

Development, Functioning, and Effectiveness of a Preoperative Risk Assessment Clinic

Supplementary Issue: Perioperative Medicine

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ABSTRACT: Lee first described the concept of preoperative assessment testing (PAT) clinic in 1949. An efficiently run clinic is associated with increased cost-effectiveness by lowering preoperative admission time and thus reducing the length of stay and the associated costs. The setup of the PAT clinic should be based on the needs, culture, and resources of the institution. Various models for the setup of PAT clinic have been described, including the concept of a perioperative surgical home, which is a patient-centered model designed to improve health and the delivery of health care and to reduce the cost of care. Although there are several constraints in the development of PAT clinics, with increasing awareness about the usefulness of pre-operative risk assessments, growing bodies of literature, and evidence-based guidelines, these clinics are becoming a medical necessity for the improvement of perioperative care.

KEYWORDS: preoperative risk assessment clinic, PAT clinic, preop clinic, perioperative surgical home

SUPPLEMENT: Perioperative Medicine

CITATION: Tariq et al. Development, Functioning, and Effectiveness of a Preoperative Risk Assessment Clinic. *Health Services Insights* 2016;9(S1) 1–7 doi:10.4137/HSI.S40540.

TYPE: Review

RECEIVED: July 18, 2016. **RESUBMITTED:** September 25, 2016. **ACCEPTED FOR PUBLICATION:** September 27, 2016.

ACADEMIC EDITOR: Professor Charles Phillips, Editor in Chief

PEER REVIEW: Four peer reviewers contributed to the peer review report. Reviewers' reports totaled 327 words, excluding any confidential comments to the academic editor.

FUNDING: Authors disclose no external funding sources.

COMPETING INTERESTS: Authors disclose no potential conflicts of interest.

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Introduction

A fundamental role of the preoperative assessment testing (PAT) clinic is to assess patients prior to surgery in order to gather information upon which risk assessment and perioperative management decisions are made.¹ This process precedes the delivery of anesthetic care, before surgical and non-surgical procedures.²

Lee³ first described the notion of an outpatient PAT clinic in 1949. In the traditional preoperative assessment model, the anesthesiologist who would administer the anesthesia would typically assess the patient on the evening prior to or on the day of the procedure. However, Lee proposed that the patient should rather be seen as soon as the surgeon schedules the patient and the PAT clinic should facilitate the patient arriving in the operating room medically optimized. The increasing prevalence and popularity of same day surgery served as a catalyst for the PAT clinics to form an established role in hospitals across the United States.⁴

Many benefits arise from PAT clinics for both the hospital and the patient. An efficiently run clinic is associated with an increased cost-effectiveness by lowering preoperative admission time and thus reducing the length of stay and the associated costs.⁵ These clinics allow for focused assessment of patients and prevent unnecessary investigations and consultations that can potentially delay or cancel surgeries. Furthermore, medical optimization of patients significantly reduces

the probability that a procedure will be delayed or postponed for a medical reason; this reduces anxiety for the patient and increases the efficiency of the operating room with a financial benefit to the hospital.⁶

According to the Centers for Disease Control and Prevention in 2010, ~51.4 million procedures were performed in the United States. A study done from 1994 to 1999, assessing operative mortality in 1.2 million patients in the Medicare System, found that among these procedures, overall operative mortality varied widely between different elective procedures. The procedures considered to have low operative risk included carotid endarterectomy (1.3%) and nephrectomy (2.3%) with more than 10% mortality reported for procedures like mitral valve replacement (10.5%) and esophagectomy (13.6%). Of note, mortality was twice that for patients older than 80 years as compared to patients aged 65–69 years.⁷ This increased mortality associated with age emphasizes the importance of medical optimization of the multiple and sometimes complex chronic illnesses of the elderly.

