



# Special article

# The perioperative surgical home: An innovative, patient-centred and cost-effective perioperative care model



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### ABSTRACT

Contrary to the intraoperative period, the current perioperative environment is known to be fragmented and expensive. One of the potential solutions to this problem is the newly proposed perioperative surgical home (PSH) model of care. The PSH is a patient-centred micro healthcare system, which begins at the time the decision for surgery is made, is continuous through the perioperative period and concludes 30 days after discharge from the hospital. The model is based on multidisciplinary involvement: coordination of care, consistent application of best evidence/best practice protocols, full transparency with continuous monitoring and reporting of safety, quality, and cost data to optimize and decrease variation in care practices. To reduce said variation in care, the entire continuum of the perioperative process must evolve into a unique care environment handled by one perioperative team and coordinated by a leader. Anaesthesiologists are ideally positioned to lead this new model and thus significantly contribute to the highest standards in transitional medicine. The unique characteristics that place Anaesthesiologists in this framework include their systematic role in hospitals (as coordinators between patients/medical staff and institutions), the culture of safety and health care metrics innate to the specialty, and a significant role in the preoperative evaluation and counselling process, making them ideal leaders in perioperative medicine.

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## 1. Introduction

Increasing costs together with non-optimal health care outcomes is leading the US health care federal agency [Centers for Medicare & Medicaid Services (CMS)] to move progressively from separate payments to providers for individual services towards a single payment reimbursement to hospitals, physicians, and other providers involved in the overall care surrounding each

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surgical episode [1]. This so called "bundled payments for care improvement" initiative is forcing caregivers to change their practice model and may lead to higher quality and more coordinated care at a lower cost for medicare. In the current system (pay for volume), hospitals and providers are paid for each service provided to their patients, which may lead to increased healthcare expenditures. In the "bundled payment" system (pay for value), hospitals and providers will have to optimize the expenses to outcome ratio in order to increase the revenue generated for each care episode. Indeed, the shift from 'volume' to 'value' is not limited to the bundle payment initiative but includes the fee-for-service model as well. On January 16th 2015, the Secretary of Health and Human Services indicated that by 2018, her intention is that 80% of all payments CMS will make will be dependent on value parameters [2]. One of the goals associated with these changes is to force hospitals, groups, and providers to decrease their expenses as well as to improve the patient experience and clinical outcomes (decreased incidence of

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Abbreviations: ASA, American Society of Anesthesiologists; CMS, centers for medicare & medicaid services; ERAS, enhance recovery after surgery; GDP, gross domestic product; LOS, length of stay; N-SQIP, National Surgical Quality Improvement Program; OR, operating room; PSH, perioperative surgical home.

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complications, decreased length of stay...) in order to maintain their revenue.

In this context, a new delivery care model referred to as the perioperative surgical home (PSH) has emerged from the American Society of Anesthesiologists (ASA) to optimize perioperative care [3]. The PSH is a patient-centred micro health care system that begins at the time of the decision for surgery and continues until physical and social recovery as an outpatient. The PSH model of care is designed to help achieve the triple aim proposed by the Institute for Healthcare Improvement [4]:

- improving health;
- improving the patient care experience (quality and satisfaction);
- reducing health care costs.

While the PSH incorporates certain components of enhanced recovery after surgery (ERAS), it is a broader concept that uses social engineering methods and performance management techniques (such as Lean and Six Sigma) to optimize care. The PSH model of care stresses that the role of anaesthesiologists is branching out from operating rooms (OR) and becoming a natural source of leadership for coordinated, perioperative care teamwork. The aim of this manuscript is to explain the rational and the overall concept of the PSH and to discuss the practical aspects of its implementation at individual facilities.

