



The Perioperative Surgical Home Experience



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OUTPATIENT/SHORT-STAY VASCULAR SURGERY: *A Model for the PSH*

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What is the Perioperative Surgical Home (PSH), and are both anesthesiologists and surgeons ready to accept this?

The PSH is a concept of coordinated perioperative patient care that has been proposed by physician anesthesiologists. In a recent paper from Vetter et al. from the University of Alabama-Birmingham, the benefits and aspects of the surgical home were well described.¹ It has been proposed by ASA and others as “an innovative, patient-centered, surgical continuity of care model that incorporates shared decision making.”¹ The need for this is multifaceted. One of the goals of the Affordable Care Act is to reduce costs and improve health care outcomes by shifting the system toward quality over quantity through increased competition, regulation and incentives to streamline the delivery of health care. These goals will be accomplished by moving from a fee-for-service payment plan to “value-based purchasing.” That “value” will be determined by various outcomes measures, including patient-reported outcomes, complications and metrics such as length of stay, 30-day readmission, mortality and surgical site infections. Furthermore, the Centers for Medicare & Medicaid Services (CMS) reduced all hospital payments by 1 percent in 2013, and will be reducing these payments by an additional 0.25 percent per year through 2017. Hospitals may earn back the reductions with incentive programs based on quality metrics.

Pressure has now been put on hospitals to have shorter lengths of stay and more outpatient procedures. This must all occur without sacrificing outcomes: in other words, “no outcome, no income.”² In turn, hospitals and practices must now improve patient-reported outcomes and maintain data on improved quality of life after procedures as well as

technical success. Furthermore, evidence-based guidelines must be used to standardize responses to support existing and new treatment protocols and intervention. Some of the most complex patients requiring care are vascular surgery patients. It is well known that these patients often have multiple comorbidities such as hypertension, coronary artery disease, diabetes, smoking hyperlipidemia, renal failure and conditions requiring anticoagulation such as atrial fibrillation. They may have acute or chronic disease and are often elderly with suboptimal support at home. Transportation issues to and from the hospital or outpatient facility may be complex because of difficulties with ambulation. These patients also need extensive support services and medical follow-up on discharge after the procedure. In this population, it is even more difficult to perform procedures safely as short-stay or outpatient (up to 23 hours). They are the ideal beneficiary of coordinated care – the model patient for the surgical home. Collaboration between physician anesthesiologists, surgeons, case management and medical teams will theoretically enhance quality. Regarding anesthesiology departments – this paradigm may be critical in demonstrating quality in a field that is largely set up on fee-for-service models.

The surgical home may include commonly performed preoperative optimization, communication with the surgical team pre-procedure, and high-quality and efficient intraoperative and immediate postoperative care. However, the complete surgical home would also involve the anesthesia team in coordinated transfer from the postoperative unit to ward and step-down units, and additional coordination with post-procedure care and discharge planning. Components of the surgical home would include not only surgeons and physician anesthesiologists, but also nurse practitioners, hospitalists, case managers and social workers.

At NYU Langone Medical Center, a coordinated effort has been undertaken with the departments of anesthesia and surgery, along with the chief quality officer, to develop a pilot program of a surgical home for vascular surgery patients. Outcomes will be followed after protocols are established for preoperative, intraoperative and postoperative care. The program will incorporate hospital-based initiatives already under way regarding O.R. efficiency, pre-surgical optimization, patient safety outcomes, treatment outcomes and possible health care economic advantages.



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In the preoperative phase, as soon as the patients are booked for surgery, the surgical scheduler will contact both the pre-admission testing unit and the primary care physician (PCP).

Arrangements will be made for labs, a medical optimization visit with the PCP and a review by the anesthesia department. The pre-surgical evaluation will become more than just data collection but rather a review of all aspects of preoperative care and optimization, including meeting with case managers about discharge planning and the physician anesthesiologists and nurse practitioners about issues such as smoking cessation, pain management expectations and medication management in the perioperative period. All aspects of the preoperative phase will be performed as far as possible prior to the surgery date in order to allow for a complete pre-surgical evaluation.

The intraoperative phase will include review of the pre-surgical work-up on the day of the procedure, and having the patient arrive as close to or on the day of the procedure made possible by the coordinated preoperative evaluation. Such planning will decrease the length of stay by decreasing perioperative time in the hospital. Optimal intraoperative management will then take place, as well as communication with the postoperative care unit about the intraoperative course and communication with the surgical care team upon discharge from the postoperative care unit.

The postoperative phase will include coordination with the case managers and social workers for discharge and communication with the PCP by the surgical team upon discharge. In addition, a summary of the intraoperative and perioperative systemic events will be added by the “perioperativist” – a term coined by Vetter et al.¹ to

better describe the physician anesthesiologist involved in the surgical home. Additional follow up will occur by the case managers after discharge along with the PCP. Quality metrics such as patient-reported outcomes, clinical outcomes, readmission rate, length of stay and resource utilization will be reviewed.

The surgical home will potentially improve quality metrics and contribute to increased efficiency in an era of value-based purchasing. Such success would represent an expansion of the traditional role of the physician anesthesiologist to now include more extensive preoperative involvement and also postoperative care beyond the recovery room. It's not what many physician anesthesiologists envisioned in training, but it is a novel and logical response to a quality-based health care system. Vascular surgery patients may be an early beneficiary of this system. As physicians and hospitals undertake combined risk-sharing and gain-sharing, the surgical home may be a method of achieving more efficient resource utilization. Physician anesthesiologists and surgeons working in concert throughout the perioperative process add value and improve our patients' outcomes and experience. We might even improve our own experience.

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UC Irvine Health Experience With the PSH

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Total health care spending in the United States is projected to climb to \$4.8 trillion in 2021, up from \$2.6 trillion in 2010 and \$75 billion in 1970. To put this into context, health care spending will account for nearly 20 percent of gross domestic product (GDP), or one-fifth of the U.S. economy, by 2021.¹ A defense can be made that unhindered health care expenditure is warranted if it parallels better outcomes. Yet with U.S. mean life expectancy at 78.7 and ranked 26th in the world, this argument does not hold to fruition. One must inquire as it pertains to health care: why does the U.S. spend the most, but not deliver the best? A closer investigation of hospital-based care provides the ideal opportunity to resonate the importance of change management. Of total health care spending, a remarkable half (51 percent) goes to pay the cost of medical services provided by hospitals and physicians. When one takes an even more meticulous

look, the forum of perioperative care is the principal culprit of expense, surmounting nearly 60 percent of all hospital costs.

The existing model does not curtail waste, redundancy and inefficiency during the perioperative continuum. Rather, this existing model is fragmented, with little care coordination of the patient.²⁻⁴ Autonomous physicians practice with an individualistic, artisan-like approach. Preoperative evaluation is often inconsistent, with little consensus on appropriate consults and labs to consider. Postoperative care is disorganized, with no clinical pathways to minimize variability. One solution to these issues is the recently developed Perioperative Surgical Home care model.²⁻⁶ By definition, the PSH is a patient-centered, physician-led multidisciplinary and team-based system of coordinated care.²⁻⁶ Via personalized and evidence-based care plans, it guides the patient through the entire surgical experience and continuum from decision for the need for



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Drs. Les Garson, James Cyriac and Katherine Tobin along with Kathryn Komaki review a “future state” Lean Six Sigma process map of the Orthopedic Perioperative Surgical Home at UC Irvine Health.

surgery to discharge from a medical facility and beyond. While autonomy for both the patient and practitioner is not hindered, ambiguity is clarified and addressed, fostering a forum for improved outcomes as defined by numerous metrics. The PSH model increases patient satisfaction while reducing costs, complications, recovery times and length of stay in the hospital. This perioperative care model – which refers to the period before, during and after surgery – spans the patient’s entire surgical experience, starting with the decision to have surgery through 30 to 90 days after hospital discharge. We recently published several papers in *Anesthesia & Analgesia* demonstrating the efficacy of the PSH for total-hip and total-knee replacements.^{2,7,8} The cornerstone of the PSH model is collaboration between all phases of the surgical episode with succinct handoffs or “transitions of care” between providers. Principles also at the forefront of the model include emphasis on diversified patient education tools as well as thorough preparation for optimal clinical outcomes.

What key elements have made the PSH so successful at UC Irvine Health?

Our group at University of California (UC) Irvine Health initiated the process of building a PSH for patients undergoing primary total-hip arthroplasty (THA) or total-knee arthroplasty (TKA) in April 2012. Under this Total Joint Replacement Perioperative Surgical Home (Total Joint-PSH) initiative, members of the departments of anesthesiology and perioperative care and orthopedic surgery, together with colleagues from all perioperative hospital services, developed and implemented a series of clinical care pathways defining and standardizing preoperative, intraoperative, postoperative and post-discharge management for this group of patients. Concurrently, UC Irvine Health engaged the entire organization in a Lean Six Sigma (LSS) initiative⁹ and most of the faculty in the department, along with all anesthesia CA-1 residents and

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many members of the perioperative staff (nurses, O.R. technicians and O.R. administrators), were trained in LSS. Our goal was to integrate four perioperative components: preoperative, intraoperative, postoperative and post-discharge components, as well as metrics and quality assurance and research components. In April 2012, a Total Joint-PSH steering committee was created. This steering committee was composed of eight physician anesthesiologists, two surgeons, three nurses, two pharmacists, one physical therapist, one case-manager, one social worker and two information technology experts. The steering committee met weekly during the implementation phase and quarterly once the Joint Replacement-PSH became operational. To achieve our results, we suggest that the entire bundle of the PSH is needed, with “protocolization” of preoperative, intraoperative, postoperative and post-discharge care. Moreover, the use of LSS to reduce variability and increase standardization was a very important component in our program. Adherence to our clinical care pathway was strictly monitored, and any deviation was managed by our surgical home team. Also, in order to scale up our PSH program to the entire department of orthopedics, we needed to hire a quality improvement specialist as well as a project coordinator and a nurse practitioner to manage these patients after surgery.

What challenges may arise when other physician anesthesiologists attempt to replicate this model in their own hospitals?

While we encountered some challenges at the onset of Joint Replacement-PSH, particularly with adherence to the protocols, the teamwork and coordination of postoperative care by the PSH anesthesia and orthopedic teams allowed the program to stay on track. But change management is a major issue that every organization needs to address. Yes, implementation of the PSH also needs the use of technology and other resources, but change management is the main challenge. How does one convince colleagues in the anesthesia group, the administration, the surgeons, the hospitalists, nursing and other stakeholders of the need for change? After the initial success we had with a Total Joint Replacement PSH,



A multidisciplinary team, including anesthesiologists, critical care providers, orthopedic surgeons, pharmacy and IT staff, works on articulating the current state process for orthopedic spines at UC Irvine Health during the Orthopedic Perioperative Surgical Home kick-off retreat.

a major challenge facing our institution as we scale up the PSH to all perioperative services is postoperative patient care coordination and management by the department of anesthesiology and perioperative care. For example, with the Total Joint-PSH, the anesthesia regional/acute pain team handled postoperative PSH patient care management. This model, however, is not viable when considering the entire spectrum of perioperative services. Other institutions, such as the University of Alabama, address the issue by using critical care medicine services. This is certainly a viable option; however, we are seriously exploring the concept of designated anesthesiologists to supervise dedicated PSH nurse practitioners.

How does one become a champion for the PSH in one's own institution?

Cost containment strategies are increasingly becoming a reality in U.S. health care secondary to the unacceptable rise in health care costs. In the aftermath of the Affordable Care Act of 2010, the groundwork has been laid to provide incentives for quality care and opportunities to reduce costs.

In this new evolving reality, it would be ideal to develop a model in which autonomous surgeons or surgical services can deliver efficient, reliable, high-quality patient care while simultaneously achieving cost reduction *within a hospital system*. While this may seem impossible, methods for systematizing

care based on the best-available evidence – and coordinating consistent perioperative care through the continuum of the preoperative clinic through the surgical and inpatient experience to outpatient follow-up – may yield such results. A physician anesthesiologist should start with a plan of how to implement a PSH and then how to sustain this new model of care. This champion anesthesiologist should start by getting consensus between all stakeholders – and in particular the surgeons and the administration. Once a consensus is achieved, the champion can reach out to existing resources such as the performance improvement department of the hospital and the decision-support individuals. Creating a team that will consist of physician anesthesiologists, surgeons, nurses, IT, pharmacy, decision support, nutrition and many other disciplines is the key for success. Working along a surgeon champion will benefit the entire perioperative service and help lift the service to higher levels of patient-centered care. Ultimately, the PSH will increase the quality of care delivered to the patient, decrease the cost of care, and improve the satisfaction of the medical and surgical teams taking part in the PSH.

