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Preoperative Patient Preparation, Programs, and Education in the United States

State of the Art, State of the Science, and State of Affairs

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Keywords

• Perioperative medicine • Perioperative education • Preoperative assessment
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Key points

- We describe the state of the art for clinical preoperative patient preparation programs in the United States and give examples.
- We describe the state of the science for preoperative patient preparation process utilized in United States and United Kingdom and provide evidence to support best practice.
- We describe the state of the affairs for perioperative education in the United States and broader international Anesthesia community and provide examples of noteworthy programmatic education.

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INTRODUCTION

Approximately 100,000 surgeries are performed in the United States each day and although perioperative complications affect relatively few of these patients, when complications do occur the management of these events consume a disproportional large amount of health care resources compared with costs of care for nonsurgical patients [1–5]. Although evidence strongly supports that the opportunity for greatest value enhancement in health care lies within the management of the most complex episodes of care for the sickest patients [6,7], one is left to wonder why preoperative patient preparation, albeit easy to rationalize [8–11], continues to have great variability of effectiveness and wide gaps in implementation. Emergencies and urgencies notwithstanding, the goal of preoperative preparation should be to reduce risk associated with surgery and facilitate functional recovery after surgery [12,13]. Despite these goals, variation in practice standards for determining a patient's readiness for surgery continues and the best approach for system integration and achieving surgical readiness (Box 1) is in an ongoing process.

Currently, most preoperative practice models (albeit not all) enable a preoperative history and examination, but do not proactively engage in closing gaps when preoperative patient surgical readiness is determined to be not optimal. The concept of a preanesthesia testing (PAT) clinic has become a threshold standard of a presurgical and preprocedural preparatory process. In this setting, patients are typically scheduled to have either an in-person clinic visit or a phone screen encounter determined by criteria depending on the originating surgical or procedural service [14]. Although an important goal of preoperative patient preparation is to prevent day-of-surgery case delays or cancellations, up to 20% of patients seen in a presurgical clinic have modifiable medical risks [15]. These modifiable risks are noted but likely not managed in a PAT model, whereby an appointment typically only enables a presurgery risk review, medication review, and presurgical history and physical examination

Box 1: Preoperative clinic organization tiers

Tier 1 - No formal preoperative clinic, pain service, or other hospital base structure

Tier 2 - Anesthesiology has formal relationship with a hospital base preoperative clinic

Tier 3- Anesthesiology manages preoperative assessment clinic and acute pain service

Tier 4 - Anesthesiology has comprehensive optimization, pain, and postoperative TOC services

Tier 5 – Above structured closely coordinated with institutional population health program(s)

Tier 6 – Above completely integrated within the health care system

Abbreviation: TOC, transition of care.

to be performed. This model may also allow for the anesthesia consent to be signed, the advance directive reviewed, and copays and other financial preparations to be completed. The request to schedule a PAT clinic visit, however, rarely occurs more than 30 days before the date of the procedure or surgery and commonly occurs only days before surgery. The timing of the PAT visit in this model provides minimal opportunity for effective preoperative patient preparation. By the time patients are scheduled to be seen in a preoperative clinic before an established surgery date, it is typically too late to modify their modifiable risk without an uneasy disruption of expectations. The preoperative physician is thus left with the dubious task of passing the risk information forward to the anesthesia and surgery care team. After risk stratification, the surgical care anesthesiologist is left to do the best she or he can under the circumstances. Because adverse outcomes occur infrequently and intraoperative management best efforts give a sense of contributing to an optimal result, we tend to underappreciate the impact of a forfeited opportunity to preoperatively shift the risk curve.

Ideally, the primary goal of preoperative patient preparation is to identify and reduce the risks associated with comorbid medical conditions affecting patients' perioperative outcomes. Additional goals would be to identify and initiate care to decrease the risk associated with common health issues of the perioperative patient independent of surgical intervention and to promote shared decision-making opportunities between patients, families, and provider for best course of action (which may include a decision not to undergo a surgery). Furthermore, confronting the need for surgery is an important teachable moment to influence long-term lifestyle change that is often underused [16]. Although there remains great variability among programs in their approach to preoperative patient preparation, herein are descriptions of the state of the science for preoperative patient preparation in the United States as well as some programs considered leading edge with respect to preoperative patient preparation process and programmatic education.

