize Value
INTEGRATED CARE PATHWAY (ICP)

• ICP = Task-orientated care plan that details all the essential steps or elements in the care of all patients undergoing a specific surgical procedure

• Toyota Production System (TPS) approach to making cars and LEAN Six Sigma methodology are rigorously applied to surgical patient care.

• Collect and analyze data to highlight and address any lack of process standardization and resulting inefficiencies, rework, and waste

EXAMPLES OF INTEGRATED CARE PATHWAYS

Integrated care pathways in use in Britain
- Medical conditions: Acute myocardial infarction, Gastrointestinal surgery, Urological surgery, Deep vein thrombosis, Care of the elderly, Acute admission, Depression in the elderly, Rehabilitation of multiple sclerosis (acute care), Stroke, Transient ischaemic attack, Asthma, Inflammatory bowel disease, Varicose veins, Acute pneumonia, Acute exacerbation of chronic obstructive lung disease

Surgical conditions or procedures: Abdominal hernia surgery, Lower limb joint replacement, Total knee joint replacement, Management of fractured neck of femur, Colorectal surgery, Prostatectomy, Carotid endarterectomy, Laminectomy, Coronary artery bypass graft, Open and laparoscopic cholecystectomy, Transrectal resection of the prostate, Acute mitral valve replacement, Mastectomy, Laparoscopic hernia repair


PERIOPERATIVE RISK OPTIMIZATION AND MANAGEMENT PLANNING TOOL

• Conventional national clinical practice guidelines can have limited local clinician buy-in and adoption

• PROMPT™ → local clinician-designed/driven approach:
  – Accommodates patients’ individual differences
  – Respects and seeks local providers’ clinical acumen
  – Keeps pace with the rapid growth of medical knowledge

• PROMPT™ is not prescriptive “cook-book” medicine but a local best practices-based decision support tool

• Some examples of PROMPTs (55+ in pipeline at UAB):
  – PONV, postoperative delirium; patient-centered blood management; perioperative anticoagulant therapy

In this example, the Integrated Care Pathway (ICP) (e.g., for pancreatectomy) contains 16 specific, standardized elements, and the patient's co-morbidities warrant 3 Perioperative Risk Optimization and Management Planning Tools (PROMPT 1, PROMPT 2, PROMPT 3) (e.g., for preoperative anemia, diabetes mellitus, and postoperative cognitive dysfunction/delirium).

WHAT PROBLEMS ARE WE TRYING TO FIX?

- Incomplete & inconsistent patient preparation for surgery
- Incomplete documentation of patient co-morbidities
- Incomplete & inaccurate medication reconciliation
- Irregular & inefficient patient scheduling and throughput
- Persistent case delays and cancellations
- Continued failure to rescue and never events
- Greater than desired morbidity and mortality
- Higher than desired hospital readmission rates
- Difficulty with compliance with key performance measures
- Lower than desired patient and family satisfaction
- Excessive and variable cost per episode of surgical care

BY THE WAY, DOCTOR... WHAT IS YOUR RISK-ADJUSTED MORTALITY?

- Observed-to-expected (O:E) mortality ratio is an increasingly important health care quality metric.
- Allows quantification/comparison of survival outcomes among different providers/institutions
- Hospital revenue will be directly affected by its risk-adjusted mortality rate.
- As hospital performance data circulate ever more widely to the public, the O:E ratio is quite prominent.

### UHC TOP PERFORMERS (123 MEMBERS)

<table>
<thead>
<tr>
<th>Rank</th>
<th>October 2013 UHC Quality Leadership Awards</th>
<th>October 2014 UHC Quality Leadership Awards</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NYU Langone Medical Center</td>
<td>NYU Langone Medical Center</td>
</tr>
<tr>
<td>2</td>
<td>Emory University Hospital</td>
<td>Mayo Clinic – Rochester</td>
</tr>
<tr>
<td>3</td>
<td>Emory Hospital Midtown</td>
<td>Ohio State University Wexner Medical Center</td>
</tr>
<tr>
<td>4</td>
<td>Mayo Clinic – Rochester</td>
<td>Beaumont Health System, Royal Oak, MI</td>
</tr>
<tr>
<td>5</td>
<td>Rush University Medical Center</td>
<td>Rush University Medical Center</td>
</tr>
<tr>
<td>6</td>
<td>Beaumont Health System, Royal Oak, MI</td>
<td>University of Utah Health Care</td>
</tr>
<tr>
<td>7</td>
<td>Flakchee Allen Health Center, Vermont</td>
<td>Emory University Hospital</td>
</tr>
<tr>
<td>8</td>
<td>Ohio State University Wexner Medical Center</td>
<td>University of Kansas Medical Center, Kansas City, KS</td>
</tr>
<tr>
<td>9</td>
<td>University of Utah Health Care</td>
<td>University of Missouri Health Care</td>
</tr>
<tr>
<td>10</td>
<td>University of Colorado Hospital</td>
<td>Cleveland Clinic</td>
</tr>
<tr>
<td>11</td>
<td>Houston Methodist Hospital</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Memorial Hermann-Texas Medical Center</td>
<td></td>
</tr>
</tbody>
</table>