What are some of the main considerations if one wants to implement the PSH at one's own institution?

Certain factors are essential for successful implementation of the PSH. Support of organizational leadership and a committed group of clinical champions, including a surgeon, ancillary support staff (such as physical therapy, nursing, case managers, etc.) and a physician anesthesiologist, is key for implementing change in practice. Involvement of stakeholders from multiple disciplines in establishing protocols and implementing clinical pathways ensures their buy-in, making it easier to transition from traditional surgical practice to a standardized, coordinated care delivery model. Resources are often felt to be the barrier both during and after implementation of the PSH. At UC Irvine Health, we have taken the approach of reorganizing existing resources to provide more efficient and effective care pathways. Clinical pathways are built into the electronic medical record order sets, and electronic documentation has facilitated automated data collection for quality improvement and research. Our Total Joint Replacement PSH took a fragmented system of care – one in which each provider has his or her own segment of care and does it independently, which sometimes can cause conflicts of opinion on what is the best care option – and streamlined the system so that all pathways are agreed upon in advance, before the first patient enters the process.

All the care is provided mutually as a team. There's no more conflict of opinion. Everybody is a stakeholder and cares for the patient jointly. Everyone has agreed to the protocols. If a patient has to veer off the regular pathway, you have a team to talk to and discuss the situation. It's a very different experience than that which exists in the average hospital.

In conclusion, the PSH is an innovative clinical model aimed to transform the way we deliver surgical care by improving clinical outcome, enhancing service and reducing complications. At UC Irvine Health, we have implemented this model successfully for the past two years. After providing a “proof of concept” with the Total Joint Replacement PSH, we are now implanting this model throughout the entire orthopedic surgical line as well as selected urological service lines. We strongly believe this model represents a huge opportunity for the specialty of anesthesiology and the perioperative environment.

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The Perioperative Surgical Home: *From Concept to Reality*

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The transformation of American health care is shining a spotlight on the shift from volume to value-based care.

Across specialties, physicians expect that value-based payment models will equal about 50 percent of their total compensation in the next 10 years.¹ Secretary of Health and Human Services Sylvia Mathews Burwell announced in January an accelerated goal to have 30 percent of Medicare payments in alternative payment models, including bundled payments, by the end of 2016 and 50 percent by 2018.² The Perioperative Surgical Home (PSH) Learning Collaborative is implementing a proactive vision of redefining value propositions in new models of care delivery and payment to provide relevance in an evolving market. The PSH model is a patient-centered, physician-led, interdisciplinary and team-based system of coordinated care for the procedural and surgical patient.³



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The PSH Learning Collaborative has 44 health care organizations piloting many different projects to achieve the overall goals of this initiative. The three goals of the collaborative are to: a) develop better delivery of perioperative care models focused on the needs of the patient; b) better payment models to sustain the hard work in this coordinated physician-led, team-based care; and c) creation of a PSH implementation toolkit for organizations to rapidly spread knowledge. The primary metrics of the PSH are grouped into: 1) Clinical & Safety Outcomes, 2) Patient-Centered Outcomes, 3) Internal Efficiency Outcomes and 4) Economic Outcomes. These metrics will provide the framework to begin to evaluate the comparative clinical effectiveness of these pilot projects in each organization and across the collaborative to provide real-world evidence of our progress toward achieving the triple aim.

The initial focus of the Learning Collaborative was primarily developing the infrastructure and stakeholder teams for each PSH pilot in each organization. Sharing successes and barriers for the project management associated with creating change in each organization was the main imperative the first six months. The challenge of collection, reporting and analyzing the data began in January. We will have much more information to share as the collaborative concludes this November.

Our Learning Collaborative participants are all at different stages in their 17-month performance-improvement journey. We are highlighting two very different organizations focused on two very different populations of patients experiencing common perioperative care processes. One is a large pediatric



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health system and the other is a small community hospital. They are both early in their PSH journeys for transformation of care but are willing to share lessons learned and a few of their metrics that are critical to quality.

PSH Pediatric Pilot Adenoidectomy

Nationwide Children's Hospital in Columbus, Ohio is one of the country's largest not-for-profit freestanding pediatric health care networks, with nearly 10,000 hospital staff and 1,000 medical staff. Adenoidectomy was chosen for our PSH pilot due to the surgery being common in a broad range of facilities from pediatric centers to community hospitals to ambulatory sites. At Nationwide Children's, we have an enthusiastic physician champion ENT surgeon, Charles Elmaraghy, M.D., and guidelines already in place for adenotonsillectomy. We demonstrated a decrease in unanticipated admissions and in the process found other areas for improvement.⁴ Our team agreed to apply key PSH elements to a smaller project (adenoidectomy) to demonstrate success in achieving future buy-in from other service lines in our hospital. Our team emphasized the two postoperative phases because our data showed these processes required the most improvement.

Prior to implementation, there was a massive education via a series of emails and informal discussions by Vidya Raman, M.D., Joshua Uffman, M.D., and Thomas Taghon, D.O. of all four PSH phases: preoperative, intraoperative, postoperative and post-discharge. One barrier in implementation was the concurrent transition from our current electronic medical record to EPIC. Both the anesthesia and surgical services transitioned at once. Due to the complexity of the transition requiring multiple resources, our actual PSH implementation was delayed. Another distracting barrier was the simultaneous opening of the radiology sedation center.

It was necessary to standardize each phase with consistent care and medications. We currently have a strong preoperative process. We identify all patients through the PAT clinic nurse. Once identified, these patients are tagged throughout the perioperative process. The anesthetic plan is displayed in every room to provide standardized care for these children. ENT has a well-defined surgical process that it uses in every case. Similar uniform protocols are in place in the PACU. We standardized a three-minute video for parents to watch. We found the postoperative discharge instructions were not standardized and wanted the families to hear the exact same message. The follow-up anesthesia physician phone call on the evening of discharge is scripted as well.

As we launched our PSH pilot, we worked closely with our quality improvement (QI) department to ensure we are managing the project via the Plan Do Study Act protocol. The QI team generates daily reports to help target these patients. The goal is to have EPIC identify these patients in the header as PSH participants and have datasets applicable to them. Our IT champion, Nicole Rayburn, was critical in working with EPIC and the educational program. We have estimated savings of \$1 million as we move toward bundled payments for adenoidectomies. We belong to Partners for Kids, which covers Medicare and One Source patients. This plan is incentivized for efficiency and participates in bundled care for these patients.

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We participate in many insurance plans with negotiated bundled payments for this procedure and various other common surgeries. We recognize this is a growing trend nationally. Our strategy is to achieve the triple aim (better health care, lower costs and improved satisfaction) for our young patients and their families.

PSH Adult Pilot Arthroplasty

White River Medical Center in Batesville, Arkansas is a 209-bed, not-for-profit community hospital performing approximately 7,000 surgeries per year. Surgery staff includes three orthopedic surgeons who perform 220-240 total joint arthroplasties per year. Representatives from administration, anesthesiology, nursing, IT, quality, care coordination and orthopedic surgery were instrumental in the development of our PSH. The orthopedic surgeons had recently joined a bundled payment initiative through Medicaid in Arkansas, and the hospital is exploring participation in the Bundled Payments for Care Improvement initiative (BPCI). We focused on total joint arthroplasty and formed four teams: preoperative, intraoperative, postoperative, and data and metrics teams.

All stakeholders agreed to standardize processes in the following areas: clinics, preadmissions testing, preoperative holding, intraoperative care, postoperative care and discharge planning. Standardization required multiple meetings between the anesthesiology and surgery departments to review literature and agree upon “our” standard of care for morbid obesity, uncontrolled diabetes mellitus, preoperative anemia, preoperative multimodal pain control, intraoperative anesthetic selection, postoperative pain control regimen and postoperative discharge disposition. The data and metric team met regularly to build reports using our Meditech electronic medical records.

Many changes in practice patterns were created through several team meetings. These practice patterns included strict screening guidelines and adherence to optimization protocols regarding obesity, diabetes and anemia along with utilization of the same implants, supplies and intraoperative local anesthetic combinations. Anesthetic changes included standardization of preoperative and postoperative pain control regimens, and anesthetic selection. Spinal or general anesthesia was decided on by co-morbidity, not provider preference.

Our biggest barriers have been related to data, team meetings and drift. Our internal data contained inaccuracies or lacked data points, and our external data were outdated and difficult to query. This forced us to create internal reports for each of our leading and lagging indicators and to meet with frontline workers to ensure the accuracy of the data documented.

Since each group member worked full time in other areas of the hospital, preparing for the meetings and finding a time to meet was a struggle. Also, once a protocol was agreed upon and implemented, those involved in the process exhibited less adherence to the protocols as time passed. We are now in the process of hiring a master of health science administration (MHSA) to create process flow maps, organize meetings, take minutes, create agendas and lead discussions. This addition will allow time for each team to dedicate itself to rapid cycle improvement, creation of additional protocols, and eventually inclusion and standardization of additional service lines. This will also imbed these processes in place to avoid drift due to personnel changes or complacency.

Our goal is to incorporate evidence-informed protocols into every aspect of our perioperative care through creation of a system that will continually improve its internal adherence to the ever-changing standard of care. Our program is still in its infancy, but we are starting to see encouraging data. We have seen a decrease in postoperative pain scores, a decrease in readmissions, an increase in discharge disposition to home, and a decrease in discharge disposition to inpatient rehab facilities and skilled nursing facilities. These changes will result in a decrease in our total cost of care and should also improve the overall health of the patient and quality of the health care delivered (triple aim).

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The Conundrum of Care in Perioperative Stress Myocardial Ischemia, the Importance of 30-Day Outcomes and the Perioperative Surgical Home

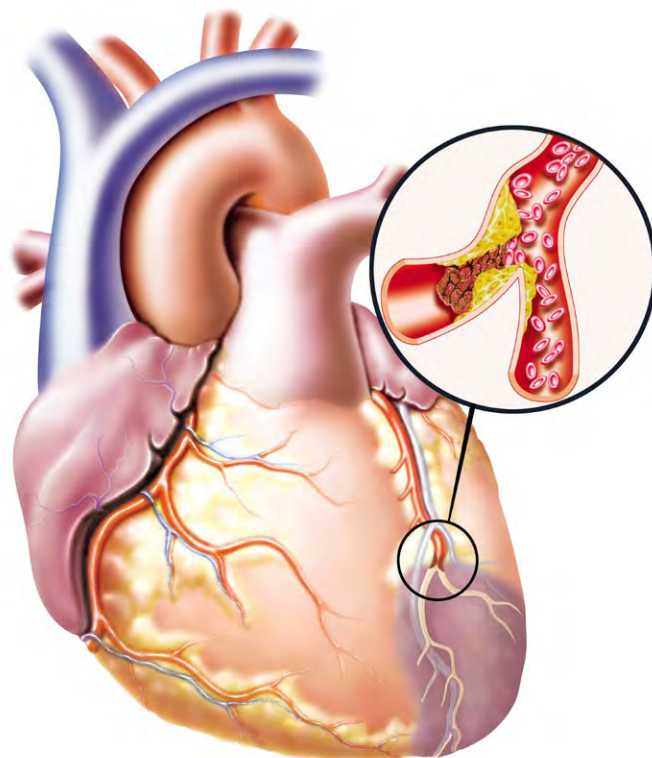
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The Perioperative Surgical Home (PSH) is an innovative method of delivering health care during the entire patient care experience, from the time of decision for surgery, throughout preoperative, intraoperative and postoperative care, beyond discharge, until full patient recovery.¹ The goal of the PSH includes better care coordination and increased standardization while still allowing for patient variability, which has been shown to result in better clinical outcomes. An added benefit of the PSH model is the reduction of costs associated with health care by eliminating unnecessary tests, improving efficiencies, and reducing postoperative complications and hospital readmissions through coordination of care and transition planning.²

It is hard to imagine a more immediate anesthesia patient safety and coordination of care issue than the identification and management of relatively healthy patients recently identified to be at risk for postoperative morbidity and mortality. Analyses of the VISION cohort study, published in 2012 and 2014, prospectively studied perioperative patients, revealing a markedly high incidence of silent postoperative myocardial ischemia, infarction and mortality.³ These patients did not fall into the category typically reserved for high-risk patients.⁴

The 2014 VISION study examined outcomes of 15,065 patients over age 45 who had major non-cardiac surgery and required an overnight stay. Vascular, colorectal or major orthopedic joint replacements were the majority of procedures performed. Plasma troponin T (TnT) concentrations were initially obtained within six to 12 hours after surgery and again on



each of the first three postoperative days. Eight percent of patients had elevated postoperative TnT concentrations (TnT) >0.03 ng/mL, consistent with myocardial injury after non-cardiac surgery (MINS).