The role of a preoperative risk assessment clinic is to identify the risk factors associated with increased intra- and postoperative complications. Prompt identification of high-risk patients, timely interventions, anesthesiological care, and medical optimization can lead to significant reduction in peri- and postoperative mortality and morbidity. Several scoring systems, preop testing, and biochemical markers can guide in



predicting the complications and mortality.⁸ According to an Australian study, there was a sixfold increase in mortality in the patients who underwent inadequate preop assessment as compared to those who were thoroughly assessed.^{9–11}

Aims of a PAT Clinic

PAT clinics are specifically designed to stratify patients' risk with the aim of identifying and mitigating the effect of risk factors associated with high perioperative morbidity and mortality. The clinician participating in a PAT clinic should do so with clear goals in mind. First, it is important to create an open environment for the patient by building rapport with the patient and their relatives, to address the anxiety associated with invasive surgical procedures. The patient should be assessed in a systematic and focused manner following evidenced-based established guidelines with the aim of reducing the morbidity and mortality of the surgery. All necessary investigations and referrals should be done in a timely manner to avoid surgical delays or case cancellations.

The aim is not just to clear the patient for surgery, rather to prepare him or her for it. A summary of recommendations should always be provided to the patient in person, and a clear record should be kept in the medical records for all practitioners involved.

Setup of a PAT Clinic

Location and design of PAT clinic. There is no single, standard model of care for perioperative programs. Design should be based on the needs, culture, and resources of the institution. The physical location and flow of a PAT clinic should complement the clinical goals set forth by the hospital. The clinic should be accessible via the main entrance of the hospital, or adequate elevators should be available to provide patients easy access to the clinic. The registration area should receive the patient as soon as he or she walks in, and direct patient flow along the evaluation process from their initial vitals and electrocardiogram (EKG) to the seating area waiting should be called. The examination rooms should foster the patient–physician relationship and should not present physical barriers between the two; accommodation for relatives should also be provided. The location of the clinic should allow easy transition of patients to diagnostic facilities commonly used in preoperative assessment such as laboratory, radiology department, and cardiac testing. Support facilities such as drinking water and bathroom facilities should also be provided.

Functioning of a PAT clinic. When a patient is evaluated at the outpatient surgical department and is deemed to undergo surgery, the secretary of the outpatient department has to book an appointment at the PAT clinic. At the day of the PAT clinic appointment, patients report at the secretary desk of the PAT clinic. The secretary enters the patient's information into the system and completes the registration process. The patient is sent to the waiting room to wait for the nurse to record vital signs and do an EKG. After this, the patient

waits in the examination room for the physician. Based on the patient's medical history and the screening, the physician determines if the patient is fit for surgery or if additional examinations are necessary before surgical clearance. Then, the patient has to go to the phlebotomy suite and radiology department for blood work and radiologic testing, if required. When a patient needs additional examinations, the patient goes to the secretary who contacts the designated department to make an appointment for the patient. After these examinations, in most of the times, the patient does not have to return to the PAT clinic. Based on the information gathered by the additional examinations, the physician makes the decisions concerning surgery approval. This is communicated by telephone with the surgical team and the patient. The process of the functioning of a PAT clinic is summarized in Figure 1.

Staff and their role. A preoperative risk assessment clinic should typically employ a multidisciplinary approach in an effort to ensure that patients are fully prepared for their stay in the hospital. For this purpose, such a clinic should include administrative personnel, nursing, and ancillary staff, alongside appropriately trained physicians.

Role of a physician. Traditionally, anesthesiologists have been regarded as preoperative physicians and are concerned with preoperative evaluation, intraoperative anesthesia administration, and acute postoperative management of patients, including that in an intensive care unit (ICU) setting.¹¹ They are skilled in preoperative evaluation and assessment of common risk factors so as to clear patients for surgery. However, a standard anesthesia evaluation does not encompass the optimization of chronic medical problems that may worsen during or after surgery. According to some studies, the preoperative assessment that was not done by the anesthesiologists was different from that of other medical professionals and the patients who were cleared for surgery previously were not deemed fit by the anesthesiologist later.¹² An internist, on the other hand, is in a position to perform a thorough preoperative review leading to a decrease in the length of stay and fewer complications, thus reducing the associated expenditure of resources. Therefore, internists can serve as suitable mediators to systematize the process of transition of care from the surgical episode to a safe discharge and outpatient follow-up. These findings were corroborated by a study published in the *Journal of Hospital Medicine*. It was observed that adding a hospitalist-run preoperative analysis to an anesthesia evaluation was associated with reduced length of stay for high-risk patients (American Society of Anesthesiologists (ASA) score of ≥ 3), fewer surgical cancellations, and a reduction in inpatient mortality rates.¹³