[https://www.uhc.edu/news/Twelve-academic-medical-centers-receive](https://www.uhc.edu/news/Twelve-academic-medical-centers-receive)

### THE AGING UNITED STATES POPULATION

**“THE SILVER TSUNAMI”**

Number of Americans ≥ 65 years (millions)

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Americans (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1900</td>
<td>3.1</td>
</tr>
<tr>
<td>1920</td>
<td>4.9</td>
</tr>
<tr>
<td>1940</td>
<td>9</td>
</tr>
<tr>
<td>1960</td>
<td>16.6</td>
</tr>
<tr>
<td>1980</td>
<td>25.5</td>
</tr>
<tr>
<td>2000</td>
<td>31.2</td>
</tr>
<tr>
<td>2010</td>
<td>40.3</td>
</tr>
<tr>
<td>2020</td>
<td>54.6</td>
</tr>
<tr>
<td>2030</td>
<td>72.1</td>
</tr>
</tbody>
</table>

An estimated 32% of older Americans undergo surgery in the year before their death... and 25% of all Medicare spending occurs in the last year of life.

### PROJECTED RISE IN CHRONIC DISEASE BURDEN BETWEEN 2003 AND 2023

Percentage Increase in Prevalence

By 2020, 157 million Americans will have one chronic disease, and 81 million will have multiple such conditions.

**ANESTHESIA-RELATED SAFETY**

- Modern death rate from complications/adverse events associated with anesthesia has decreased by 97%:
  - 64 deaths per 100,000 anesthetics in late 1940’s
  - By 2005, only 0.82 deaths per 100,000 anesthetics
- Both increased age and prevalence of chronic diseases have been independently associated with increased surgical mortality.
- Maintaining or improving on the 20th century gains in anesthesia-related mortality will be challenging.
- The Perioperative Surgical Home offers the needed more comprehensive and coordinated approach to the management of our older and sicker surgical patients.

---

**WHEREVER YOU GO – THERE YOU ARE**

Surgical death rates vary widely across US hospitals — from 3.5% in very-low-mortality hospitals to 6.9% in very-high-mortality hospitals.

- Despite similar rates of overall complications and of major complications —
- **MORTALITY** in patients with major complications was significantly greater in hospitals with very high overall mortality compared with those with very low overall mortality.

---

**FAILURE-TO-RESCUE (FTR)**

- Silber et al. (1992) = Hospital deaths after adverse occurrences such as postsurgical complications
- Contributors to FTR have been broadly categorized:
  1. Lack of a **timely** response → prompt recognition of the complication
  2. Lack of an **appropriate** response → correct management and treatment
- An abundance of retrospective data supports that adverse events in general ward (non-ICU) patients are preceded by a significant period — on the order of hours — of physiologic deterioration
- Most common causes in the surgical population
  1. Respiratory complications (38%)
  2. Infection complications (28%)
  3. Cardiovascular complications (23%)

---

---
COMPLICATIONS, FAILURE TO RESCUE AND MORTALITY RATES

- Medicare Provider Analysis and Review (MEDPAR) data from 2005 and 2006 for pancreatextomy, esophagectomy, AAA repair, CABG, AVR, and MVR
- 8 major postoperative complications: pulmonary failure, pneumonia, myocardial infarction, deep venous thrombosis/pulmonary embolism, acute renal failure, hemorrhage, surgical site infection, and gastrointestinal bleeding
- Failure to rescue (FTR) was defined as death in a patient with one or more of these 8 defined complications.