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Ischemic Features of Patients with MINS

Only 15 percent of patients with MINS reported ischemic symptoms. However, 35 percent of MINS patients had ischemic electrocardiographic (EKG) changes, a majority of which were in the anterior chest leads. Combining those who reported ischemic symptoms and those who had ischemic changes on EKG, only 42 percent of patients with MINS showed an ischemic feature that met the criteria for diagnosis of myocardial infarction.⁵ Since EKGs were largely obtained only because of elevated TnT concentrations, it is apparent that nearly all infarctions would have been missed without biomarker monitoring.

Ten percent of patients with MINS were dead within 30 days of surgery, with most mortality occurring in-hospital. The death rate was nearly identical in patients with asymptomatic MINS and in those with ischemic symptoms. Most patients who died thus did not meet the universal definition of myocardial infarction criteria because of lack of some clinical feature.⁵ Death in MINS patients is by far a leading cause of 30-day postoperative mortality. It is not widely recognized that this postoperative mortality is actually the third-leading cause of death nationwide.⁶

“The goal of the PSH includes better care coordination and increased standardization while still allowing for patient variability, which has been shown to result in better clinical outcomes.”

Identification of Perioperative Patients at Risk of Active Ischemia

Identifying perioperative patients “at risk” of having active ischemia is the first and substantial challenge for perioperative physicians. Among patients with active ischemia, 80-85 percent will have silent ischemia that is not accompanied by typical symptoms or symptom complexes suggestive of angina pectoris. *Absent daily postoperative troponin testing for the first three days, most patients with active myocardial ischemia will thus be missed.*^{7,8} Why lethal myocardial ischemia does not produce symptoms in the perioperative period remains unknown, but the administration of potent analgesics may contribute.

Improving or Verifying the Quality of EKG Data

Applying simple quality controls may help in interpreting and comparing EKGs. In 12-lead EKGs, negative “P” waves in lead I may suggest limb lead reversal, congenital dextrocardia or acquired dextrotorsion. Leads I, AVL and V6 share the same sagittal plane, with the size of the “R” waves increasing from AVL to I to V6 following their relative proximity to the left ventricle. Prominent “S” waves in V6, not seen in leads I and AVL, usually indicate misplaced lateral chest leads, where lead V6 is located anterior to the midaxillary line. This will help ensure both EKGs were properly obtained before comparison.

It is difficult to make good judgments from faulty data. EKG leads are often misplaced.⁹ Proper EKG lead placement is important, and it should follow bony landmarks. Lead placement for 12-lead EKG studies and all perioperative monitoring should adhere to standard anatomic landmarks to permit comparison of intraoperative and postoperative tracings to baseline EKG studies. The V5 lead should be placed where the fifth intercostal space intersects with the anterior-axillary line, overlaying the LV. EKG changes consistent with ischemia are more commonly noted in the anterior chest leads compared to inferior limb leads.³ This is not surprising. The closer the inferior leads (RL and LL) are to the heart, the less likely inferior ischemia will be detected. Surgical procedures on a hip, abdomen or groin may preclude placing the lower limb leads in a standard position on the leg or thigh. To optimize detection of myocardial ischemia, correct lead placement should be maintained in PACU, telemetry, intermediate care and ICU settings. *EKG changes may trigger earlier-than-planned troponin studies.*

Observation of technical aspects when obtaining EKG studies may identify opportunities for improvement in ischemia detection and lead to technically correct studies for later comparison in all postsurgical patients. Improving EKG quality, while valuable, is not a substitute for biomarker testing.

Management of Silent Myocardial Ischemia

Eighty-seven percent of MINS events, TnT elevations, were noted by the end of the second postoperative day.³ Acute inferior wall myocardial ischemia may present as postoperative gastrointestinal complaints, such as severe or unrelenting nausea or belching. MINS placed patients at higher risk for other outcomes, including non-fatal cardiac arrest, congestive heart failure and stroke.³

The imbalance of myocardial oxygen demand and supply, including plaque rupture, thrombosis and spasm, must be corrected with the goal of adequate myocardial tissue perfusion and preservation. A cardiology consultation may be in order for both management and future continuity of care within

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the context of the PSH care model. Aspirin and statins to prevent coronary thrombosis and stabilize coronary plaques are often included in current outpatient therapy. Pharmacological interventions may suffice; however, correction of anatomic obstructions may be required.

Post-discharge management is at the discretion of the cardiologist, surgeon and primary care doctors, in conjunction with the perioperative physician in a PSH model. Patient education and directed risk reduction strategy for known risk factors such as hypertension and hyperlipidemia are indicated and may be best accomplished by the perioperative physician and team upon discharge planning.

“The imbalance of myocardial oxygen demand and supply, including plaque rupture, thrombosis and spasm, must be corrected with the goal of adequate myocardial tissue perfusion and preservation. A cardiology consultation may be in order for both management and future continuity of care within the context of the PSH care model.”

The silent nature of most episodes of perioperative myocardial ischemia and the frequent adverse outcomes associated with them, even in the setting of higher than normal, yet low troponin levels, demands our attention to identify, educate and provide continuing and competent perioperative care well beyond the time of discharge.¹⁰ Economically, the laboratory costs of four troponin levels is approximately the same as one dose of intravenous acetaminophen; the former has the potential to prevent myocardial infarction and death.

This patient population, previously thought to be at “low cardiac risk” for surgery and anesthesia, may best be diagnosed, treated and managed through the continuum of care model provided by the PSH. Preoperative optimization, appropriate baseline EKGs, appropriate consults, accurate perioperative monitoring for ischemic changes, daily follow-up with troponin levels, postoperative consultation, management, patient education and continued follow-up visits may lead to reduced incidence of myocardial ischemia, infarction and 30-day mortality.

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THE PERIOPERATIVE SURGICAL HOME:

Electronic Patient Assessment Tool

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Zeev N. Kain, M.D., M.B.A.

The overall aim of the Perioperative Surgical Home (PSH) model is to transform surgical care based on the triple aim suggested by Berwick in 2008. That is, improved clinical quality, enhanced patient experience and lower cost of medical care. The PSH involves early identification of patient medical problems, optimization prior to surgery, clinical pathways, reduced variability and perioperative management up to 30 days following surgery. As part as of the ongoing implementation of the PSH in the University of California, Irvine (UC Irvine Health), the PSH Information Technology group developed a package of Web apps to facilitate the preoperative screening process in order to identify patients requiring additional assessment prior to meeting their physician anesthesiologist on the day of surgery. The package of apps is called the Electronic Patient Assessment Tool (e-PAT). These Web apps make it easy for patients to enter their medical information and apply a set of clinical decision-support rules to suggest ASA Physical Status

risk classification, postoperative risk of pulmonary and renal complications, postoperative nausea and vomiting (PONV) and postoperative delirium. In addition, the decision support logic suggests the appropriate preoperative evaluation for the planned surgery. Use of e-PAT and the associated assessment algorithms has enabled our group to consistently maintain the day of surgery cancellation rate under 2 percent within our institution.

The e-PAT package consists of three apps. The first, the *Patient app*, gathers information from the patient regarding his or her overall medical condition. The second is the *Approval app*, in which the planned surgery is added in the surgeon's office, and the output of the report generator is displayed. The third is the *Viewer app*, used in the preoperative anesthesia clinic to display the list of patients with preoperative screening evaluations, the output of the report generator and the current status of the preoperative evaluation process.



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The Patient app was designed for simplicity. Other than a few demographic entries, all patient questions are simple multiple choice, making input straightforward on handheld tablets. The questionnaire is brief and targeted to the preoperative screening process. The questionnaire is not a complete preoperative assessment but rather serves as a screening tool to determine which patients need further evaluation. The questionnaire is built using branching logic with positive patient responses leading to more detailed questioning, while negative patient responses allow the survey to skip those questions. Healthy patients will have as few as 35 questions to answer, and a complicated patient with every single possible problem would have about 80 questions to answer. It takes an average of six minutes for patients to complete the questionnaire. Some patients need assistance with a few of the questions, but most are able to complete the questionnaire by themselves. Currently we are asking patients to use the Patient app in the surgeon's clinic at the time they are evaluated for possible surgery. Patients can also complete the form on their personal computer or tablet prior to the visit with their surgeon. Initial survey of patients showed the majority prefer the electronic questionnaire over a paper form.

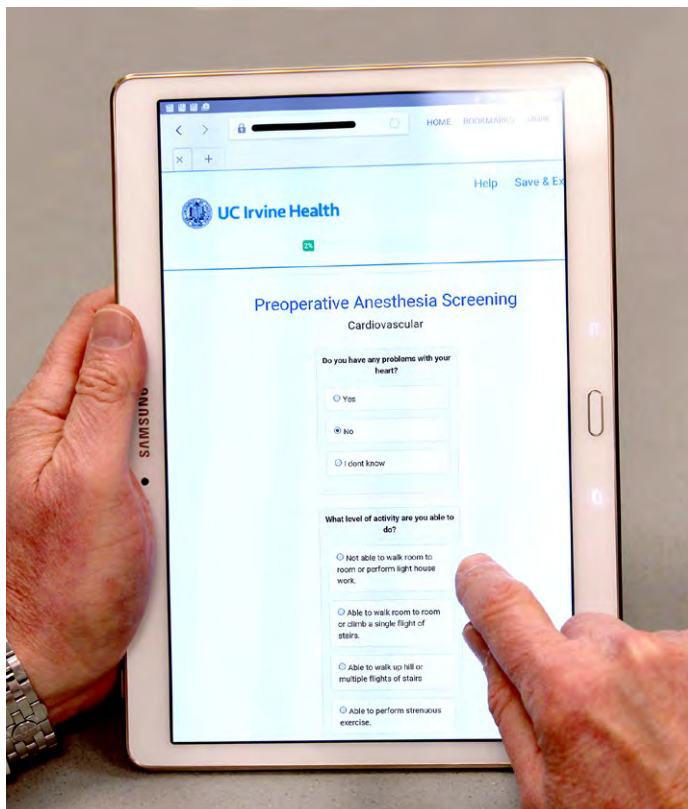


Figure 1: The Patient app of e-PAT is a Web-based electronic survey tool designed for quick entry of the relevant medical condition by patients. Since it is a Web app, patients can enter their information via PC, Mac, iPad, Android tablet or even smartphones.

e-PAT Output

Newsletter, ASA
MRN: 12345678
Approved By: hschwid
Proxy: Jill (Spouse) - 1234567890

Personal Data:

55 year old Male
180.00 lbs, 71.00 inches, BMI 25.10
Phone: 1234560987
Email: none@none.com
Scheduled Procedure: Orthopedics [* Lumbar Laminectomy/Discectomy]

Positive Findings:

Had heart attack more than 6 months ago
Coronary stents placed more than 6 months ago
Denies ICD
Exercise - Able to walk uphill or multiple flights of stairs
Exercise limited by breathing
Uses medications for hypertension
Doesn't know if snores
Has vision problems
Has a history of PONV
Doesn't know if has family history of problems with anesthesia
Doesn't know if has Advance Directive

Pt. Provided Feedback:

This was an efficient way to provide my info.

Risk Scores:

ASA: 3, Has had previous heart surgery or procedure, Coronary stents placed
PONV: 2/5, Non-smoker, Has a history of PONV
Pulmonary: 1/6, ASA > 2
Renal: 2/9, Has had heart attack, Uses medications for hypertension
Delirium: 1/6, Has vision problems

Recommendations:

Follow-up: Preop Evaluation by PHONE CALL: Has had heart attack, Coronary stents placed, Uses medications for hypertension, Doesn't know if has family history of problems with anesthesia

CBC: YES - High Bleeding Risk Surgery
PT/PTT/INR: YES - High Bleeding Risk Surgery
BMP: YES - Uses medications for hypertension
Liver Function Test: No
EKG: Yes - Major Surgery, Male, Age > 50
CXR: No
Urine Pregnancy Test: No
AICD/Pacer Interrogation: No

Figure 2: The output of the e-PAT report generator displays the positive findings in the medical condition and also suggests risk scores, recommendations for further evaluation and reasons for the recommendations.