### 2. Rationale for implementing a new model of care

An interesting combination of forces is naturally driving the PSH model of care lead by anaesthesiologists. These forces are:

- the increasing cost and decreasing quality of healthcare: the American and French healthcare systems are not the best systems anymore. They are expensive and outcomes (clinical outcomes and patient satisfaction) are not improving. The portion of the Gross Domestic Product (GDP) invested in healthcare is not invested elsewhere, which is problematic in a stalling economy. One of the goals of the PSH is to improve perioperative outcomes, while decreasing costs;
- government incentives: in the US, the affordable care act aims at a universal health insurance coverage, which will mechanically increase healthcare expenditures. At the same time, by modifying the payment system, its goal is to contain costs for each care episode. In the perioperative environment (fragmented and expensive) [5], one of the goals of the PSH model of care is to make this care accessible in a highly protocolised environment;
- pressure on Anaesthesiology as a profession: the value of physician anaesthesiologists is decreasing. As concerns ASA I or II patients, if anaesthesiologists are confined to a purely intraoperative role, the latter is likely to become obsolete (too expensive for no difference in outcomes compared to midlevel providers). We (i.e. anaesthesiologists) need to change our value proposition and move from a purely intraoperative/critical care environment, to a perioperative medicine approach, where we can help improve the perioperative process of care.

Below is a detailed analysis of the driving forces leading the PSH model of care.

## 2.1. Increasing costs and decreasing healthcare quality

The US health care system presents growing health care expenditures, estimated at \$8,508 per capita and representing 16.9% of the GDP [6]. Despite that the US is ranked first for healthcare expenditures, the Commonwealth Fund reported a

corresponding low quality of care, ranking the US as 11th out of the evaluated countries [7]. The French health care system presents similar problems, with health care spending representing \$4,118 per capita (11.6% of the GDP) associated with a deficit of 7.3 billion euros [8] for a quality of care ranked 9th [7]. The definition of quality of care is based on six dimensions:

- effectiveness;
- efficiency;
- accessibility;
- acceptability/patient-centeredness;
- equity;
- safety [9].

Several factors held in common between the USA and France have historically prevented improvement of the current delivery of perioperative care. First, the fee-for-service payment system (pay for volume) leads to an increased demand for care [10], which drives costs up and does not provide incentives for improving outcomes. Indeed, as each service leads to a payment, the feefor-service system encourages the multiplicity/redundancy of lab tests and specialist consults prior to surgery. This approach also creates a fragmented model of care, where patients are spread across multiple care providers and institutions [5]. Second, perioperative care providers are likely to work alone, which contributes to increased individual management, lack of application of evidence-based protocols, human errors and therefore variation in delivery of care to patients [11]. The latter may be further explained by the fact that the concept of "quality of care" is pretty recent. For example, physician training and culture has been historically focused on pathologies rather than on patients and the overall concepts of "quality" and/or "system issues" have always been a secondary concern. We now realize that our practice needs to shift and become more quality and patient-centred. As Lienhard mentioned in a French survey on mortality related to anaesthesia in 2006, "Much remains to be done to improve compliance of physicians to standard practice and to improve the anaesthetic system process." [12].

### 2.2. Government incentives

In order to solve the contradiction posed by low health insurance coverage associated with high health care costs, the Affordable Care Act is a US law that made health insurance compulsory for all American citizens [13]. What is less known in France is that this American law introduced various tools to decrease health care costs, wherein four directly impact perioperative care:

- the pay-for-performance program provides a bonus to health care providers if they reach agreed-upon quality or performance measures;
- care givers are incentivized to join Accountable Care Organizations and the National Quality Strategy Program [14];
- hospital readmissions within 30 days after discharge from the hospital, new hospital-acquired conditions and poor patient experience scores lead to a significant decrease in payments made to hospitals;
- the National pilot program on payment bundling drives health insurers to pay for a set of services, not "per unit of care delivered" under the fee-for-service model.

Interestingly, similar changes have been observed in France. Since 2008 in France, the health facility payment method is based on case-based payments or diagnosis-related groups (DRGs) (Groupement Homogène de Malades, Groupement Homogène de Séjours) balanced by patient characteristics or perioperative complications. The impact of this activity-based funding on outcomes is not straightforward [15], and serious complications during the patient stay lead to additional expenses for the facility and for care providers. Certain modifications could occur following the implementation of the French law termed "Loi de Santé", adopted on April 14th, 2015. This law includes a proposition to "modify care towards the need of the patient," which could be rephrased as a "patient-centred clinical pathway" [16]. This law also tackles the issues of bundled payment organization and patient accountability. However, no penalty or reward for improving the quality of perioperative care is proposed.