PREOPERATIVE PATIENT PREPARATION: STATE OF THE SCIENCE

Although every surgical procedure carries some degree of risk, this risk is usually relatively low. The risk for serious medical complications from surgery is less than 0.1% overall in healthy patients [17]. Healthy patients have significant physiologic reserves and tolerate major and minor surgical procedures well. The goal of preoperative patient preparation and risk assessment is to identify procedure- and patient-related factors that significantly increase the risk for complications at a cost in time and resources proportional to the risk.

Preoperative patient evaluation and preparation enables implementation of strategies to mitigate risk from the trauma of surgery. The normal biological and physiologic stress response of surgery is inflammation induced by cytokines released at the surgical site. This inflammatory cascade is accompanied by the release of endogenous hormones (eg, catecholamine) with the

consequence of a hypercatabolic, procoagulation state with increased oxygen consumption, hyperglycemia, and intravascular fluid redistribution. That said, the specific type of surgery independently influences the risk for complications and also influences the risk for specific types of complications. Comorbid conditions such as heart disease, pulmonary disease, kidney and liver disease, diabetes mellitus, bleeding disorders, nutritional status, anemia, sleep apnea, smoking, hazardous alcohol use, and poor exercise tolerance also independently increase perioperative risk [18–22].

The evidence base for many preoperative interventions is in large part relatively poorly developed: a modest number of small, predominantly single-center studies are available to guide practice. As a consequence, few centers have implemented all the potentially beneficial interventions that are available to improve patient care before surgery. The 3 main categories of interventions are (i) shared decision making, (ii) comorbidity management, and (iii) prehabilitation. Critically important in enabling implementation for each of these areas is the so-called reengineering of the preoperative pathway [23,24].

Central to the definition of perioperative medicine is the temporal scope of interest: "from the moment of contemplation of surgery until full recovery" [25]. Recognition that the window of opportunity to intervene and benefit the patient opens at the moment that surgery is first contemplated is critical to effective implementation. A corollary to this observation is that the later the patient is engaged in the 3 core processes, the greater the lost opportunity to intervene and improve care. The moment of contemplation differs for different surgeries. For cancer surgery, it may be the moment the first screening test is completed (eg, cystoscopy, colonoscopy). For orthopedic surgery, the moment of contemplation is in the family doctor's office, in the physical therapist's office, or during a discussion with the surgeon. Moreover, although there is usually an urgency associated with major cancer surgery, owing to concerns about the clinical impact of disease progression if surgery is delayed, this is less likely to be the case for elective orthopedic surgery. Knee and hip replacement, the most common elective major orthopedic procedures, are undertaken with the aim of improving quality of life, rather than quantity. In this context, it is likely that the time taken to make considered shared decisions as well as to maximize the potential clinical benefits that may be achieved through comorbidity management and prehabilitation, will be time well spent.

An important feature of early engagement in the assessment and planning of perioperative care is that the processes of patient risk evaluation can occur in parallel with surgical assessment, rather than in series with it. Consequently, information obtained during the preoperative assessment can be fed into the surgical decision making process. In this way shared decision making [26,27] is facilitated and the so-called unnecessary surgery, where the risks of surgery outweigh the benefits, is less likely to happen. Where the preoperative assessment occurs later in the journey to surgery, it can be very difficult to reverse a settled surgical decision that the patient has become significantly invested in–

the opportunity for true shared decision making is at best diminished, and at worst lost.

Effective management of long-term conditions and acute illness is also more readily achieved when more time is available before surgery. Although comorbidity management has been a long-established component of preoperative assessment, early identification of pathology offers greater opportunity to intervene effectively. The most well-developed area in this regard is the management of preoperative anemia [28,29].

Anemia offers a relatively straightforward opportunity to improve care within a limited timeframe. There is a clearly defined and easily measurable abnormality, a noncomplicated diagnostic pathway, and a limited set of available management approaches that are typically rapidly effective at reversing the underlying abnormality. Hemoglobin levels obtained early in the pathway to surgery may be routinely screened by the perioperative team and abnormally low hemoglobin values may automatically trigger analysis of hematinic variables to categorize the type of anemia. For patients identified as iron deficient, iron therapy may be commenced by oral or intravenous routes depending on the severity of the abnormality and the proximity of the surgery. The value proposition for preoperative anemia is relatively straightforward owing to the consequent reduction in costs owing to reduced red blood cell transfusions [30].