Role of a nurse. The nurse is an important member of a preoperative assessment team and plays an important role in identifying patients' needs and risk factors that may affect the surgical outcome.¹⁴ A nurse is also responsible for understanding patients' expectations and alleviating their anxiety through adequate education and serves as a conduit for

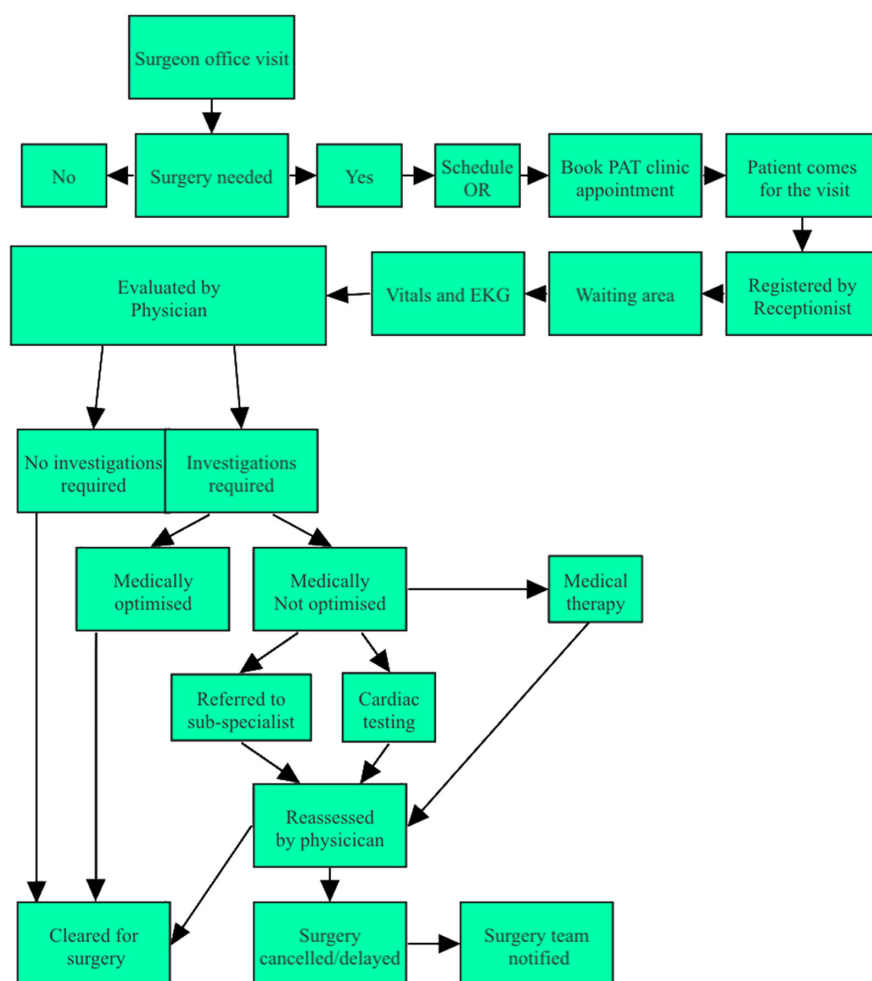


Figure 1. A flow sheet describing the preoperative risk assessment process.