Michigan Surgical Collaborative for Outcomes Research and Evaluation (M-SCORE)

- 32.7% for esophagectomy
- 4.0% for pancreatextomy

PREOPERATIVE TARGETS TO PREVENT FTR AND IMPROVE SURGICAL MORTALITY

- “Failure to rescue is an emerging quality metric.”
- 2007 to 2011 Nationwide Inpatient Sample
- Lowest mortality quintile: N = 282 hospitals; 56,893 patients
- Highest mortality quintile: N = 282 hospitals; 45,784 patients
- Small bowel resection, pancreatextomy, colorectal resection, open abdominal aortic aneurysm repair, lower extremity arterial bypass, and nephrectomy
- FTR population → (+) Qualifying postoperative complication
- High-mortality risk population → High risk predicted via logistic regression model based upon age & co-morbidities
PREOPERATIVE TARGETS TO PREVENT FTR AND IMPROVE SURGICAL MORTALITY

Variation in mortality rates across lowest-mortality hospitals (gray bars) and highest-mortality hospitals (black bars)

1) FTR population $\rightarrow$ 18.9% vs 7.8%, $p < 0.0001$, NNH = 9
2) High-risk $\rightarrow$ 20.2% vs 7.5%, $p < 0.0001$, NNH = 8
3) Emergency surgery $\rightarrow$ 11.1% vs 4.1%, $p < 0.0001$, NNH = 14
4) Elderly (> 75 years) $\rightarrow$ 10.7% vs 3.7%, $p < 0.0001$, NNH = 14

↓ Postoperative FTR = A potential way to reduce mortality

ASSOCIATION BETWEEN POSTOPERATIVE TROPONIN LEVELS AND 30-DAY MORTALITY AMONG PATIENTS UNDERGOING NONCARDIAC SURGERY

- 15,133 patients; sequential 4th generation troponin T levels at 6-12 hours postoperatively, POD 1, 2, 3 $\rightarrow$ peak value of...
  - TnT of 0.02 ng/mL:
    - 4% mortality with adjusted hazard ratio [aHR] = 2.41
  - TnT of 0.03 to 0.29 ng/mL:
    - 9.3% mortality $\&$ aHR = 5.00
  - TnT of 0.30 ng/mL or greater:
    - 16.9% mortality $\&$ aHR = 10.48

Myocardial Injury after Non-Cardiac Surgery (MINS)

How do we risk stratify patients and prevent MINS?

PYRAMID OF PRACTICE CHANGE

3 BUILDING BLOCKS

Vetter TR, Jones KA: Perioperative Surgical Home: Perspective II. In Value-Based Care, Anesthesiology Clinics 2015 [In press].
**PERIOPERATIVE MEDICAL INFORMATICS**

Perioperative epidemiology is an area of growth—ultimately enabling the perioperative care team to translate precise real-time information into improved outcomes.


---

**MEMORIAL SLOAN KETTERING CANCER CENTER DIRECTOR OF PERIOPERATIVE INFORMATICS AND INNOVATION**

- The Director of Perioperative Informatics and Innovation (“Director”) will be a key leader in the transformation of care across the pre-operative, intra-operative, and post-operative care, leading a team in the implementation of systems across the new 14 story Josie Robertson Surgery Center.
- The Director will be a leader in the development of system-wide analytics initiatives that will transform care for MSK patients.
- The qualified candidate will have experience overseeing the design, build and implementation of clinical systems combining informatics and clinical process, data analytics and the ability to optimize the interoperability of clinical information systems to enhance patient safety and clinical outcomes.


---

**WHAT’S IN IT FOR THE SURGEON?**

- The Perioperative Surgical Home is not intended to replace the surgeon’s primary patient care responsibility…
- Rather aligns and leverages the talents and abilities of the entire perioperative care team in the service of the patient.
- From a surgeon’s perspective, the Perioperative Surgical Home model can create value in four primary ways:
  1) Takes advantage of the well-established relationships among the surgeon/anesthesiologist/intensivist/hospitalist
  2) Expands upon the existing pre-, intra-, and post-operative relationship between the anesthesiologist and the patient
  3) Increases the quality of surgical care by increasing the scope and depth of the perioperative team
  4) Improves the surgeon’s efficiency and productivity

ENHANCED RECOVERY AFTER SURGERY (ERAS)

- Pioneered in Scandinavia and UK by surgeons
- Evidence-based “fast-track” approach to surgery
- Multifaceted perioperative care pathway designed to attenuate the stress response during all three phases of the perioperative period and the patient’s surgical journey
- Facilitate the maintenance of bodily composition and organ function and to achieve early recovery


PREOPERATIVE PREHABILITATION

- “Prehabilitation” is an intervention to enhance functional capacity in anticipation of a forthcoming physiological stressor.
- Preoperative prehabilitation aims to enhance functional capacity preoperatively for better tolerance of surgery and to facilitate recovery.
- Also accurately predict and then reduce need for prolonged postoperative, post-discharge institutional rehabilitation and convalescence


PREOPERATIVE TRIMODAL PREHABILITATION

• Home-based, approximately one month program:
  1) Moderate aerobic and resistance exercises
  2) Nutritional counseling + whey protein supplementation
  3) Relaxation exercises (anxiety reduction)

But no changes were observed in SF-36 or Hospital Anxiety and Depression Scale (HADS) scores and post-operative complication rates and the hospital length of stay were similar in the prehabilitation versus the postoperative rehabilitation patients.