#### 2.3. Pressure on anaesthesiology as a profession

When examining the evolution of anaesthesiology as a profession over the past 50 years, two main characteristics strike the observer. First, our specialty has been a leader in developing patient safety concepts and mortality related to anaesthesia has decreased from 373 per million procedures in the 1950s' to less than 8 per million today [17]. No other medical specialty has pushed the envelope of patient safety as far as anaesthesiologists have. The second striking observation is that this increase in patient safety has been paralleled by a decrease in physician anaesthesiologists' involvement in direct patient care. As a matter of fact, one physician anaesthesiologist was required per anaesthesiology procedure in the 1950's, while today one physician anaesthesiologist, with the assistance of midlevel providers such as nurse anaesthetists, can supervise ('medical supervision') up to four simultaneous anaesthesia procedures. The ratio of physician anaesthesiologists to nurse anaesthetists can reach up to 1:7 under a "medical direction" model. This development may become a problem for physician anaesthesiologists when one considers that the cost of a nurse anaesthetist is half that of a physician anaesthesiologist in the United States and when some states (e.g. California), now allow midlevel providers to provide anaesthesia under the supervision of any physician (including surgeons) [18]. According to the "Loi de Santé", this practice may soon exist in France [19]. Indeed, the second chapter of this law, article 30, extends the scope of nursing with the creation of a status of nurse practitioner ("infirmier clinician"), particularly in the field of chronic diseases. These new projects may also result in expanding roles for nurse anaesthetists. Thus, given the current environment, physician anaesthesiologists may become obsolete for the provision of services to ASA I and II patients if they do not change their value proposition. By remaining confined to operating rooms, our value compared to midlevel providers may not be worth the gap in payment. The place occupied by anaesthesiologists in the surgical ward is fuzzy [20,21]. If the role of anaesthesiologists in the surgical ward is merely counselling (on medical complications or pain control management), we will only further contribute to the fragmented nature of the current model of care [22].

Overall, we hypothesize that anaesthesiologists are currently faced with a unique opportunity: our expertise together with the external pressures on our profession puts us in a position where we must venture out of the operating room in order to solve the issues related to the perioperative environment. Doing so will allow us to lead the changes required for optimizing the perioperative process, while simultaneously increasing our value proposition.

# 3. Basis of the PSH model of care

Recognizing that perioperative care is a major component of total health expenditures, the American Society of Anesthesiologists introduced the concept of the perioperative surgical home (PSH), akin to the medical home model developed in the primary care setting [23]. Once again, PSH is defined as a micro health care system centred on the patient from the time of the decision for surgery to the physical and social recovery as an outpatient up to 30 days after discharge from the hospital with a triple aim (Fig. 1) of improving (i) clinical outcomes and the (ii) patient experience, as well as (iii) reducing health care costs [24]. The approach of this future health care system is summarized in Table 1. We hypothesize that the PSH concept can be the focus of a French project coordinated by the French Society of Anaesthesiologists [Société française d'anesthésie et de réanimation (Sfar)], broadening the skills of our future practice [25]. The PSH is based on five principles that will be covered below: (i) patient-centeredness, (ii) comprehensiveness, (iii) coordination of care, (iv) accessibility, committed to (v) quality and safety [26].

# 3.1. An accountable clinical pathway for patient-centred care (comprehensiveness and accessibility)

In the PSH model of care, the perioperative clinical pathway is centred on the patient rather than on the physician (Fig. 2), ensuring that caregivers and family members are engaged as partners as concerns a given patient's care. Coaching and education are vital for the accountability of the active patient [27].



Fig. 1. The triple aim: improved clinical outcome, improved patients satisfaction, decreased cost. Patients, care providers and payers interact to optimize the health care system within an accountable care organization.

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 Table 1

 Current and future characteristics of healthcare systems.