inter-professional communication. With rising costs and shortage of medical staff, nurses have taken over with nurse-led clinics, providing for more comprehensive services than medical assessment alone. A review¹⁵ of available research on the effectiveness of nurse-led preoperative assessment clinics on patient outcomes showed decreased length of stay, cancellations, non-attendance for the procedure, and patient anxiety. Higher compliance with presurgical testing and avoidance of unnecessary tests were observed. It also showed improved patient satisfaction, preoperative preparation, and understanding of postoperative care needs, but due to the lack of randomized controlled trials or a higher level of evidence, definitive conclusions could not be made. Some studies, however, concluded that preoperative risk assessment screening done by nurses over telephone with complete assessment done by the anesthesiologists on the day of surgery led to far less day of surgery cancellation rates.^{11,16}

Role of a psychiatrist and social worker. The role of a psychiatrist in a preoperative risk assessment clinic would be to assess the surgical candidates for perioperative anxiety and to identify those at high-risk development of postoperative

depression and requiring necessary counseling treatment and follow-ups. The role of a social worker is to provide education and support to the patients and their families. They are well trained and better equipped to provide the necessary education and perioperative assessment of the patient's social needs. Their role also involves anticipating the postoperative complications, making the necessary referrals to rehabilitation centers and nursing homes, facilitating a smooth transition from the inpatient postoperative care to discharge planning, and focusing on decreased length of stay in the hospital. They also collaborate with the patients and families to improve postdischarge outcomes and the delivery of the durable medical equipment (necessitated as per patients' clinical condition).¹⁷⁻¹⁹

Ancillary staff. Support staffs including patient care technicians are necessary for routine laboratory work, assessment of vital signs, EKG, and collection of other data. In addition, administrative members of the team deal with the storage of information and records and other organizational works. The receptionist has a crucial role of making the necessary appointments, greeting the patients at the clinic, and streamlining the



process from preop evaluation to setting up and coordinating the postop appointments.

Various purposed models of PAT clinics.

Nurse only: chart collation and record review. Nurse-led preadmission clinics or services have been implemented in many health services as a strategy to facilitate the admission and assessment of booked surgical cases. Though evidence of effectiveness for nurse-led preadmission services on a wide range of outcomes for elective surgery patients has been reported in various studies, the lack of experimental trials means that the level of evidence is low.¹⁵

Internal Medicine Preoperative Assessment, Consultation and Treatment center. The main purpose of the Internal Medicine Preoperative Assessment, Consultation and Treatment (IMPACT) center is to carefully evaluate patients prior to their surgery and optimize their medical conditions. This helps to minimize the risk of developing complications during and immediately after surgery as well as minimize unnecessary cancellation of surgeries.

The components of the IMPACT clinic include evaluate patients undergoing non-cardiac surgery, assess and outline perioperative risks, optimize all chronic medical conditions, order appropriate testing to optimize medical conditions before surgery, coordinate care between specialists preoperatively for complex medical conditions, and make evidence-based recommendations for patients, anesthesiologists, and the surgical team (related to both pre- and postoperative periods).

Pre-Anesthesia Consultation and Education. Pre-Anesthesia Consultation and Education is led by an anesthesiologist.

Triage Based Model evaluation High risk/high impact patients. Patients are managed based on their ASA (American Society of Anesthesiologists) risk class.

Perioperative surgical home—future of PAT clinics? The perioperative surgical home (PSH) is a new model developed as a solution for the costly and fragmented perioperative system. PSH as defined by the ASA is a patient-centered model designed to improve health and the delivery of health care and to reduce the cost of care.²⁰ In a PSH model, the internists, family practitioners, surgeons, anesthesiologists, nurses, pharmacists, physical therapists, case managers, social workers, and information technology (IT) experts actively coordinate and provide care. This model considers patient's episode of care as shared and one continuum of care rather than fragmented preoperative, intraoperative, and postoperative care. This model also includes facilitated return to primary care physician or further rehabilitation.