When the patient submits his or her medical information from the Patient app, the responses are saved in a file on a secure HIPAA-compliant server. After the patient sees the surgeon, the Approval App is used to add the planned procedure to the patient's information. Either the surgeon or an assistant enters the procedure via a simple drop-down list for each surgical service line. The patient's medical conditions and the planned procedure are again stored on the HIPAA-compliant server.

After the planned procedure has been entered, a clinical decision support system suggests scores for postoperative risk indicators based on the patient's medical condition. As stated previously, the risk indicators include ASA Physical Status

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classification, risk of postoperative pulmonary and renal complications, PONV and postoperative delirium. The decision support system also executes institution-wide algorithms to combine the patient's medical condition and planned procedure to recommend whether the patient needs further evaluation by the anesthesia service via phone call and suggests the appropriate preoperative studies. The e-PAT output is available immediately in the surgeon's office to facilitate ordering of preoperative labs and often allows the full preoperative screening and laboratory evaluation to be completed in the surgeon's office during the initial visit.

The Viewer app is used in the anesthesia preoperative clinic to display the list of submitted e-PAT preoperative anesthesia questionnaires and the status of the preoperative screening process. The app makes it easy to see which patients are "Data Entry Only" and which require clarification of some information by phone call. "Data Entry Only" means the medical assistant types the information entered by the patient in the e-PAT Patient app into the anesthesia preoperative assessment module of our AIMS. This information is confirmed by the anesthesiologist responsible for the case the day of surgery. The e-PAT may recommend that staff in the anesthesia preoperative clinic call the patient to obtain further information ("Phone Call Needed"). For example, if the patient indicated on e-PAT that they or a family member had a prior problem with anesthesia other than PONV, a phone call is recommended and the caller is directed to obtain further information about the previous anesthetic problem. For a few patients, the phone call leads to a visit with an anesthesiologist, cardiologist or other consultant.

Implementation of e-PAT at Other Institutions

In order to use e-PAT or a similar preoperative screening tool at other institutions, it is first necessary to develop institutional guidelines for preoperative testing. Only when there is agreement between surgeons and the anesthesiologists for required testing can a computerized system be implemented. Agreement is essential, otherwise there will be delays and case cancellations on the day of surgery due to missing studies and consults, or unnecessary tests will be ordered to avoid possible delays. Once the providers agree on a predefined approach, the algorithms can be computerized.

The process for developing and implementing our preoperative testing process was methodical and collaborative. Representatives from the department of anesthesiology met with members of the UCI hospitalist group specifically interested in perioperative medicine. After a number of meetings over the course of approximately three months, this group developed an up-to-date, evidence-based document delineating recommended lab tests, ECGs, CXRs and other testing for patients based on an algorithm that is procedure- and patient comorbidity-specific.

Name	Date of Birth	MRN	Survey Date	Approved By	Viewed By
[REDACTED]	8/8/1999	2373208	3/12/2015 9:26:16 AM	eaicala	eaicala
Bigles, Howard	11/1/1955	123456	3/14/2015 10:55:13 AM	hschwid	lgarson
[REDACTED]	11/13/1968	12312312	3/6/2015 2:09:52 PM	csellias	csellias
[REDACTED]	9/14/1997	1240833	2/12/2015 9:02:59 AM	eaicala	eaicala
[REDACTED]	10/22/1946	0673254	3/18/2015 3:01:22 PM	eaicala	eaicala
[REDACTED]	10/30/1959	1232444	3/25/2015 3:06:28 PM	eaicala	eaicala
TestPatient	2/26/1984	1234567	3/24/2015 9:52:51 PM	csellias	csellias
[REDACTED]	11/30/1964	2370148	2/18/2015 3:33:16 PM	eaicala	eaicala
[REDACTED]	11/9/1963	1111111	3/16/2015 11:27:17 AM	gloverm	jgilliam
[REDACTED]	11/9/1993	22334455	2/26/2015 1:44:07 PM	gloverm	gloverm

Figure 3: The Viewer app displays the list of submitted preoperative evaluations. The icon on the right shows one of four states: "Ready for Data Entry," "Data Entry Completed," "Needs Phone Call," "Phone Call Completed."

This document was presented to the O.R. committee, fine-tuned and presented again the following month. Upon approval by the O.R. committee, this preoperative testing algorithm was presented to the medical executive committee for final approval as the preoperative testing recommendations of record for all UC Irvine Health clinics. Once this approval was given, the preoperative testing algorithm was discussed and explained to the anesthesia attendings at our monthly faculty meeting for dissemination and comments. In the final step, this document was then distributed to all surgical clinics to be used as their primary source to determine which preoperative tests, if any, should be ordered for their patients scheduled for surgery.

In order to smoothly integrate the algorithm into the workflow of the surgical clinics, all the surgical schedulers, medical assistants and nurses were instructed to communicate any questions regarding implementation of the algorithm to the Center for Perioperative Care (CPC), the department of anesthesiology's preoperative clinic. The collaborative effort between the department of anesthesiology, surgeons, CPC and the hospitalist group ensured the consistency of reasonable ordering of labs and other pertinent studies across the patient populations of the organization. CPC is often consulted by the physicians and nursing staff of the clinics to ensure the correct ordering of studies.

After the preoperative testing algorithm is defined, it can be computerized. The medical questions and responses are written to determine the extent of the patient's comorbidities to satisfy the requirements of the patient medical condition portion of the preoperative testing algorithm. The decision support logic for the testing recommendations determines the necessary questions and choices for responses.

Change Management and the Perioperative Surgical Home

Leslie M. Garson, M.D., M.I.H.M.

Shermeen B. Vakharia, M.D.

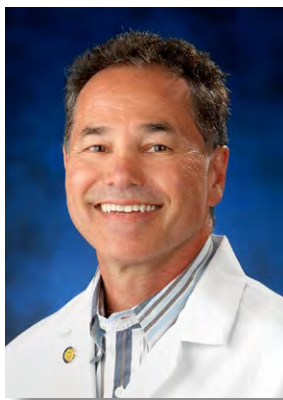
Zeev N. Kain, M.D., M.B.A.

The Perioperative Surgical Home (PSH) model – to reiterate what has been the defining lexicon in the anesthesia world for the past two years – is a patient-centered, physician-led multidisciplinary and team-based system of coordinated care for the surgical patient. This is a model of care that provides for the patient a perioperative experience that is continuous, seamless, without silos, efficient and intuitive. By intuitive, we mean *from the patients' perspective*. As patients, it would seem only natural that everybody on the team would know what the other individuals are doing. It would be obvious that information about the patient gathered in the preoperative phase would be communicated to the intraoperative team and postoperative team. Those events occurring during surgery would be appropriately communicated to the team managing the patient postoperatively. And, of course, once the patient left the hospital, all the information and events of the hospital course would be communicated with that patient's primary care physician and other providers, if

appropriate. However, we on the other side of the veil know differently. We understand, and have come to expect, silos of care, discontinuity of communication, and fragmented and variable processes. In fact, one could argue, as physicians and clinical providers, this way of practicing and caring for patients is "in our DNA." It is how we were trained and have practiced for years.

As the specialty of anesthesiology has embarked on this transformational journey of leading the PSH care model, those of us developing these new processes of care, implementing pathways, leading multidisciplinary teams, and initiating communication across practice areas and specialties have also experienced barriers to change along the way. It is in this regard that the mantra of change management has become so timely and imperative. John Kotter, in an article in *Harvard Business Review*,¹ makes the observation, "for any organization, the basic goal has been the same: to make fundamental changes in how business is conducted in order to help cope with a new, more challenging market environment." Nothing could more accurately describe the situation facing physician anesthesiologists trying to implement the PSH. Indeed, anesthesiologists need to use change management not only for various hospital processes but also within their own group culture and extend the concept to other physician stakeholders as well. Kotter goes on to explain that transformation is a *process*, not an event. It advances through stages that build on each other. And it may take years. Most importantly, shortcuts never work.

Kotter identifies eight crucial steps that, if skipped or not executed in the correct order, can sabotage an organizational change and lead to failure of an initiative. As we at UC Irvine



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Health have instituted a number of PSH service lines, these steps have been a guiding principle in bringing the organization along with our department in this transformational process. In the Prosci Change Management program,² “change management is the processes, tools and techniques for managing the people-side of change.” It is exactly this point Kotter extols in his eight steps to organizational change management – that it is the people involved who are the difference between success and failure.

Briefly, let’s review the stages required to bring about change management and how we have met these goals at UC Irvine Health. First and foremost, it is essential to establish a *sense of urgency*. It is further recommended to convince at least 75 of your managers that the status quo is more dangerous than the unknown. Dr. Zeev Kain has aptly demonstrated this concept in his oft used, and now commonly referred to, “burning platform” analogy.³ So it was within our department when we embarked on this process more than three years ago. At faculty meetings, in hallways, by email, the message by the chair of the department was clear – our way of “doing business” needed to drastically change and it needed to happen imminently. Second was the need to form a *guiding coalition*. This was executed by bringing together a group with a shared commitment and

enough leverage within their respective departments to get things done. Namely, the chair and vice chair of the anesthesiology department, the chair of the orthopedic department, chief of quality and safety, a surgeon champion in the form of our total joint replacement surgeon, and frontline anesthesiology faculty attendings who understood the day-to-day challenges of clinical care in the O.R. Next, and perhaps most importantly, was the need to *create a vision* – a vision that could be described in a 60-second elevator ride to anyone who worked in our hospital. And, within the construct of that future state, develop strategies for realizing that vision. This was the “hard work” part for our group. Meetings were organized to understand operational processes and barriers that currently existed. We determined fixes, devised quick wins, and developed mechanisms to operationalize the vision, all over many months.

For our institution, we used Lean Six Sigma methodology to help us understand current processes and make improvements. After creating a vision we then had to *communicate the vision*. This is where our department leaders took to the forefront to communicate and explain what we were doing in developing a PSH program to the hospital administration and others in

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leadership positions throughout the hospital. New models of caring for patients in the perioperative period were explained to all clinical staff – but it was primarily by example from the guiding coalition that the new ways of managing patient care were illustrated. Moving forward, it was then essential to *empower others to act on the vision*. Systems that undermined the goal of a PSH program were altered or changed. If workarounds were needed, they were implemented. At group meetings to build these new processes and establish multidisciplinary lines of communication, all ideas were welcome and given consideration. Next, it was imperative for overall morale and establishment of value to *create short-term wins*. We were fortunate to have a passionate, committed orthopedic surgeon as our surgical champion for this new model of perioperative care. As a member of the guiding coalition, along with other dedicated members of the multidisciplinary team, we were able to establish and validate with metrics the success of a Total Joint Replacement Surgical Home program in just 12 months.⁴

“As patients, it would seem only natural that everybody on the team would know what the other individuals are doing. It would be obvious that information about the patient gathered in the preoperative phase would be communicated to the intraoperative team and postoperative team. ... However, we on the other side of the veil know differently. We understand, and have come to expect, silos of care, discontinuity of communication, and fragmented and variable processes.”

As we have matured in this process of developing PSH service lines, we have likewise implemented the next step of Kotter's eight steps for successful transformation. Namely, we have *consolidated improvements and moved on to implement more change*. With the success of our Total Joint Replacement Surgical Home program now entering its third year, we have established surgical home programs for urology and other

orthopedic service lines and are currently in the midst of developing a new Neurosurgical Surgical Home service line. With each new service line PSH program we developed, we have brought on new members of the guiding coalition, with renewed commitment and more ideas and thus have reinvigorated the change process. Additionally, the credibility gained from the success of our current Surgical Home programs has allowed us to institute structural and system changes within the organization that heretofore would have been difficult, if not impossible, to execute.

Lastly, we have *articulated a shared connection between the PSH programs and institutional success*. New behaviors and innovative ways of doing things in a multidisciplinary fashion have now become the norm at our institution. Surgeons who are not formally in a PSH service line request that their patients “be a PSH patient.” Metrics shared with hospital administration exhibiting gained opportunity days, savings in the hundreds of thousands of dollars, decreased length of stay and improved patient satisfaction have ensured that our department and the hospital are on this path together.

We have seen from our experience that transforming a care model for an entire department is not without barriers, roadblocks, naysayers and missteps. However, with the guideposts offered by John Kotter, proposed by leadership with vision and fortitude and implemented by committed individuals with a shared purpose, we have shown that this kind of change is possible and can be successful. It is hard work, takes time and patience, and can sometimes be discouraging. But the important point is about putting a change management strategy into place that will last beyond any particular person, single event, service line or group. Rather, it will allow a transformation of clinical practice that will bode well for our specialty and, most importantly, for our patients.