From	То
Pay for procedures	Pay for value
Fee-for-service	Case rate/budgets/capitation
More facilities/capacity	Better access to appropriate settings
Physicians/hospitals acting	Physicians/hospitals collaborating
independently	for global risk
Physicians and hospitals	Highly accountable care organization
working in parallel	Patient-centred
Hospital centred	Continuum of care
Fragmented care	Maintain health
Treat disease/episode of care	Engineering method improvement
Individual improvement	(Lean Six Sigma)

The clinical pathway is modelled according to the time frames associated with the different stages of management: decision for surgery, preoperative assessment, hospital admission, pre-, intra-, and postoperative care, secondary care facility, home discharge



**Fig. 2.** The perioperative surgical home model of care. The perioperative surgical home (PSH) is a patient-centred, institution-led, interdisciplinary and team-based system of coordinated care that guides the patient through the entire surgical continuum, from the surgical decision to full recovery; the PSH is provided by a preoperative assessment to generate a ranked and seamless continuity of care. Care providers revolve around the patient; performance measures analyse patient evolution and provide a quality improvement process.

and return to daily activities. It is of major importance to understand that involvement in post hospital care is critical because this period represents up to 40% of the expenses related to a given surgery. This seamless continuity of care (comprehensiveness) would reduce unnecessary preoperative testing and consultation services, as well as day-of-surgery cancellations [28]. It has recently been shown that improving each milestone throughout the process can decrease the postoperative length of stay (LOS) [29]. Post-acute care (nursing facilities, medical homes) can also be a major part of the pathway cost, thus further indicating the need to optimize every stage of patient care [1]. Also, new approaches are being developed, such as home-visits by nurses [30] and postoperative consultations with patients self-reporting progress via electronic media (accessibility) [31]. Nevertheless, the adaptation of the PSH in the outpatient setting has yet to be described [32]. It should be stressed that PSH benchmarks the quality of recovery, which is widely desired by physicians [33], beyond the simple metric of LOS [34].

# *3.2.* The physician anaesthesiologist: the perioperative team leader (coordination)

The patient-centred pathway design needs to be spearheaded by an accountable physician-leader within a perioperative team. Coordinated care will be accomplished mostly by breaking silos between specialties through effective communication and mutual monitoring. Obtaining feedback, as well as analysing behaviour markers, enhances the perioperative team performance and ensures optimal patient safety [35]. Anaesthesiology appears to be the physician specialty the most appropriately prepared to provide such comprehensive perioperative medicine. Our unique qualities include our universal and diverse roles in hospitals (coordinator between patients/medical staff and institutions), our culture of safety and health care metrics, and our role in preoperative evaluation and counselling [28]. The perioperative physician would rapidly establish a reasonable model supported by others by implementing and coordinating care ("from home to recovery at home"), improving staff matching, leveraging resource allocation for each patient's requirements, and accounting for the costs of patient care [36]. A nurse practitioner serving as the patient's "perioperative transition coach" [24] could follow the patient on a daily basis and ensure achievement of each pathway milestone.

# 3.3. Real-time access to best practices and engineering strategies to propose and sustain a seamless quality of care: a commitment to quality and safety

Perioperative medicine has to deliver the best possible pre-, intra- and postoperative care to meet the needs of patients undergoing surgery [37] (Fig. 3). The efficient design of related clinical pathways calls for the implementation of evidence-based medicine and social engineering strategies that make use of Information Technology (IT). Individualized care based on intuitive decision-making by physicians should be replaced by a multidisciplinary "PSH model" using standardized protocols. The underlying concept is to reduce variation originating from system heterogeneity and/or differences in practice among doctors ("variability is the enemy of quality"), while allowing some variability based on individual patients. Evidenced-based protocols and checklists can not only decrease human error [38], but can also allow clinicians to embrace a broader view of the patient, and would reduce redundancy. The benefit associated with evidence-based, new guidelines, such as the enhance recovery after surgery programs (ERAS) [39], has been clearly demonstrated via decreases in perioperative morbidity; the latter are also well



Fig. 3. Tools allowing implementation of the perioperative surgical home (PSH) model of care.

integrated in PSH. As an example, ERAS in colorectal surgery is based on approximately 20 items spanning the pre, intra and postoperative periods (Table 2) [39,40]. Beyond simply editing the protocol, costs and sustainability issues associated with its implementation should be thoroughly monitored [41,42]. Furthermore, protocols streamline human tasks (i.e. applying anaesthesia protocols would allow nurse anaesthetists to be more independent) [25] and would therefore allow anaesthesiologists to embrace their role as perioperative physicians.