Screening and optimization of cardiac, respiratory, and other comorbidities (malnutrition, diabetes, obstructive sleep apnea, pain, etc) often require more involved investigative routines but may still be governed by diagnostic and treatment algorithms.

Patients with poor glycemic control in the perioperative period or diagnosed diabetes often have serious comorbidities, such as cardiovascular disease, obesity, and chronic kidney disease, all of which significantly increase surgical risk [31]. Additionally, patients with diabetes undergoing surgery are more prone to postoperative infectious complications such as pneumonia, surgical site/wound infection, and sepsis [32,33], as well as longer hospital length of stays [34].

Obstructive sleep apnea occurs in approximately 20% of the population and is associated with serious perioperative complications, including cardiac arrhythmias, myocardial injury, and sudden death [35,36]. Patients who test positive for obstructive sleep apnea on screening should be referred for proper evaluation and management, as well as assessment for occult right heart failure. Postoperative airway adjuncts, such as continuous positive airway pressure, should be used when possible and appropriate.

The opportunity to improve patient care through prehabilitation–defined as intervention to enhance functional capacity in anticipation of a forthcoming physiologic stressor [37] may encompass behavioral change interventions including physical activity, exercise, diet and nutrition, and smoking and alcohol cessation strategies–is critically dependent on the amount of time available before surgery.

There is evidence that smoking and alcohol cessation before major surgery improves clinical outcomes, albeit in a limited number of small studies. Current

smokers are at increased risk for perioperative complications including hypoxia, delayed wound healing, increased inflammation, and a higher incidence of pneumonia [38,39]. Evidence suggests that cessation as few as 4 weeks before surgery can decrease postoperative complications [40], with each week of cessation increasing the beneficial effects [41]. Preoperative alcohol consumption is associated with an increased risk of general postoperative morbidity and mortality, infection, wound complications, pulmonary complications, prolonged hospital stay, and admission to the intensive care unit [42] and abstinence for 4 weeks before surgery has been shown to decrease complications from 71% to 31% [43]. The preoperative use of opioids for chronic pain is a risk factor for adverse events, including infection risk, decreased gastrointestinal function, and longer hospital stays [44–46].

Exercise interventions before surgery have been shown to improve physical fitness before intracavity surgery [47] and orthopedic surgery [48,49]. Nutritional interventions before surgery have been well-studied and data suggest that preoperative enteral supplementation of nutrition in undernourished patients results in a decrease in surgical stress, insulin resistance, protein losses, postoperative complications [50], and intensive care and hospital stays after surgery, along with fewer infective complication [51,52]. Nutritional support in malnourished patients should begin 7 to 10 days before surgery [53,54]. The effectiveness of such interventions in patients who are well nourished is less well-studied. Immunonutrition, with supplementary antioxidants or other immune modulators added to enteral feeding, is more controversial. The hypothesis that such additions reduce perioperative infections and hospital length of stay is supported by a Cochrane systematic review [55]. The role of micronutrient (vitamin and trace element) supplementation is less certain.

Obesity is associated with diabetes mellitus, hypertension, and cardiovascular disease and, compared with normal weight patients, morbidly obese patients (body mass index of >35 kg/m^2) may also be at greater risk for postoperative wound infections, pulmonary complications, deep venous thrombosis, and gastric reflux with aspiration of gastric contents.

Psychological interventions also have a small, but growing, evidence base. Preoperative anxiety, depression, and impaired self-efficacy are consistently associated with short- and long-term adverse clinical outcomes and decreased quality of life after major surgery and this finding has led to the hypothesis that interventions targeted at these issues may improve outcomes after surgery [56]. The combination of exercise, nutrition, and psychological interventions to maximize resilience to the physical and psychological challenges of surgery and thereby improve surgical outcomes has recently been referred to as the trimodal approach to prehabilitation [57].

PROGRAMMATIC APPROACHES TO PREOPERATIVE PATIENT PREPARATION IN THE UNITED STATES: STATE OF THE ART

Within the United States, a number of programs are leading efforts to reframe the preoperative assessment and preparation approach for surgery. Among

these programs there are similarities and differences. An absence of community hospitals on the list is noteworthy. Currently, there is great variability and differences among community hospital settings regarding preoperative patient preparation. Processes range from doing nothing until the day of surgery in a setting with healthier populations undergoing simple operations to processes exemplified by any of the programs described here.