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Palliative Care and the Perioperative Surgical Home

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The potential for creative cross-over, stimulating overlap of expertise, and ground-breaking collaboration between palliative care and anesthesiology within the Perioperative Surgical Home (PSH) environment is enormous.

Palliative care has been defined as patient- and family-centered care that attempts to optimize quality of life while minimizing the burden of disease. Palliative care is provided by a team of interdisciplinary specialists who address the physical, emotional, psychosocial and spiritual domains that make up a whole person. Unlike hospice care, palliative care is not constrained to an expected prognosis, so patients may receive palliative care at any stage in the course of their serious illness and they may receive curative treatment alongside palliative treatment. For patients with serious illness, palliative care provides better quality care at a lower cost.¹

The PSH has been defined as “a patient-centered and physician-led multidisciplinary and team-based system of coordinated care that guides the patient through the entire surgical experience,” from decision for the need for surgery until 30 days post-discharge from a medical facility. The goal is to create a better patient experience and make surgical care safer, thus promoting a better medical outcome at a lower cost.²

Leaders of the PSH movement view it as “an innovative, patient-centered, surgical continuity of care model that fully incorporates shared decision-making.”³ Shared decision-making, in which the patient and provider make health care decisions together, is at the heart of patient-centered care. Patient-centered care improves clinical outcomes, quality of life and patient satisfaction, and is associated with a decrease in inappropriate health care utilization and expenditure.⁴



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From its inception, the field of palliative care has focused on the importance of patient-centered care and shared decision-making, and multiple studies have demonstrated that palliative care provides better quality care at lower cost.⁵⁻⁸

The focus preoperatively in the PSH is on determining if the surgery itself is medically appropriate and in line with the patients' goals of care as well as optimizing their preoperative symptom management and medication regimen. Intraoperatively, the goal becomes guiding the patient through the surgery as safely as possible. Postoperatively, then, the focus shifts to optimizing pain and symptom management, and getting the patients home as quickly and safely as possible, while minimizing readmission and complication rates. Palliative care practitioners are experts in symptom management and goals-of-care conversations and could be extraordinarily helpful in guiding the care of these patients.

The health care system in the U.S. is moving from a fee-for-service model (“pay for volume”) to a bundled payment model (“pay for value”), incentivizing organizations to improve quality and service while lowering the costs. The Institute for Healthcare Improvement (IHI) came up with the “Triple Aim” as a framework of three interdependent goals to guide this necessary health care reform. The goals are 1) to improve the individual patient's experience of care (prioritizing shared decision-making and patient-centered care), 2) to improve the health of populations (educating and empowering patients to take a leadership role in their own as well as their family's and

	IHI	PSH	PC
Goal #1	Improve patient experience	Improve patient experience	Improve patient experience
Goal #2	Improve population health	Minimize surgical complications	Minimize burden of disease
Goal #3	Reduce per-capita cost	Reduce per-capita cost	Result is reduction in per-capita cost

IHI = Institute for Healthcare Improvement

PSH = Perioperative Surgical Home

PC = Palliative Care

their community's health) and 3) to decrease the per-capital costs of care. The Patient-Centered Medical Home (a primary care model) already exists, and recent data suggest it meets the triple aim. The PSH would be the surgical equivalent.⁹ Palliative care's entire philosophy incorporates the goals of the triple aim.

There are 30 million major inpatient surgeries and 50 million ambulatory outpatient surgeries in this country every year. More than half of hospital admission expenses are related to surgical care, and almost a third of patients 65 years and older undergo surgery the year before they die. The number of surgical patients 65 years and older is expected to reach 55 million by 2020 and 72 million by 2030.^{3,9}

“Who better to provide these patients expert palliative care than a palliative-trained anesthesiologist? One who understands both sides of the coin (the perioperative side and the specialized palliative care side) and can help patients and their families get where they want to be.”

A study done at Brigham and Women's in 2012 showed that nearly 5 percent of preoperative outpatients died within one year of their procedure. Among all preoperative patients there, half of those expected to require a postoperative ICU admission did not know this risk, and many reported feeling conflicted about having surgery at all.¹²

How many of these surgeries are necessary? How many are happening simply because the train is moving forward and no one has thought to apply the brakes? We need more focused patient-centeredness, shared decision-making and preoperative goals-of-care conversations. We need more palliative care in the perioperative environment.

Patients with serious illness and poor prognoses often receive care that does not help them achieve their goals. Who are these patients most commonly, and where can palliative

care involvement be most helpful? While not an exhaustive list, below are a few examples where palliative care would significantly improve standard perioperative care.

- The elderly – especially those with dementia – and their families could benefit from thorough preoperative goal-of-care conversations. These patients are also at highest risk for postoperative delirium. Are the procedures we providers recommend going to give these patients what they want and need?
- Patients with cancer who have chronic cancer-related pain, and who are on opiates preoperatively, may require a more complicated pain management regimen perioperatively. These patients may also benefit from goals-of-care conversations.
- End-stage heart failure patients who are being evaluated for mechanical assist devices need more thorough preparedness planning than a simple advance directive or living will provides. The Joint Commission now requires a palliative care provider to be a part of the core interdisciplinary ventricular assist device team for programs to receive advanced certification.
- Patients with multiple comorbidities are often symptomatic preoperatively and could use palliative care involvement to optimize their symptom management throughout the perioperative period.
- All patients receiving a tracheostomy and/or a feeding tube deserve a goals-of-care conversation to ensure these procedures are in line with patients' and family members' expectations.
- And patients, and families of patients, who have suffered neurologic or orthopedic trauma may need the kind of emotional support or goals-of-care guidance palliative care teams are trained to provide.

These patients and their families deserve better care than they are receiving in our current health care system. The PSH is one way of getting them that care. Physician anesthesiologists are skilled in providing much of this perioperative care. Even

Continued on page 30

though most anesthesiologists are not trained in palliative care, all are capable of providing primary palliative care. Primary palliative care is defined as the basic communication and management “skills and competencies required of all physicians and other healthcare professionals” who care for patients with serious illness.

Specialty palliative care becomes appropriate when patients require more complicated symptom management or goals-of-care conversations. Anesthesiologists are not trained in how to conduct complicated goals-of-care conversations. Most are not

“The perioperative patient population is an untouched frontier for palliative care. As the PSH movement continues to gain momentum, the possibilities for collaboration between the fields of anesthesiology and palliative care are wide open. And the need and opportunities for palliative-trained anesthesiologists, especially, have never been higher. Now is the time to join forces and get involved.”

experts in delirium management or “total pain” when patients’ psychosocial suffering is causing them physical pain. These patients need and deserve expert palliative care.

Who better to provide these patients expert palliative care than a palliative-trained anesthesiologist? One who understands both sides of the coin (the perioperative side and the specialized palliative care side) and can help patients and their families get where they want to be.

In 2006, the American Board of Anesthesiology acknowledged certification in Hospice and Palliative Medicine, formally designating it a medical specialty open to anesthesiologists. As of 2014, there were 78 ACGME-accredited fellowships and 111 certified anesthesiologists. But the number of fellowship-trained and board-certified anesthesiologists practicing palliative care is a much smaller number, probably on the order of 20.

The perioperative patient population is an untouched frontier for palliative care. As the PSH movement continues to gain momentum, the possibilities for collaboration between the fields of anesthesiology and palliative care are wide open. And the need and opportunities for palliative-trained anesthesiologists, especially, have never been higher. Now is the time to join forces and get involved.



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PSH Learning Collaborative 1.0 Wraps Up Successful Run, Version 2.0 to Begin in April

On November 30, 2015, members of the first Perioperative Surgical Home Learning Collaborative assembled at ASA headquarters in Schaumburg, Illinois, to celebrate the completion of the first collaborative – and the launch of the PSH Learning Collaborative 2.0.



Dr. Schweitzer addresses members of the first PSH Learning Collaborative last November at ASA headquarters.

In April 2014, 44 leading health care organizations united in the first collaborative to evaluate the viability of a PSH model in a variety of settings, from academic medical centers to community hospitals to group practices. In November 2015, these participants shared their experiences, and the decision was made to continue the learning collaborative for another two years. The second collaborative includes a number of enhancements, including new membership options, custom support opportunities and improved access to benchmarking data.

PSH Learning Collaborative Medical Director Michael Schweitzer, M.D., was pleased with the level of participation in the first collaborative and the results those participants reported.

“The PSH Learning Collaborative far exceeded our expectations. We had 44 participants instead of the 12 to 15 we had initially anticipated,” said Dr. Schweitzer. “About three-quarters of these collaborative members successfully launched one or more pilots.”

Dr. Schweitzer said the most common PSH service line pilots involved surgeons in specialties such as orthopedics, colorectal, urology, neuro-spine and general surgery. Ninety-two percent of the initial PSH Collaborative members plan to expand to new procedures or service lines soon.

Feedback from participants about challenges faced during the initial collaborative have been crucial in helping PSH organizers determine how best to assist those joining the second collaborative.

“The biggest barriers for success seemed to be data collection/reporting and buy-in by the health system senior leaders to prioritize staff resources for supporting PSH pilot implementation,” said Dr. Schweitzer. “We need to help members ensure buy-in from their health system senior leadership for the next collaborative.”



Learning Collaborative 1.0 participants shared their successes and challenges before moving into the next phases of their respective PSH models.

Learning Collaborative Participant Profile: TeamHealth Anesthesia

TeamHealth Anesthesia, based in Palm Beach Gardens, Florida, was one of the 44 participants in the initial learning collaborative. Because TeamHealth is a multispecialty physician group, Chief Medical Officer Sonya Pease, M.D., said the strategic goals of improving integration across service lines aligned perfectly with the goals of the PSH.



Sonya Pease, M.D., second from left, with members of her TeamHealth PSH team.

“For us, it was a no brainer, an opportunity to get smarter faster with added resources and infrastructure,” she said. “It was also a way of engaging our hospital C-suites and post-acute care partners in a joint effort by becoming a part of their organization’s value stream as well.”

The PSH model that TeamHealth adopted not only improved their internal integration efforts but also helped better integrate with external health care stakeholders.

Getting the C-Suite on Board

TeamHealth benefited from a very engaged and supportive C-suite. Dr. Pease said, in fact, that all of their PSH innovation sites maintain a C-suite executive sponsor, and each site has actively participated in quarterly collaborative meetings.

Not everyone jumped on board as quickly, however.

“Most of our medical directors were very wary of the added work,” said Dr. Pease. “Leadership is work and requires time and support, so we hired a full-time project manager and decompressed some clinical time so our leaders could be engaged.”

Measuring Success

On a scale from 1-10, Dr. Pease described her organization’s overall success with their early PSH model as a “7.” But the numbers were relative in TeamHealth’s experience.

“Some of our sites started at a 1, some of our sites started at a 7, so those struggling at the bottom learned quicker and had a lot of tools and resources to use,” said Dr. Pease. “Those who started on the higher end of the bell curve still showed significant improvement in the overall standardization and process improvement steps, but probably didn’t show as much growth simply because they were already great performers.”

Advancing the PSH Model

Dr. Pease described her organization as ready for the next steps in their PSH “portfolio.” Their initial work in 2014-15 put foundational elements in place related to leadership alignment, clinical standardization and quality management and improvement.

“Experience with multiple sites representing community hospitals, academic hospitals, for-profit, not-for-profit, unions and non-unions has given us a huge portfolio of tactics and strategies to make this possible in any environment,” she said. “We will continue to hard wire what we have learned and build out our implementation tools so we can make this model of care the standard across all our practices nationwide.”

Society Support

Dr. Pease said that ASA helped TeamHealth enormously by “doing the hard work of circling the wagons” and providing tangible resources and leadership in the early stages of implementation. As their own PSH grew, its successes quickly drew notice. Success fed upon success.

“We’re all competitive, and when you see what other organizations are doing first-hand, it’s impossible to stand there and do nothing,” said Dr. Pease. “Being a part of the collaborative has created a lot of momentum within our organization.”



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New Home Page – My Personal Experience with a Surgical Home Model

George Williams, M.D., FCCP
Committee on Critical Care Medicine

With the creation of the Perioperative Surgical Home (PSH), ASA has our specialty poised to take advantage of physician anesthesiologists' diverse and unique training.

The PSH has definitively established that the practice of anesthesiology encompasses the entire perioperative arena.¹ The concept is not novel because physician anesthesiologists have always fulfilled this role to varying degrees. The current regulatory and legislative environment, which emphasizes quality of care and reduction in health care costs, strives to promote consistency across all practices caring for patients. Without consistency, it is difficult to demonstrate improvement when it occurs. With ongoing changes in health care, we are now creating an environment in which outcome studies are becoming part of all practices.