Protocols should be associated with preoperative clinical decision tools [43] that increase the efficiency of various treatments, while also improving protocol compliance and decreasing overall practice variability [44]. For example, a preoperative consult describing a history of sleep apnoea for a given patient would alert anaesthesiologists, who would then avoid preoperative benzodiazepines, a relative contraindication for ambulatory procedures. Combined with anaesthesia information management systems (AIMS), perioperative cognitive aids can be designed to provide real-time decision support, thus helping avoid human errors. For instance, a low mean arterial pressure combined with a high

### Table 2

Checklist of Enhanced Recovery After Surgery (ERAS) Group recommendations.

Propositions
Preoperative
Preadmission information and counselling
Preoperative bowel preparation
Preoperative fasting and preoperative carbohydrate loading
Same-day admission
Pre-anaesthetic medication avoidance
Antimicrobial prophylaxis
Intraoperative
Standard anaesthetic protocol
Balanced/multimodal analgesia
Goal-directed therapy
Minimally invasive techniques
High oxygen concentrations
Preventing intraoperative hypothermia
Avoidance of drains and lines
Postoperative
Early mobilization and oral intake
Prophylaxis against thromboembolism
Preventing and treating postoperative nausea, vomiting and ileus
Balanced analgesia
Early removal of drains, lines and urinary catheters
Audit

Adapted from [39,40].

minimum alveolar concentration inhaled drug (recorded by the AIMS) might generate an alert subsequently sent to the care provider's cell phone [45]. A step closer to automatic management is closed-loop systems, wherein the speed of a continuous infusion can be rapidly (quasi-instantaneously) modified by the real-time measurement of the desired effect [46].

Bevond protocol implementation, social engineering strategies derived from the manufacturing industry can improve costeffectiveness and should be implemented within the PSH model of care. For instance, Lean and Six Sigma methodologies streamline care (removal of waste from a value stream) and focus on reducing variation and 'defects' within a process according to the DMAIC cycle: Define the opportunity, Measure the baseline performance, Analyse the root causes, Improve the process, Control the improved process to prevent regression. This highly-reliable care organization approach is focused on both processes and outcomes. The addition of multiple small cycles for rapid improvement achieves an overall better outcome. Applied to healthcare-delivery systems, the DMAIC cycle has contributed to the development of goaldirected protocols, resulting in decreased LOS [42]. By eliminating waste and redundancy, this improved care can be achieved in a cost-effective manner.

3.4. Full transparency with continuous monitoring and reporting of quality of care and cost data

The continuous monitoring of performance measures tracks patient progress within the PSH model of care and guides process improvement in order to decrease health care costs [47]. All metrics are stored in a data mart. Metric results provide feedback to institutions enabling modification of clinical pathway protocols, if deemed necessary (Table 3). Feedback would also lead to improved compliance, lower variability of care, and enable physicians to enhance delivery of care. Within a framework of multidisciplinary teamwork, anonymous quality assurance reporting is needed to rapidly modify individual behaviours or established protocols in order to learn from mistakes, regardless of their origin [48].

On a national scale, the National Surgical Quality Improvement Program (N-SQIP) in the United States has applied this approach by reporting readmission rates (transparency) [49]. N-SQIP reporting has enhanced quality of care by influencing "subpar caregivers" towards improved delivery of care. Adoption of the N-SQIP to improve safety is widely recommended [50].

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Table 3 Lexicon.