PSH is an innovative model, complementary to the patient-centered medical home, that defines methods for improving the patient experience and clinical outcomes and controlling costs for the care of surgical patients. It can reduce unnecessary tests and provide consultations regarding preoperative evaluation, delay in surgeries, postoperative complications, length of stay, and unnecessary admissions after outpatient surgery.

Components of PSH. The important components of surgical home model are as follows:

1. engaged physician leadership
2. early patient engagement and education
3. patient optimization for surgery
4. timely scheduling
5. evidence-based protocols
6. expert surgical and anesthetic care
7. facilitated prehabilitation/rehabilitation
8. measurement of patient-centered outcomes
9. continuous performance improvement
10. facilitated return to primary care.

Elements of PSH.

Preoperative phase. Once a mutual decision is made between the patient and the surgeon to proceed with surgery, the patient is referred to the preoperative clinic. The goal of the preoperative clinic is to identify, communicate, and minimize patient's specific risks of surgery and anesthesia. Patient education and engagement should be emphasized in the preoperative clinic. Detailed information about enhanced recovery after surgery (ERAS) program can be given to the patient to decrease anxiety and enhance postoperative recovery and hospital discharge. Preoperative psychological interventions, pamphlets, multimedia information containing planned procedure and education about postoperative feeding, early postoperative mobilization, and pain control and respiratory physiotherapy can be given to reduce the incidence of postoperative complications.²¹

ERAS program is based on standardized, evidence-based, interdisciplinary care pathways such as preoperative preparation of the patient with medical optimization (physical pre-conditioning, nutritional supplementation, and fasting prior to surgery), intraoperative management (selecting type of anesthesia and analgesia, goal-directed fluid therapy, transfusion protocols, and minimal use of opioids, NG tubes, urinary catheters, and drains), postoperative pain management, deep vein thrombosis prophylaxis, alimentation, early mobilization, and transition of care to primary care physician or rehabilitation center.²²

Intraoperative phase. Case delays and cancellation can be avoided not only by medically optimizing the patient preoperatively and through good communication but also by creating consensus among anesthesiologists about the criteria for proceeding with scheduled cases.²¹

Postoperative phase. Postoperative team consisting of anesthesiologists, surgeons, internists, mid-level providers, and registered nurse should coordinate the postoperative patient care from postanesthesia care unit to ICU or inpatient. Pain management, alimentation, early mobilization, and patient and patient's family education are of greatest concern.²¹

Transition of care. Transitional care for 30–90 days post discharge with good hands-off should be provided. Effective

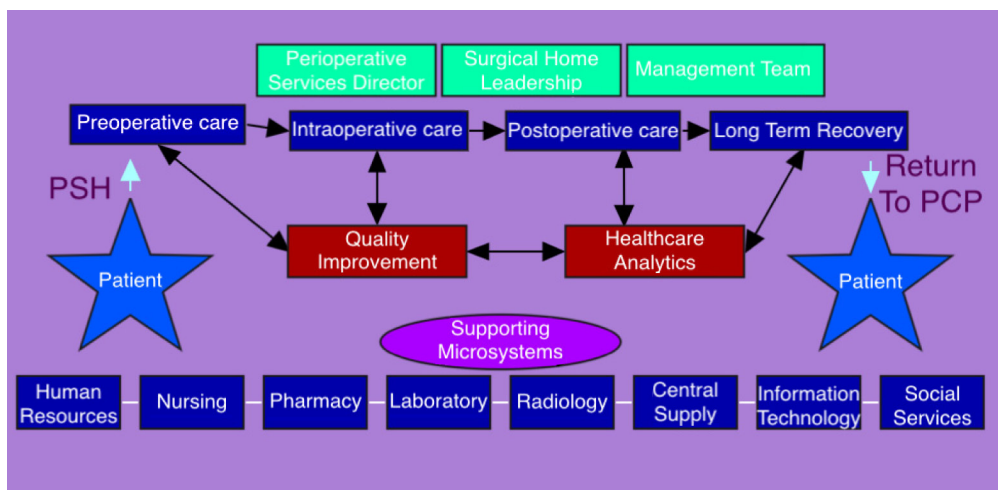


Figure 2. Elements of perioperative surgical home.^{20–23}

communication should be provided to the patient, primary care physician, or rehabilitation service (Fig. 2).