To achieve consistency in health care, fewer teams, transitions and handoffs are needed, effectively breaking down silos that exist. The O.R. is one of the highest-cost areas in any hospital, and physician anesthesiologists are the foremost physicians who can help to control this cost.² The ICU is another cost center for hospitals; more than \$3.3 billion of Medicare spending is applied toward critical care medicine and high-acuity physician's fees.³ Harmonizing care between the ICU and O.R. establishes a continuum of care. For example, at Memorial Hermann Hospital, our neurocritical care team (comprising physician anesthesiologists and neurologists) has implemented a surgical home model for all acute admissions with a traumatic brain injury spanning operative and ICU care.

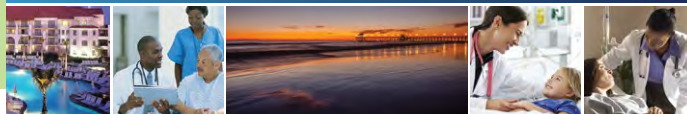


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From the moment a patient comes into the ICU, either from the emergency room or the O.R., the attending in the ICU becomes the physician of record following the first 24 hours of admission (to meet American College of Surgeons trauma center guidelines). Thereafter, as the neurocritical care attending, I am responsible for all aspects of the patient's care in perpetuity. When the patient is transferred to the intermediate care unit (IMU) or regular hospital floor, I remain responsible for his or her care. At first, I was not enthusiastic about proceeding in such a fashion. I had completed a fellowship in critical care, after all, and if a patient is not critically ill he or she does not need my expertise as an acute care perioperative physician.

"The results are clear: length of stay has been reduced, patient satisfaction is improved and costs associated with each admission are lower. Given our success, other groups in our hospital are attempting to replicate this model."

After having practiced in this fashion for more than two years, however, it is clear that there are many benefits to this level of integration. First of all, I have been forced to apply my O.R. efficiency mindset to ICU patients; I complete tasks as simultaneously as possible. Nursing home discussions happen much earlier, including the implications of long-term care and repeated surgeries. If a patient has not received a physical therapy assessment, swallow evaluation or other necessary determination, he or she will remain in the hospital longer, increasing the size and complexity of my service. These formalities become priorities for patient discharge. I have become much more fluent in the rules for patient disposition (i.e., which patients will be accepted by long-term acute care, skilled nursing or rehabilitation facilities) and can apply this knowledge earlier in the admission. Using my acute care skills to decide who is truly "sick" or not, I approach each evaluation with this consideration: Why should this patient be in the hospital?



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Perioperative Surgical Home 2015 Supplement

The results are clear: length of stay has been reduced, patient satisfaction is improved and costs associated with each admission are lower. Given our success, other groups in our hospital are attempting to replicate this model. Using a similar model, others have demonstrated reduction in length of stay and mortality.⁴ I readily admit that every physician anesthesiologist may not be comfortable practicing in the O.R., ICU, IMU and on the hospital wards, but having practiced in this model for some time now, I can honestly say that the medical knowledge we use every day is no different in these venues. What is different is the focus. Caring for a patient with a medical condition requiring surgery is the same in the PACU or O.R.

In 2011, \$176 billion was spent on inpatient surgery in the United States.⁵ If implementing the surgical home across all of our practices could reduce costs by 1 percent, more than the entire national cost of the Children's Health Insurance Program (CHIP), Maternal Health and Rehabilitation programs (three separate programs) could be offset in the same year.⁶ When ASA meets with policymakers advocating for payment reforms, cost-saving models are an effective way to be heard. With the development of the Merit-Based Incentive Payment System (MIPS), more of these conversations will take place in the near future.

Don't miss the printed PSH supplement you received with this issue of the *ASA Monitor*. The supplement contains reports from physician anesthesiologists and others who have incorporated Perioperative Surgical Home models in their institutions. These PSH innovators share their challenges and successes and are eager to open up dialogue with others interested in this important new model of care. Don't miss their stories! You can learn more about the PSH at asahq.org/psb.

Although the ability to care for patients at extremes of physiology sets us apart from every other specialty, we also can improve patient care across the entire perioperative domain. Expanding our practice outside the walls of the O.R. gives physician anesthesiologists the advantage of exerting leadership in a demonstrable, consistent way to benefit our patients. We can steer the changes that occur daily in the practice of medicine. As Benjamin Franklin famously said, "When you're finished changing, you're finished."

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The Future of Perioperative Medicine

Solomon Aronson M.D., M.B.A., FACC, FCCP, FAHA, FASE
Committee on Future Models of Anesthesia Practice

David E. Attarian, M.D., FACS

The cost of health care is unsustainable. By 2020, with approximately 50 percent of adults predicted to have one chronic disease and 25 percent to have multiple diseases, an estimated 19 percent of the United States gross domestic product will be devoted to health care. Additional burdens on the system are expected from an aging population, with Americans aged 65 years or older projected to reach \$55 million by 2020 and \$72 million by 2030. As a consequence, Medicare spending (Part A, B and D) is expected to be \$542 billion in deficit by 2025.¹

Surgical care, in particular, accounts for half of hospital admission expenses, with the rate expected to increase as the population ages. However, the majority of this spending comes from a smaller proportion of the population. For example, it is estimated that 32 percent of the U.S. population aged 65 years or older undergoes surgery in the year before their death. That fact, taken together with knowledge that the average cost of a surgical complication is approximately \$12,000 per event,² is cause for alarm. The opportunities to alter this cost trajectory and add value to the health care system are enormous.

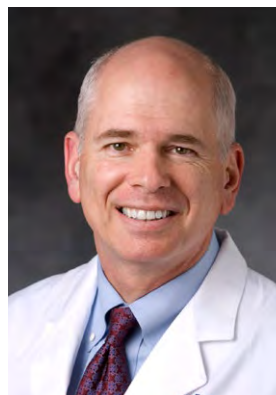
Homes, Enhanced Recovery and Beyond

The concept of a medical home or “Patient-Centered Medical Home” (PCMH) was first proposed in the late 1960s by the American Academy of Pediatrics and later adapted by the American Academy of Family Physicians to fulfill the goals

of the “triple aim.”³ The medical home concept has continued to evolve in primary care, and the traditional promise of cost savings from population health care within the PCMH model is being re-evaluated. It is now understood that the administrative overhead required to care for the largest (i.e., healthy) cohort of a population far exceeds the expected reduction in health care spending for that population segment. Currently, it appears that the asymptomatic early chronic disease cohort is served best by a traditional medical home model, whereas the opportunity for greatest impact may lie within the management of the most complex episodes for the sickest patients. In this latter cohort, early adaptation of multidiscipline specialty driven, best practice-care design offers the greatest opportunity for value enhancement in population management. Since the recent introduction of the concept, we have seen several versions of the Perioperative Surgical Home (PSH) proposed as a surgical care model.^{4,5} It is noteworthy that individual programs have been received with varying degrees of acceptance and/or resistance. The concept of “Enhanced Recovery” after colorectal surgery was pioneered in the late 1990s⁶ in Denmark and has since expanded to other procedures throughout the world. Successful implementation of enhanced or accelerated recovery protocols portend decreased hospital length of stay and decreased postoperative complications. All require collaboration between surgeons, anesthesiologists and the perioperative nursing service to provide optimal perioperative care.



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Following early success at Duke with colorectal enhanced recovery⁷ and with interest to develop more comprehensive perioperative best practice care redesign, the Perioperative Enhancement Team (POET) was launched in 2012. The guiding principles of POET are to enhance the value proposition of perioperative care through a disciplined and multidiscipline care re-engineering process. At Duke, POET has grown in scope and scale with support from other institutional key stakeholders, including general surgery, orthopedic surgery, gynecologic surgery, CT surgery, neurosurgery, neurology, hematology, endocrinology, gerontology, hospital medicine, hospital pharmacy and hospital administration.

“Surgical care, in particular, accounts for half of hospital admission expenses, with the rate expected to increase as the population ages. However, the majority of this spending comes from a smaller proportion of the population. For example, it is estimated that 32 percent of the U.S. population aged 65 years or older undergoes surgery in the year before their death.”

The collective competencies of a core team bring together strategy, operations, tactics, finance, workflow design, project management, information technology integration and data tracking. The POET process begins with generative discussion with an expectation for a supportive business case to implement care design change. Once the clinical outcome improvement and financial analysis are completed and judged to be compelling, care providers and clinical managers work with a project management team to redesign work streams and facilitate operational changes. At the same time, clinical metrics are developed and informatics resources are leveraged to enable continuous data tracking.

The first POET project was a preoperative anemia clinic (PAC). A proactive approach for perioperative blood management and reducing transfusion-related adverse outcomes requires the optimization of the patient's preoperative red blood cell mass, thus avoiding the critical intra/postoperative

transfusion threshold decision altogether.⁸ Recognizing that preoperative anemia is one of the strongest predictors of perioperative transfusion, comparative research was first performed to determine the institution's transfusion rate and procedure-specific triggers for transfusion. Volume projections for work flow and work need analyses were then conducted based on institutional historic rates of anemia. This was followed by a financial modeling of the anemia clinic's impact. Subsequently, a comprehensive diagnostic and treatment workflow model was created, and downstream staff planning and training requirements were determined. Physical space options and needs for laboratory ordering, schedule integration and care team communication were also established before launching the program. Finally, patient education needs were assessed and met.⁹ Continuous data tracking and communication of program status are performed with a newsletter to all stakeholders describing progress and ongoing efforts.

Other POET projects aimed at risk stratification, risk reduction and care optimization of patients prior to surgery include a preoperative diabetes clinic, with the aim of enhancing glucose management in diabetic surgical patients at high risk

Continued on page 18



for perioperative infection and related adverse outcomes secondary to inadequate glucose control¹⁰ and the Patient Chronic Pain Management Center (PCPMC) for perioperative management of patients with complex pain syndromes. The PCPMC utilizes triggers¹¹ to identified patients likely to be high resource utilizers and re-engineers the perioperative care pathway for these chronic pain patients prior to and following elective surgery. In the spine optimization pathway, PCPMC plans to utilize telehealth visits before and after spine surgery. On deck, other risk reduction and care optimization concepts for POET include a preoperative nutrition clinic and a preoperative physical therapy clinic as a component of our preoperative optimization for senior health, or POSH, clinic.

Outside of the direct perioperative domain, POET initiated the Pain Assessment Risk Treatment for Novel Effective Recovery (PARTNER) program whereby “high utilizers” of the emergency department (ED) are identified and addressed. Hospitalists, anesthesiologists, neurologists and social workers collaborated to develop and implement an alternative clinical care pathway for patients with sickle cell disease, chronic headache disease and/or chronic pain with the goal to reduce avoidable ED visitation.

POET has also coordinated a multidisciplinary team to define coagulopathy correction algorithms for hemorrhagic protocols in the setting of OB, CT surgery and trauma surgery as well as coagulopathy correction for hemorrhagic stroke. The Coagulation and Lysis Oversight Team, or CLOT, facilitates system development, dissemination and electronic medical record (EMR) integration of these protocols to monitor and thereby help ensure adherence.

Going forward, POET may contribute more broadly to population health management. Many patients with chronic disease only enter the health system when declared surgical. The Risk Evaluation-Care Optimization for Value Enhanced Recovery, or RECOVER, program could offer comprehensive preoperative management (where appropriate), dietary and/or smoking cessation counseling, preemptive muscular strength conditioning, and track compliance with preventive health care measures, including vaccinations, immunizations, blood pressure and lipid screening. In addition, POET proposes the Multidisciplinary Acute Postop Service (MAPS) Team. MAPS would engage vital contributions from surgeons, internists/hospitalists, anesthesiologists and nursing personnel to work as partners to provide effective care navigation and coordination,

ensuring adherences to enhanced recovery care maps, acute pain and acute or chronic medical condition management (exacerbated by the perturbation of surgery), and rehabilitation to facilitate throughput and expedited discharge.

In summary, the future of perioperative medicine will rely on, and be sustained by, the competencies of multiple disciplines and their respective coordination of care. This is especially true for patients with chronic and complex disease, whereby the greatest savings opportunity will be realized in reducing variation in care design and proactively engaging perioperative specialist teams to not just identify risk but to aggressively manage risk. The future of perioperative medicine is POETic.