Brigham and Women's Hospital

The Weiner Center for Preoperative Evaluation at Brigham and Women's Hospital has been designed to offer a single assessment output with all elements of the preoperative assessment under the leadership of the department of anesthesiology. The attending physicians supervise the assessment, review every patient, order tests, write prescriptions as needed, and discuss issues with the primary care physicians and referring specialists. In this model, a nurse practitioner performs the surgical history and physical examination as well as the anesthesiology and nursing assessments. Employees who had been responsible for preoperative assessment in the individual offices of various surgeons have been shifted to a central clinic so all assessments could be standardized. The nurse practitioners are supervised by an on-site attending anesthesiology physician.

The Cleveland Clinic

The Internal Medicine Preoperative Assessment, Consultant, and Treatment (IMPACT) Center at the Cleveland Clinic and Pre-Anesthesia Clearance and Evaluation (PACE) clinic used a process that begins in the surgeons' offices, when an operation is deemed necessary. At that time, the patient is asked to fill out a health screening questionnaire. A computerized report based on the questionnaire then guides the surgical office in scheduling the patient to specific areas according to algorithms. Based on case complexity and clinical needs, patients are scheduled for the IMPACT Center along with the PACE clinic. The PACE clinic performs comprehensive preanesthetic assessments to identify conditions that affect perioperative anesthetic care in the operating room, recovery room, and/or intensive care unit, including assessment for postoperative pain control needs. The PACE clinic also collaborates with the sleep center to screen patients for obstructive sleep apnea, allergists to offer penicillin allergy testing for patients who have unconfirmed self-reports of an allergy, and offers support to help patients quit smoking. After appointments and tests are scheduled, patients are given information about their procedure and preoperative instructions. An electronic assessment tool used in the IMPACT Center collects data for the National Surgical Quality Improvement Project.

Duke University Health System

The PeriOperative Enhancement Team (POET) at Duke guides perioperative care redesign [58–60] (Figs. 1–3) whereas the Preoperative Anesthesia and Surgical Screening (PASS) clinic determines readiness for surgery as soon as a surgical declaration occurs. Once a determination for surgery is made, a phone screen eligibility logic is implemented. System data evaluation points determine

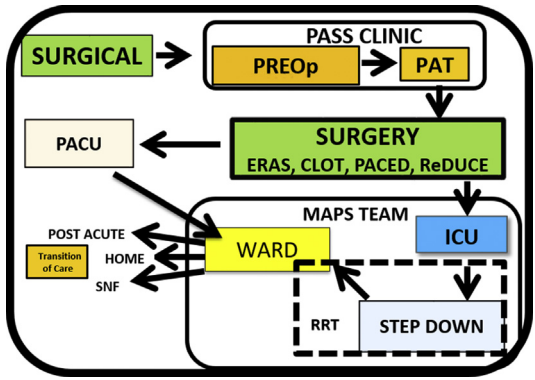

Fig. 1. The POET program. (*From* Aronson S, Westover J, Guinn N, et al. A Perioperative Medicine Model for Population Health: An Integrated Approach for an Evolving Clinical Science. Anesth Analg. 2018; 126(2): 682–90; with permission.)

a patient's status, calculate a score, and determine the threshold for phone or in-person visit criteria. If an in-person visit is deemed necessary, then a dedicated, physician led team of advanced practice providers focus attention to unique perioperative medical and social needs. The PASS clinic is a surgical care corridor whereby prescriptive preoperative screening, evaluation, and management of modifiable comorbid medical conditions occurs to enable and facilitate communication, education, medical management, surgical care coordination, and population health of at-risk patient populations. It also serves