Optimal timing of PAT evaluation. There is not enough data specifying the optimal timing for preoperative evaluation. In general, screening should take place from one week to 30 days prior to the date of the scheduled procedure. Factors that have an effect on the timing of presurgical evaluation include patient demographics, clinical condition, invasiveness of the procedure to be performed, and the availability of resources.¹ An efficient appointment system in addition to timely reporting of the results of laboratory and radiologic tests is crucial in deciding the most favorable time of preoperative evaluation.

Efficacy of PAT Clinic

With the introduction of preoperative risk assessment clinics, there has been increased coordination between preoperative surgical, anesthesia, nursing, and laboratory care and a resultant increase in the efficiency of the perioperative care. There has been increased focus on patient's individualized care based on the information from patient's records, interview, physical examination, and type and invasiveness of the planned procedure.

Reducing medically unnecessary preoperative testing. Indiscriminate testing not only increases the risk of iatrogenic injury but also results in surgical delays and increased medicolegal liability for not following an abnormal test.²³ It has also been found that the majority of the tests ordered preoperatively are medically unnecessary.²⁴ In an effectively functioning preoperative clinic, there is documentation of medical necessity of every test and imaging ordered based on patient's medical comorbidities and the planned surgical procedure, which results in significant reduction in the number of tests and imagings. This is not only cost effective but also more feasible for the patient without adverse patient events.²³

Reduction in the number of subspecialty referrals.

These preoperative risk assessment clinics have provided a platform where patients can be optimally risk stratified according to the standard guidelines, reducing the number of multidisciplinary referrals, which ultimately reduces the pressure on the available resources. The physicians can be more selective with referrals concentrating only on those patients with major or multiple risk factors and poor functional capacity.²⁵ The thoughtful use of cardiac testing/procedures in preoperative clinics can dramatically reduce the number and increase the yield of cardiology consultations.²⁶

Reducing the number of cancelled procedures. A majority of surgical procedures are cancelled due to non-availability of beds, inappropriate preparation of patients, or non-attendance of the patients.²⁷ Most of these scenarios are potentially avoidable with proper planning, medical optimization, and communication starting from the preop clinic till the day of surgery. It has been studied that a proper functioning preop clinic reduces the number of cancelled procedures and increases patient acceptance.^{28,29}

Increasing patient's education about surgery. Preoperative assessment clinics are also valuable with regard to educating the patient about their surgery.³⁰ Patients are given written information leaflets in addition to verbal explanation about their admission and surgery. An attempt is also made to identify any social issues that might delay the discharge. The patients who undergo preoperative assessment were found to be more satisfied with the amount of information they receive about their procedure as compared to the ones who do not.²⁹

Discussion

The preoperative clinics are a backbone to effective perioperative management. However, we are living in an ever-evolving and challenging world of medicine and every project that we undertake has to be evaluated based on cost effectiveness, research-based evidence, and learned experience. Various models



have been proposed and reviewed for the effective functioning of a PAT clinic. The optimal model is still undefined and may depend on certain characteristics of the hospital such as types of specialty care provided, socioeconomic differences of the population being served, the expectation of the patients, and whether the facility is private versus academic practice.³¹

The nurse-led pre admission services have been studied to be effective on a wide range of outcomes for elective surgery patients. However, there are insufficient randomized controlled trials done for this model¹² to confidently describe it as an efficient practice. If the preoperative clinic is run by anesthesiologists, it means that they will have to spend more time out of operating room, which is not desirable given the shortage of anesthesiologists as reported by many institutions.³¹ There is abundant literature regarding the role of internists in the preoperative clinic (IMPACT center). However, it has also been studied that an effective communication and collaboration between specialties, especially between the internists and the surgeon, is required to ensure the safety of mutual patients.³² Also, in this era of advanced technology, there is also increasing trend toward the use of electronic devices to triage the patients using questionnaires before their preoperative clinic visit.³³ To summarize, when it comes to effective patient management, nurses, internists, anesthesiologists, IT specialists, and ancillary staff all have their own importance. This thinking has led to the concept of PSH.