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Interdisciplinary Teamwork and Bureaucracy Flattening: *The Keys to Optimal Perioperative Care*

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Our Biggest Problem Is Linear Management in a Non-Linear World

Surgical care providers across the U.S. are rapidly embracing the fundamental tenets of the Perioperative Surgical Home (PSH) model of care: coordinated global care of the surgical patient and standardized, evidence-based, interdisciplinary care pathways. Unfortunately, instead of seeing their expectations logically borne out as performance improvement success stories, advocates of surgical care improvement are often frustrated by unrelenting bureaucracy, persistently unfocused care coordination and suboptimal outcomes. This situation might be considered paradoxical, but in reality it is entirely predictable. Highly hierarchical organizations with centralized command-and-control are well-suited to structured, static environments and to centralized decision-making that produces predictable outcomes. Mathematicians, physicists and engineers use the adjective *linear* in describing such environments: *linear* equations, *linear* systems, *linear* thinking. However, frontline health care providers work in complex *non-linear* systems in which patients and disease processes are often highly variable, working conditions are not always optimal and outcomes are often not precisely predictable. Those multilayered bureaucracies and departmental silos that may effectively manage

linear environments and systems with linear thinking are counter-productive in our world of greater uncertainty and often semi-chaos – and the result is often suboptimal outcomes, workplace inefficiency and worker frustration.

The first large organization to recognize this phenomenon was the U.S. Marine Corps. Coming out of World War I, with its well-defined battle lines and massed troop movements, the Marines soon found themselves immersed in the radically different environment of the Central American guerrilla wars of the 1920s and 1930s. In a series of articles in the *Marine Corps Gazette*, Yale graduate Samuel Harrington described the new need for smaller, more nimble teams of soldiers with complementary skill sets, and team leaders with front-line decision-making empowerment to take both preemptive initiative and react quickly and flexibly to changing local situations. Today, the imperative of our changing surgical practice environment is similarly moving us away from hierarchical bureaucracy and departmental silos organized according to our educational backgrounds, to health care systems characterized by flattened (“delayed”) bureaucracy, front-line decision-making empowerment and clinical integration. The result will be interdisciplinary teams of surgeons, anesthesiologists, nurse anesthetists, intensivists, hospitalists, emergency physicians, nurses, and other



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professionals organized and purpose-built for the surgical lines they care for – an operational systems organization concept General Stanley McChrystal recently labeled a *team of teams*.

What Is the “Perioperative Team?”

In the past, perioperative roles and responsibilities were defined between primary care physician, surgeon and anesthesiologist, with variable coordination among them and with little consideration of the contributions of nursing, pharmacy, physical therapy and other non-physician professions. While this separation of powers and responsibilities provided a framework for the medical community to organize care, it failed to take into account basic truths about health care delivery. Surgical patient care takes place along a continuum

and is optimally coordinated between many specialties and support services. Such care should commence when the patient is first referred to a surgeon and continue seamlessly until the patient is fully recovered. The flow of relevant medical data, along with information related to psychosocial and logistical issues, to all care team members is essential. For example, it is inadvisable to perform a craniotomy on a patient with no support at home, regardless of medical fitness for surgery, without first arranging for post-discharge care. Perioperative care teams function best when all members are aware of the value that the others bring to the table. With growing patient complexity, along with fragmentation of care in the

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community, it is essential that internists, surgeons, anesthesiologists, intensivists, emergency physicians, consultants, nurses and all other members of the perioperative care team approach the patient from the same playbook.

Why the Focus on Perioperative Teamwork?

Despite increased adoption of integrated electronic health records, communication failures still rank as a top contributor to adverse patient events, according to the Joint Commission. In most practice environments, a single provider cannot possibly know and communicate with all the other providers involved in the care of a patient regarding a given plan of action, or respond to others' care plans, in a dynamic fashion. The best solution: transition our care model from teams of independent experts to a team of expert teams.

This team approach in surgery is best exemplified by the Enhanced Recovery After Surgery (ERAS) protocols. While there are basic fundamental principles for ERAS protocols, the underlying operational focus is on coordinated, integrated care across the entire surgical episode. For example, an ERAS anesthetic care plan for major abdominal surgery minimizing the use of intraoperative and postoperative intravenous opioids is contingent upon the surgeon aggressively using non-opioid-based pain regimens, oral opioids as needed and immediate resumption of enteral feeding in the postoperative recovery period. Transitioning to such a team approach allows providers to be complementary in their actions for the benefit of the patient, rather than merely focusing on their own discrete phase of traditional care. The broad success of ERAS protocols in reducing hospital lengths of stay, incidence and severity of complications, hospital readmission rates, and resource utilization is a function of perioperative teamwork: anesthesia, surgery, nursing and other professionals working in synchrony from a single, coordinated plan of global perioperative care.

Perioperative Quality Is Also a Team Concept

Similar to the successful intervention of procedure “bundles” that group together best practices for quality improvement, a perioperative team is also an interdisciplinary “people bundle” grouped together for their complementary roles in the patient care continuum. The interdisciplinary perioperative care team is the single most important component of the global perioperative quality improvement process, having the most profound impact upon surgical care and outcomes improvement. Electronic health records and registry analytics may all increase efficiency of quality processes, but the effectiveness of each process is due to the team of people implementing it.

The Michigan Surgical Quality Collaborative *colectomy bundle* is an example of this quality team concept. Composed of standardized preoperative, intraoperative and postoperative strategies, it has demonstrated marked success in decreasing the rate of surgical site infection (SSI). Standardized interventions, including appropriate antibiotics, maintenance of normothermia, oral antibiotics with bowel preparation, perioperative glycemic control, minimally invasive surgery and short operative duration, have reduced rates of SSI by one third. However, the success of this colectomy bundle is due to the perioperative care team – no one individual can produce these results. The surgeon, anesthesiologist, nurse anesthetist, hospitalist, intensivist, the PACU, O.R. and unit nurses, the pharmacist, the emergency physician, the PA and many others working as a well-organized team are critical to optimal patient outcome.

“As U.S. surgical care increasingly embraces the PSH fundamentals of a global, integrated care continuum and standardized, optimized recovery processes, and is impacted by cost management, bundled payments, surgical line-specific quality measures and population health, our health care systems will continue to discard outmoded concepts of hierarchical bureaucracy, centralized command-and-control and departmental silos.”

Why Nursing Is a Critical Component of the Perioperative Team

The impact of nursing should not be underestimated in building a strong multidisciplinary perioperative team. Nurses are the only constant in a patient's hospitalization, 24/7, from admission to discharge, and nurses are there when policies and procedures are executed and key decisions for patient care are determined. Astute nurses on your team are aware of the formal and informal hierarchy within the hospital system and are knowledgeable about when and how to summon support and buy-in when necessary. Perhaps most important, nurses often preserve the human touch and assume the role of advocate

when the patient is most vulnerable. Nurses who are expert in perioperative care processes, who possess a full understanding of formal and informal hospital hierarchy (i.e., how to get things done) and who are respected among their peers will make high-impact contributions to any perioperative team.

What Is the Role of the Health Care System Bureaucracy?

What can the administrative bureaucracy of a “team of teams” health care system do to support its surgical care teams? First, it should provide strategic direction to those teams and promote inter-team coordination and synergy. Second, it should provide a toolkit of surgical care-oriented services useful to every surgical team, including comorbidity disease management, anemia and transfusion management, nutrition, surgical infectious diseases, psychosocial, patient safety and risk management, and acquisition and analysis services for outcomes and financial data. At the same time, it should avoid second-guessing front-line decision-makers (“eyes on, hands off”). At present, health care systems rarely take this holistic approach to their surgical care microenvironment(s).

The Way Forward: McChrystal’s Team of Teams

As U.S. surgical care increasingly embraces the PSH fundamentals of a global, integrated care continuum and standardized, optimized recovery processes, and is impacted by cost management, bundled payments, surgical line-specific quality measures and population health, our health care systems will continue to discard outmoded concepts of hierarchical bureaucracy, centralized command-and-control and departmental silos. In their place, we will see bureaucracy flattening, the rise of front-line decision empowerment, and the creation and continuous improvement of nimble, interdisciplinary perioperative care teams. These teams will focus on specific surgical lines, operate within the boundaries of evidence-based, optimized care protocols, and report team-based quality and financial outcomes data that patients, payers and government regulators will expect. Samuel Harrington’s hypothesis remains as relevant today as it was nearly 100 years ago: in non-linear environments, hierarchical bureaucracy and people silos must be replaced by interdisciplinary teamwork and front-line decision-making. Surgical care is no exception – there is simply no other way.

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THE PERIOPERATIVE SURGICAL HOME:

Have Health Care Literacy, Family Education and Patient Empowerment Been Lost in the Shuffle of Streamlined Care?

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The Perioperative Surgical Home (PSH) model of care has been developed in an attempt to streamline patient recovery by providing evidence-based care and reducing care variability. Although much attention has been placed on medications, techniques and devices that can accomplish this variability reduction, we feel that an important aspect (if not the most important aspect) of these protocols is frequently ignored: patient education and empowerment. Setting realistic goals/expectations and educating the patient and family members using appropriate language and educational aids set the stage for all that follows, yet precious little literature focuses on this common-sense approach.

What literature does exist reveals varying results. A study in preoperative cancer patients concluded that face-to-face education provided more improvement on anxiety, satisfaction, knowledge and health care costs, whereas audio-visual and multimedia interventions only improved satisfaction and knowledge, and written interventions had very mixed results (Waller 2015). Preoperative patient education has also been associated with a reduced length of stay after joint arthroplasty (Jones 2011) and thoracic surgery (Madani 2015) and has been associated with reduction in total costs (Tait 2015). In contrast, a recent systematic review of orthopedic joint education concluded that preoperative education offers minimal benefit beyond decreasing preoperative anxiety (McDonald 2014).

Variation in the format of education, surgical type and overall surgical care most certainly results in this reported variability.

A focus on individual outcomes may shed more light on the benefits of preoperative education. For surgical patients, pain is the most feared complication of any procedure. With fair certainty, we can say that cutting someone with a knife will result in pain, yet Apfelbaum and colleagues found that a full third of patients surveyed reported a complete lack of preoperative education about pain. Why this might be is unclear, but *avoiding all education about a guaranteed adverse event represents neither good medicine nor good common sense*.

It is our experience that patients expect to have zero pain after surgery, yet when patients are appropriately educated about the side-effects of opioids they are more willing to accept higher levels of pain if they can avoid these effects (which were elegantly described by Gan and others in 2004). Therefore, patient education can provide a patient with an understanding of reasonable and safe analgesic goals. Along with providing positive outcomes, setting realistic expectations is a key to patient satisfaction. A study at the Hospital for Special Surgery found that 34 percent of patients had discordantly high expectations of their outcome compared to the surgeon (Ghomerawi 2012), suggesting that appropriate preoperative education could afford an excellent opportunity to provide information and set realistic expectations prior to the day of surgery.



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Health care literacy involves the patient's ability to process and understand health information needed to make appropriate health decisions. Inadequate health care literacy is associated with poor health status, increased hospital utilization and readmission (Goedell 2015). The PSH provides an opportunity to evaluate and optimize a patient's health care literacy and thereby help reduce postoperative events. As already mentioned, preoperative education can include counseling, printed materials and multimedia information. The format and personnel providing the education may (and generally should) vary between health care systems, depending on resource availability. PSH programs utilize multidisciplinary teams to develop educational programs and patients should participate in the weeks leading up to surgery (ideally always with family members present). The National Patient Safety Foundation and ASA have tools available to assist in patient education, and PSH member hospitals routinely make their educational materials freely available to others. These resources may be used as templates for health systems to create their own educational program. The goal of preoperative education is to empower patients and family/caregivers to become active participants in their recovery and increase coordination and preparedness for discharge.

PSH programs have reported great success, and much of this success comes from caring for better-informed, better-prepared patients. When discussing multidisciplinary teams and complex care interventions, let us not forget about educating the most important member of that team: the patient.

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The Pediatric Perioperative Surgical Home: Current Developments

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There has been a great deal of momentum over the past several years related to the Perioperative Surgical Home (PSH) model of care. Much of the work and published literature at institutions across the country and within the ASA PSH Collaborative have been focused on the perioperative home for adults. However, there has been a significant amount of effort specific to pediatric patients and pediatric hospitals in the PSH model. Because the continuum of pediatric care differs in a number of ways compared to the care of adults, the Pediatric Perioperative Surgical Home (PPSH) has a great deal of overlap in concept but requires distinctive planning for its potential implementation.