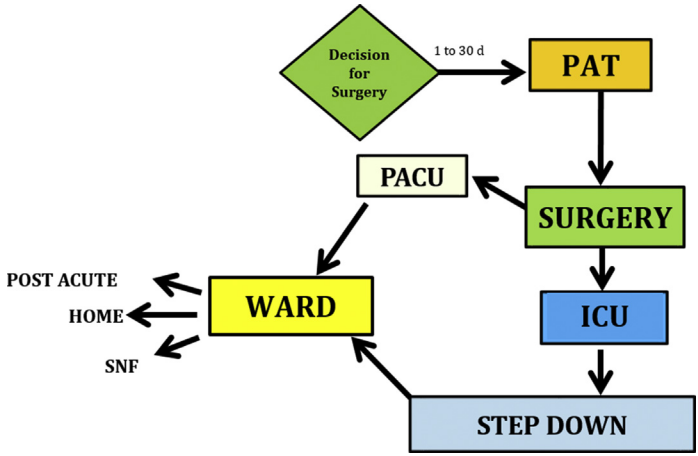

Fig. 2. Traditional pathway to surgery following declaration of surgery. (*From* Aronson S, Westover J, Guinn N, et al. A Perioperative Medicine Model for Population Health: An Integrated Approach for an Evolving Clinical Science. Anesth Analg. 2018; 126(2): 682–90; with permission.)

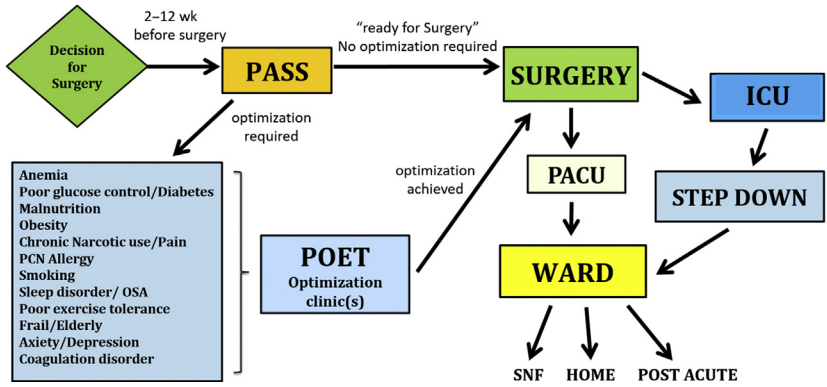

Fig. 3. PASS clinic pathway to surgery after declaration of surgery.

to increases alignment with best clinical practices and provide an important area for outcomes investigation. When referred to the PASS clinic, the patient's readiness for surgery is determined. After the evaluation, if further optimization of a modifiable condition is determined, then a referral to an optimization program is made.

The University of Michigan and Michigan Surgical and Health Optimization Program

The attending physicians review and supervise the assessment of every patient, order tests, write prescriptions and discuss issues with the primary care physicians and referring specialists as well as preform evaluations of consulted patients. A team of nurse practitioner, hospitalists and anesthesiologist performs the surgical history and physical examination as well as the anesthesiology assessments. Intrinsic to the University of Michigan's program is the Michigan Surgical and Health Optimization Program that analyzes surgical outcomes and their economic burden to insurance companies and payers. The program has identified preoperative exercise, nutrition, glucose control, pain management, deep venous thrombosis prophylaxis, obstructive sleep apnea screening, smoking cessation, and stress reduction strategies as directives to reduce cost and enhance value. A Centers for Medicare & Medicaid Services Innovation Grant among 40 hospitals between the Michigan Surgical Quality Collaborative, University of Michigan, and BCBS of Michigan has shown $2528 per case cost savings and 30% decreased hospital length of stay [61].

University of Texas at Austin, Dell Medical School

The Dell-Seton Preoperative ASSessment or Global Optimization (PASS-GO) Clinic has redefined its Pre-Admission Testing Clinic and has revised its name and focus. They use a system of risk stratification based on surgical procedure class and American Society of Anesthesiologists class to triage preoperative patient assessment toward a status of EXPRESS, PASS-GO. Regardless of triage status, evidence/consensus-based laboratory testing and diagnostic testing (when

indicated) occurs. The PASS-GO clinic provides patient, family, and caregiver education and counseling; prehabilitation, including cardiopulmonary, nutritional, and psychological support; formal preoperative E/M consultation and intervention(s); and formal postdischarge transition care management [62].

The University of Texas MD Anderson Center

The PeriOperative Evaluation and Management Center (POEM) at MD Anderson performs comprehensive preoperative assessments to identify conditions that affect perioperative care. The clinic is staffed by a team of internists, anesthesiologists, advanced practice practitioners, nurses, and various clinic staff to evaluate patients following a determination for surgery. Patient chronic medical conditions and perioperative risks are identified and managed by anesthesiology and internal medicine. The POEM center offers support to help patients quit smoking, screens patients for obstructive sleep apnea, and provides penicillin allergy testing for patients with unconfirmed, self-reported allergies.