The PSH is a step toward organizing the fragmented and expensive perioperative care in the US. The various components of this model have already been discussed in detail. In short, it is a patient-centered, physically led, collaborative care model. It serves to coordinate management of surgical patients from preoperative evaluation to postoperative discharge and transition planning in an attempt to integrate an isolated event-like surgery into the patient's complete medical care. It has been recently implemented in Kaiser Permanente (the largest integrated delivery system in California, USA). A prospective study showed that the integration of PSH resulted in simultaneous reduction in the length of stay and skilled nursing facility admission for total knee arthroplasty.³⁴

It is evident that most perioperative complications are related to a lack of coordinated care and a wide variability in its delivery. Therefore, a model such as the PSH is necessary.²¹ As compared to some of the other models and protocols of perioperative care, the PSH is a much larger conceptual framework that includes coordination of care from the minute the decision to operate was made until 30 days after discharge.

The following are the advantages of the preoperative surgical home:

1. The patient's preferences are at the center of this model (patient centered). Thus, patients participate in all decision making.
2. Allowing for a continuous flow of information between various providers, the patient PSH model allows for

seamless transition of patients from the isolated surgical event back to their routine medical care.

3. With the coordination of all phases of perioperative care between the patient's physician teams, early identification of patients at high risk for postoperative complications and readmissions may be identified.
4. It also allows for easy tracking of the patient's progress through all three phases of perioperative care. As the PSH model employs a physician-led approach employing teams including hospitalists, stratification and management of patients based on their risk factors are possible. This is particularly important in the management of high-risk patients. Such a multi-specialty approach allows to lower mortality, shorten the hospital length of stay, and lower total inpatient costs. An application of evidence-based protocols across the various disciplines involved in the care of the patient leads to reduced variability, improved outcomes, and adequate optimization of patient care modalities.³⁵⁻³⁷
5. With the coordination of all phases of perioperative care between the patient's physician teams, early identification of patients at high risk for postoperative complications and readmissions may be identified. It also allows for easy tracking of the patient's progress through all three phases of perioperative care. Implementation of the principles of the PSH model allows the patient to get the most appropriate care throughout their surgical experience, leading to better outcomes at lower costs.

There are still barriers to the implementation of this model on a wider scale.³⁸ It is still in an early phase, and more studies are required to review its effects in detail.

Conclusion

The challenges most commonly faced while setting a preoperative clinic is the limitation of finance and shortage of staff.³⁹ In addition, with the ever-increasing number of patients with multiple serious comorbidities scheduled for complex procedures, gathering information and optimizing their care is a challenge in itself. Financial constraints present the major barrier to the PSH model because the extra services provided by the physicians cannot be reimbursed within the existing payment systems. The other constraint is recruitment of staff, including IT personnel for the development of electronic medical records (EMR) templates and social work and nursing coordinators for managing patients with social risk factors. However, with increasing awareness about the usefulness of preoperative risk assessment and a growing body of literature and evidence-based guidelines, these clinics are becoming a medical necessity for the improvement of perioperative care.

Author Contributions

Conceived the concepts: HT, SC. Wrote the first draft of the manuscript: HT, SH, HA, SK, OT, RA. Contributed to



the writing of the manuscript: HT, SH, HA, SK, OT, RA. Agree with manuscript results and conclusions: HT, SC. Jointly developed the structure and arguments for the paper: HT, SH, HA, SK, OT, RA, SC. Made critical revisions and approved final version: SC. All authors reviewed and approved of the final manuscript.

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