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The adult PSH has mostly been focused on procedure-based care in areas such as total joint, spine, colorectal and coronary artery bypass surgery. There is some application of this work for the teenage population; however, both the common procedures and the considerations for the young-aged patient vary significantly from the adult procedure-based models. Additionally, efforts in blood management through an anemia clinic, adult enhanced-recovery programs, including pain management and preoperative optimization with prehabilitation pathways, are challenging to translate to a child or infant. Lastly, much of the complex pediatric care provided is disease-based rather than procedure-based, with much in common with a medical home.

The areas of high cost in pediatric patients are also dissimilar secondary to the high post-discharge care in adults and a much higher adult readmission rate, which is a focus of the PSH (19.6 percent adult readmission versus 6.5 percent pediatric readmission within 30 days). Rather than center on an episode of care, the PPSH includes the lifelong, chronic care of congenital diseases. The 10 percent of children in our care with a chronic illness represent 50 percent of the annual pediatric medical expenditure. Part of the goal of any PSH, in addition to improving quality outcomes and patient care coordination, is to reduce health care expenditure. Pediatric care represents 13 percent of total health care expenditures in the U.S. The value-based purchasing, bundled payment and



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accountable care organization (ACO) models in pediatrics lag behind adult programs. So, the children's hospital incentives may align along different cost savings goals from programs such as comprehensive care for joint replacement. Currently there are only five pediatric ACOs in the U.S.

How Does the PPSH Function?

Given the disparities between pediatric and adult perioperative care, the value components of the PSH model when applied to pediatric patients must be identified differently from the adult population. The prevalence of children in the U.S. with special health care needs – defined as physical, developmental, behavioral or emotional conditions requiring health services beyond those of the general population – has increased by 18 percent between 2001 and 2010. These patients now represent 15.1 percent of the total population less than 18 years of age. Anesthesiologists who develop and direct PPSHs, as well as PSHs caring for mixed adult and pediatric populations, will require additional pathways for children with congenital and acquired chronic disease and associated specific pediatric needs.

Rather than organized around surgical case-specific procedures such as joint replacement, pediatric integrated perioperative care might be better aggregated around procedures focused on chronic diseases that have a high cost and high prevalence. Based on recent Pediatric Health

Information System data, the most expensive pediatric surgical procedures are: bone marrow transplantation, craniotomy, spinal fusion, tonsillectomy and adenoidectomy, appendectomy and repair of congenital cardiac lesions. Procedures likely best suited for PPSH implementation include direct laryngoscopy and/or bronchoscopy, tonsillectomy with or without adenoidectomy, ventriculo-peritoneal shunt procedures, spinal fusion for correction of scoliosis, cleft lip and palate repair, gastrostomy tube insertion, and procedures to correct congenital vascular anomalies. Many of these procedures may be completed as outpatient procedures without the need for inpatient pathways. However, pre-optimization and care integration are still essential components of the care of these children. The overarching concept of the integrated episode of surgical care includes but is not limited to the preoperative component. The common aim is to consider post-acute care outcomes during the preoperative phase. Evaluation and optimization of co-morbid conditions, communication and planning with medical subspecialty physicians, postoperative pain management and disposition all may be initiated during the preoperative phase. Family engagement in the perioperative plan and education and expectations around the postoperative course are important parts of decreasing length of stay as well as preventing a portion of readmissions.

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Many of the metrics that define value in the domains of quality, safety and patient/family satisfaction in adult surgical patients may apply to pediatric practice as well. These include hospital cost, length of stay, readmission, same-day cancellations, postoperative pain, nausea and vomiting, unplanned upgrade of care, actual discharge disposition, and mortality. Although inpatient length of stay and 30-day readmission are metrics that may be applied to both populations, the use of home health aides, skilled nursing or post-acute transfer to rehabilitation facilities is not widely applicable to the pediatric population.

“Rather than organized around surgical case-specific procedures such as joint replacement, pediatric integrated perioperative care might be better aggregated around procedures focused on chronic diseases that have a high cost and high prevalence.”

Compared to adults, the reasons for readmission of pediatric patients within 30 days of discharge are significantly different and include dehydration, electrolyte imbalance, gastritis, constipation, seizures, pneumonia, anemia and upper-respiratory infection. Hospital mortality rates are 1.1 percent for pediatric patients as compared to 2.0 percent for adult patients. Pediatric postoperative care involves home care with family as the primary providers.

Pediatric Perioperative Surgical Home Activity

The PPSH not only requires different considerations than its adult counterpart but is in an earlier stage of development (no pun intended). There is definitely value and interest. The commonalities of the important and central concepts of integration, collaboration and communication must happen during the continuum of an adult or child's perioperative care. These concepts are quite basic but still hard to establish with consistency and ease.

Five pediatric-based programs started with ASA in the first PSH learning collaborative two years ago, and some have functional homes developed. More important, the interest and discussion has started among the various pediatric hospitals and programs and pediatric care providers. During the SPA-AAP Pediatric Anesthesiology 2016, a practical workshop was held that generated much discussion. Various groups are at different points of establishing a PPSH in their institutions. A formal request has been made to the leadership of SPA to formalize a PPSH special interest group. There will be various panel presentations available to learn more about the PPSH during the SPA annual meeting and throughout the October ASA ANESTHESIOLOGY® 2016 annual meeting.

The PPSH is evolving alongside adult PSH programs. There are established and successfully implemented models of the PPSH available to serve to as mentorship programs to budding ones. This is a solution to enable us to cross the continuum of the perioperative care and prevent fragmentation in a unique population. The “Triple Aim” goals of the PSH (“better health, better health care and reduced expenditures”) were originally established by a pediatrician – and this is a perfect expansion of the concept.

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Perioperative Surgical Home Collaborative Update

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The Perioperative Surgical Home (PSH) Learning Collaborative 2.0, which functions to rapidly accelerate the spread of leading practices, ends March 31, 2018.

As a reminder, the PSH model is a patient-centric, physician-led, team-based system of coordinated care that guides patients through the entire surgical experience, from the decision to undergo surgery to 30 days post-discharge and beyond. The goals are to provide cost-effective, high-quality perioperative care and exceptional patient experiences. This is achieved through care re-engineering, shared decision-making and seamless continuity of care for perioperative patients. The American Academy of Orthopaedic Surgeons, American Urological Association and the American Academy of Physical Medicine and Rehabilitation have all endorsed the PSH model and have representatives on the PSH Learning Collaborative Steering Committee. Dr. Pease (community hospital), Dr. Stier (academic medical center) and Dr. Ferrari (pediatric hospital) provide a few insights for each unique setting.

Learning Collaborative members have submitted more than 28,700 unique patient records with more than six months still remaining. The members have demonstrated significant outcomes in quality, patient experience and total cost of care reduction. While the focus was initially on establishing the PSH team and re-engineering the processes of care across the entire acute care episode, now members have implemented payment models to support this work. Members have outlined savings of \$1,000, \$2,000, \$4,000 and even up to \$10,000 per patient. A Learning Collaborative survey in August 2017 demonstrated that 55 percent of



respondents had implemented at least one payment model, and an additional 16 percent were in the process of developing their payment model. The most common payment models were:

- Comprehensive Care for Joint Replacement (CJR) – 10 members
- Bundled Payment Care Improvement (BPCI) – nine members
- Medicare Accountable Care Organization (ACO) – nine members; and
- Medical Directorship – eight members.

Other reported payment models included commercial shared savings, clinically integrated networks (CIN), Medicaid bundles, co-management or hospital quality efficiency programs (HQEPs).

The Learning Collaborative hosts a biannual meeting where members network, accelerate learning and attend sessions relevant to the work they are doing in their pilots.



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During the fall 2017 national meeting of the PSH Learning Collaborative, these were the most popular sessions:

- *Experiences with Quality Payment Program (QPP) Panel:* Gary Loyd, M.D., Henry Ford; Sonya Pease, M.D., M.B.A., TeamHealth; Chris Steel, M.D., White River Medical Center; and Scott Sumner, M.B.A., University of Florida College of Medicine.
- *Health Policy and PSH Payment Update:* Joe Damore, FACHE, Population Health Vice President at Premier.
- *Coaching: How to Be an Effective Champion for Your PSH:* Dawn Cambron, BSIE, MSM, Premier.

During the meeting, several institutions provided updates regarding their experiences with implementing PSH pilots. The academic medical center environment presented an excellent opportunity to pilot a comprehensive PSH care model. The anesthesiology department and the department of urology, in partnership, developed a PSH program focusing initial efforts on the preoperative and postoperative phases of surgical care for patients undergoing major urologic surgery. By redesigning their preoperative evaluation process into a more comprehensive approach, they were better able to identify and optimize issues that adversely impact outcome. Postoperatively, the PSH team co-managed and coordinated all aspects of care, with particular emphasis directed at acute pain, chronic disease management and transitional care. The incorporation of procedure-specific, evidence-based clinical pathways reduced clinical variability and facilitated the implementation of PSH initiatives. Although data analytics remained the greatest challenge confronting the program, over the 13-month data collection period, they demonstrated statistically significant reductions in both postoperative complications and average length of stay. During the three years of their PSH pilot, they learned that patience is necessary in building a credible program; nevertheless, within an academic medical center context, a comprehensive team-

based PSH care model can clearly improve outcomes, reduce hospital cost per discharge, and create opportunity in which to drive additional surgical volume. Based on the PSH urology experience, the program is expanding to the adult neurosurgery service line, with additional plans to pilot a surgical oncology ERAS program. Importantly, the PSH care model can be readily adapted to a variety of surgical service lines, providing the framework necessary for the transition to value-based care models.

Participating in the PSH 1.0 Learning Collaborative was very timely for TeamHealth. They took the lessons learned and the traction gained on many of the clinical pathway redesign elements in standing up the PSH model to over 30 partner hospitals who were mandated to participate in the CJR bundled payment program. Simultaneously, TeamHealth Hospital Medicine division began participating voluntarily in the BPCI. All of a sudden, all the work they were doing to better optimize patients prior to surgery to drive down complications and skilled nursing home utilization became the markers of success for these episode-based care payment models. What they have learned over the past four years in both PSH Learning Collaboratives is that not only can they improve patient outcomes they can also impact the financial performance of these bundled episodes. In the CJR locations where they have successfully implemented PSH initiatives, there was a significant reduction in the overall episode costs. At the BPCI locations, the PSH team learned to better navigate the various episodes of care to better synch with the clinical initiatives and resources available at each location. Transitioning to value-based care and alternative payment models requires not just the re-engineering of how to deliver care clinically, but more importantly it requires learning new skills around managing the risks associated with these episodes of care. The learning curve has been steep and

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fraught with many lessons learned, but the PSH model better prepares community hospitals for further ventures in advanced BPCI and other proposed new models.

The greatest value for the PSH processes in the pediatric surgical population is in shortening the inpatient length of stay and decreasing the use of high-cost hospital resources. The largest allocation of health care spending in this population is the coordination and integration of care for children with chronic complex diseases. An important component of cost-saving strategy is to identify comorbidities and optimize patients' health in advance of surgery and general anesthesia. In children with neuromuscular scoliosis, as the number of chronic conditions increased from 1-3 to ≥ 10 , the median LOS increased 60 percent, median hospital cost increased 53 percent and readmission rates increased significantly. Many pediatric centers have demonstrated both a decrease in inpatient length of stay and reduction in ICU admissions for surgical correction in patients with idiopathic and neuromuscular scoliosis by implementing PSH concepts. Similar savings can be realized for other pediatric surgical populations, including those undergoing both open and endoscopic craniosynostosis repair, approach and long gap esophageal atresia repair and children undergoing laryngeal cleft repair. A program to triage laryngeal cleft repair patients away from postoperative admission to the intensive

care unit has resulted in a 23 percent decrease in the individual cost of the perioperative episode of care for each patient and a savings of 70 ICU bedded days over a period of 18 months.

Because of the success of the current collaborative, ASA, in partnership with Premier, will be convening the next iteration of the collaborative, the PSH Learning Collaborative 2020. This new collaborative will feature two cohorts. The Core Cohort is for organizations who need more support and guidance to plan and implement their first PSH pilot. The Advanced Cohort is for organizations with at least one PSH Pilot or like pilot in place that would benefit from further optimization and system-wide conversion to multiple service lines. The Advanced Cohort members who are considering joining a voluntary bundle like BPCI advanced in 2018 will have access to Premier's opportunity analysis tool, which provides critical guidance about how individual organizations will perform in various bundles programs to make a more informed choice about whether to participate and which bundle program to join. The goals of the PSH Learning Collaboratives remain constant: to re-engineer care delivery, develop and share leading practices for rapid implementation, and create payment models to sustain the outcomes that have been successful in many different health care settings.



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