ANESTHESIOLOGY AND OUR NEEDED MORE COMPETITIVE STRATEGY

• Anesthesiology is facing strong economic pressures that require a broader competitive strategy.

• Looming austere, constrained economic landscape and need to provide a more effective and efficient product

• To strengthen the future viability of our specialty:
  Urgent need for anesthesiologists to challenge our current, historically successful business model and our assumptions about the market forces, mission, and core competencies of our specialty


THE ANESTHESIOLOGIST AND PERIOPERATIVE MEDICINE

• Necessary to expand the core knowledge, skills, and experience expected of the anesthesiologist

• Need to view the “Perioperative Medicine” as an expansion of the specialty, rather than an abdication of the traditional and still vital intraoperative role

• Not all anesthesiologists will be able or willing to play a role in this new activity.

• But just as with the seminal development within anesthesia of the subspecialties of critical care medicine and pain medicine, a subset will need to do so and be supported by colleagues in their efforts

UAB PREOPERATIVE ASSESSMENT, CONSULTATION, AND TREATMENT CLINIC

- Semantic and clinical evolution has occurred at UAB
  - PAT = Pre-Admission Testing (1990)
  - PAC = Pre-Anesthesia Assessment Clinic (1995)
  - PACT Clinic = Preoperative Assessment, Consultation, and Treatment Clinic (2010)
- Road trips to Johns Hopkins, Brigham and Women’s, Cleveland Clinic (Cleveland), and Mayo Clinic (Rochester)
- PACT Clinic moniker intentionally chosen to communicate our comprehensive scope of practice and services
- Frankly, we continue to grow into its full potential…😊

VALUE STREAM MAPPING: PSH PREOPERATIVE PROCESS ACTIVITY MAPPING

- Preoperative patient risk screening tool
- Formal E&M code-based preoperative consultation
- Robust patient-centered shared decision-making
- Therapeutic interventions
- Post-discharge care planning before surgery
- Preoperative clearance

A COMPREHENSIVE REVIEW OF THE PERIOPERATIVE SURGICAL HOME LITERATURE

“The PSH model may have significant implications for policymakers, payers, administrators, clinicians, and patients. The potential for policy-relevant cost savings and quality improvement is apparent across the perioperative continuum of care, especially for integrated care organizations, bundled payment, and value-based purchasing.”

A COMPREHENSIVE REVIEW OF THE PERIOPERATIVE SURGICAL HOME LITERATURE

- 152 peer-reviewed articles between 1980 and 2013
- History and evolution of PSH and PSH-like models
- Summary of the results of studies of PSH elements in the United States and in other countries

<table>
<thead>
<tr>
<th>Phase of Perioperative Care</th>
<th>Significantly Positive Cost &amp; Efficiency</th>
<th>Significantly Positive Clinical Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preoperative Initiatives</td>
<td>82%</td>
<td>82%</td>
</tr>
<tr>
<td>Intraoperative Initiatives</td>
<td>77%</td>
<td>86%</td>
</tr>
<tr>
<td>Postoperative Initiatives</td>
<td>75%</td>
<td>87%</td>
</tr>
</tbody>
</table>


INTEGRATED CARE PATHWAYS

- Task-oriented care plans that detail the essential steps or elements in the care of all patients on a specific service line or undergoing a specific surgical procedure
- Lean or Six Sigma: Collect data to highlight and address any lack of process standardization and resulting inefficiencies, rework, and waste
- UC Irvine Health “Total Joint Perioperative Surgical Home”

<table>
<thead>
<tr>
<th>Outcome</th>
<th>LOS</th>
<th>30 Day RA</th>
<th>Transfusion</th>
<th>Complications</th>
<th>Mortality</th>
<th>SCIP</th>
</tr>
</thead>
<tbody>
<tr>
<td>UCI Health</td>
<td>3 days</td>
<td>0.7%</td>
<td>6.2%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Group Benchmark THA UCI  THA Benchmark TKA UCI TKA

| Per Diem Cost | $16,267 | $9,952 | $17,588 | $10,042 |


FEW FINAL OBSERVATIONS...

There is no limit to what can be accomplished if it doesn't matter who gets the credit.

Ralph Waldo Emerson
(1803 – 1882)

Health care must be a business — But medicine remains an art and a science, and the successful practice of medicine is all about strong relationships with one’s patients and one’s colleagues.