University of Washington: strong for surgery

Strong for Surgery is a presurgical health optimization program launched by the University of Washington for elective procedures. In 2016, the American College of Surgeons became the national home for Strong for Surgery. The American College of Surgeons has begun administering and promoting Strong for Surgery as a quality initiative aimed at identifying and evaluating evidence-based practices to optimize the health of patients before their operations. The aim of the program is to prepare patients for surgery by helping them become healthier. Patients are screened for several risk factors during a preoperative visit. Preoperative checklists, used to screen patients for risk factors that potentially could lead to surgical complications, provide guidance for interventions to help ensure better surgical outcomes. The checklists target 8 areas known to be highly influential determinants of surgical outcomes: medication management, nutrition, glycemic control, pain management, smoking cessation, delirium, prehabilitation, and patient directives.

PERIOPERATIVE EDUCATION: STATE OF AFFAIRS

In the specialty of anesthesiology, physicians must adapt to the changing clinical landscape surrounding surgical patient care. Perioperative medicine is an emerging subspecialty within anesthesiology that emphasizes the transition of care of patients from the time surgery is contemplated until full recovery. In recent years, there has been a trend toward new training and curricula that prepare the physician not merely for intraoperative care, but for the *entire continuum* of surgical care. As of 2018, 9 programs in the United States offered anesthesiology fellowships in perioperative medicine [63,64]. There is little published literature on perioperative care fellowship curricula, and current programs have a wide range of goals and teaching. The major traditional (non–Accreditation Council for Graduate Medical Education) perioperative fellowship programs in the United States are 1 year long and include several prestigious training programs (Table 1).

Table 1
Comparison of preoperative programs

Program	Core curriculum
Beth-Israel Deaconess	PSH/preoperative evaluation Leaderships Quality and safety Research/scholarship
Brigham & Women's	Preoperative evaluation OR management Quality and safety Geriatric, pain and palliative care Hospital leadership Innovation Ethics
Duke	Business operations/development Preoperative evaluation Perioperative risk stratification ERP Change management
Stanford	OR management Quality and safety Leadership Innovation
UC Irvine	Quality and safety Risk management Leadership Change management PSH and ERP OR Management Policy, ethics, biostatistics
UCLA	PSH, ERP Quality and safety Leadership Preoperative evaluation Population health
UCSD	OR management Preoperative management Executive leadership Pain/Regional management
University of Washington	Health economics Hospital management Quality and safety Health informatics
Vanderbilt	Preoperative evaluation Echo Perioperative consults

Abbreviations: ERP, enhanced recovery protocols; M&M, morbidity and mortality; MSc, masters of science; OR, operating room; POM, perioperative medicine; PSH, perioperative surgical home; QI, quality improvement.

In addition to traditional fellowship programs (albeit non–Accreditation Council for Graduate Medical Education), novel training curriculum and training options are being developed to deliver on meeting the unmet need for qualified individuals with enhanced training in perioperative medicine.

Morpheus fellowship

The Morpheus Consortium is an international collaboration between the Anesthesia Departments of Duke University in the United States and University College London and the University of Southampton in the UK. The Morpheus fellowship provides exposure to the science and implementation of perioperative medicine through online and in-person learning opportunities, by self-discovery and interaction with experts. It provides a unique on-line opportunity for anesthesia trainees who have the ambition of reaching outside of the operating room to gain practical, academic, clinical, operational, and research expertise in perioperative medicine. The curriculum is based around 3 key pillars: clinical care of patients; leadership and innovation including essential business skills, like operations, finance, communication; and leading change and the science of perioperative medicine. The primary online program allows a wide geographic dispersion of fellows in appropriate clinical facilities with on-site mentoring by associate faculty. It includes on-site travel to partner sites to observe effective delivery models in a range of health care systems and expected attendance at international conferences (eg, American Society of Anesthesiologists, Practice Management, Evidence Based Perioperative Medicine [EBPOM]) where they can attend curriculum specific state of the art sessions (discussed elsewhere in this article). Curriculum-specific conference content is also livestreamed where possible and recorded for secondary review with an on-line tutor or tutors to allow total participation.

International programs in perioperative management

Internationally, there has been formal recognition of the perioperative domain as unique and evolving for some time. The perioperative medicine programs around the world come in different guises and are led by a variety of clinicians (internists, anesthesiologists, nurses, advanced health providers, etc). There are, however, very few easily identifiable training standards or consistently structured and regulated training programs.

Among the most recognized international programs for perioperative medicine training are The University of Manitoba, The University of Toronto, The Alfred Hospital in Melbourne, Australia, The University of Australia, North Shore Hospital in Auckland, New Zealand, University College London, and the University of Southampton. Monash University, for example, in Melbourne, Australia, has been running perioperative medicine short courses and a masters in science for many years. The University College London has an online masters in science [65] and also runs an open source Massive Open On-line Course (MOOC) endorsed by the Royal College of Anaesthetists and The World Federation of Societies of Anesthesiologists [66]. To date, more than 15,000 people from more than 120 countries

have taken the perioperative medicine MOOC. In January 2015, the Royal College of Anaesthetists launched its Perioperative Medicine Program endorsed by fellow Royal Colleges [67] and in June 2016 the UK General Medical Council approved a Curriculum amendment that included mandatory training in Perioperative Medicine to allow certification of completion of training in anesthesia (essential unit), thus setting a new standard [68]. In 2019, the Royal College of Anaesthetists have established a multiprofessional, multispecialty national Center for Perioperative Care in the UK to facilitate collaborative national initiatives for patient benefit. This center is a collaboration between the college and the Royal Colleges of Surgeons, Physicians, general practitioners (family doctors), and nursing along with patient and public representatives.

The International Board of Perioperative Medicine

Recently leaders in perioperative medicine from many of the institutions outside the United States and within the United States and other leaders from around the world have developed a perioperative medicine content outline and training curriculum to guide benchmarking and training in perioperative medicine. In the International Board of Perioperative Medicine training curriculum [69], the perioperative medicine learner would be expected to:

1. Demonstrate a patient centered approach to the integrative multidisciplinary care of patients contemplating or undergoing surgery.
2. Demonstrate expertise in the clinical management of patients in the perioperative period (ie, preoperative, intraoperative, acute postoperative, and postoperative transition of care periods).
3. Ensure that perioperative services are fully integrated, consistent, and reliable and make efficient use of resources.
4. Partner with colleagues in other disciplines, including primary care, surgeons, hospitalists, rehabilitation, geriatricians, nurses, and allied health professionals.
5. Demonstrate an advanced understanding of the importance and functioning of the preadmission process and/or clinic.
6. Educate the perioperative physician to risk stratify and optimize care of the patient in the perioperative period.
7. Develop the expertise to take a lead in collaborative decision making about the suitability of high risk patients for surgery.
8. Collaboratively manage the patient in the perioperative period, in particular high-risk surgical patients with acute or chronic medical comorbidities that require optimization and management to improve patient outcomes.
9. Obtain the managerial skills to lead a multidisciplinary perioperative management team.
10. Be equipped with research skills to understand perioperative medicine research.
11. Provide teaching to colleagues of all grades (levels) and specialties.

In addition to ongoing discussions to formalize perioperative medicine training curricula there are organizational efforts to share evidence and best practice information concerning the science of perioperative medicine.

EBPOM, for example, is an international organization that has existed for more than 25 years and is dedicated to promoting the examination, discussion, and application of evidence-based perioperative medicine and perioperative care. For the past 10 years, EBPOM International has been collaborating with groups around the world to deliver postgraduate education. The EBPOM section groups include; EBPOM Europe, EBPOM Australia–New Zealand, EBPOM Asia–Hong Kong (China), and EBPOM USA. In addition, the American Society of Enhanced Recovery, the American Society of Anesthesiologist based perioperative surgical home, the Society Perioperative Assessment and Quality Improvement, and other organizations have focused efforts of perioperative medicine information dissemination.

SUMMARY

Going forward, a better understanding of how managing specific comorbidities within the perioperative patient population and the long-term impact this management has on enhancing population health is needed [70,71]. Along that journey, steps include reengineering perioperative medical care delivery for patient populations, measurement of outcomes and better understanding of return on investment for providing perioperative services relative to the value they create for the specialty of anesthesiology, institutions and population health. Applying these models to resource constrained community hospitals will no doubt require adaptive implementation strategies. In the end however because preoperative comorbidity and surgical care complexity portend increased cost, the only sustainable (and best) return on investment will be realized when patient outcomes are optimized and costs are minimized.

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