Accessibility	"Patients and their families must be able to contact PSH providers at all times" [26]
Accountable Care	Groups of doctors, hospitals, and other health care providers, who come together voluntarily to give coordinated high quality
Organization	care to initially medicare patients
	High quality of the right care at the right time, while avoiding unnecessary duplication of services and preventing medical errors
	[59]
Affordable Care Act	Health insurance reforms that put consumers back in charge of their health care
	To make health care more affordable, accessible and of a higher quality
Bundled payment	Paying for a set of services
	Reimbursement of health care providers "on the basis of expected costs for clinically-defined episodes of care"
Centers for Medicare &	Federal agency that runs the medicare program (public health insurance program for people age 65 or older, or with certain
Medicaid services (CMS)	disabilities)
	CMS works with the states to run the medicaid program (public health insurance program for incomes < \$29,700 for a family of
	four)
Committed to quality and	Perioperative medicine has to deliver the best possible perioperative care to meet the needs of patients undergoing surgery in
safety	using evidence-based protocols allowing for decreasing variability of practice
Comprehensiveness	Seamless continuity of care spanning the entire patient pathway
Coordination	The "deliberate organization of patient care activities between two or more participants (including the patient) involved in a
	patient's care to facilitate the appropriate delivery of health care services" [60]
	"The PSH model requires coordination between all phases of the perioperative process: from the surgeon's office to the
	preadmission testing process, through the pre-, intra- and postoperative periods in the hospital and lastly, the post-discharge
	process at a skilled nurse facility or at home" [50]
Fee-for-service	A method in which doctors and other health care providers are paid for each service performed [61]
Metrics	Performance measures, clinical data reporting
	Ouantitative measurement of delivery of care and outcomes
	Provide the ability to track patient progress during their time in the PSH, generate reports on the functioning of the PSH and
	guide process improvement
	Ex: National Anesthesia Clinical Outcomes Registry (NACOR)
N-SQIP	The National Surgical Quality Improvement Program, a nationally validated, risk-adjusted, outcomes-based program to
-	measure and improve the quality of surgical care
Patient-centeredness	Perioperative "health care that establishes a partnership among practitioners and patients, and their families to ensure that
	decisions respect patients' wants, needs, and preferences and that patients have the education and support they need to make
	decisions and participate in their own care" [62]
Pav-for-performance (P4P)	Performance measures for guality and efficiency. It penalizes caregivers for poor outcomes, medical errors, or increased costs
· · · · · · · · · · · · · · · · · · ·	Value-based purchasing
Triple aim	An approach towards optimizing health system performance by simultaneously developing three dimensions: improving the
<b>F</b>	patient experience of care (including quality and satisfaction), improving the health of populations, and reducing the per capita
	cost of health care
	Developed by the "Institute for Health care Improvement", an independent not-for-profit organization

PSH: perioperative surgical home.

# 4. Implementing the PSH strategy in our institution: a new challenge for the anaesthesiologist

The PSH model of care is an opportunity for French anaesthesiologists to embrace new dimensions: by consistently measuring our practice and patient outcomes/satisfaction, we would improve our delivery of care. In tailoring our care process by focussing it on the patient, we would decrease care variability while encouraging a patient individualized approach.

## 4.1. Assessment of local perioperative management

A necessary first step that must be carried out before applying a coordinated strategy is the description, quantification and questioning of the current perioperative patient management process. What is the clinical pathway (consults, lab tests, hospital admission, perioperative care, and home discharge until full recovery)? How do all perioperative care providers (physicians, paramedics and administrative) interact? How is care provided: use of evidence-based protocols, use of tools allowing quantification of patient states (comorbidity and satisfaction scales) and quality of care? Last but not least, what is the cost of each part of this micro health care system (consults, patient movements, lab tests, hospital stay, care provider fees, etc.)?

# 4.2. Implementation of PSH in local institutions

The assessment of the local perioperative environment would serve as a basis for the reorganization of care. Importantly, implementation depends on local constraints (i.e. an efficient PSH in a dedicated area might not be as efficient in a different location) [51]. A PSH is organized according to a personalized and evidencebased care plan, coordinated by a leader from a perioperative team. Implementing a new perioperative approach would ideally lead to care improvements, increased patient and physician satisfaction, [52,53] and cost savings.

### 4.3. Key elements to insure the success of PSH

Anaesthesiologists and dedicated surgeons, together with colleagues from all perioperative hospital services, should develop and implement a series of clinical care pathways defining and standardizing pre-, intra-, postoperative and post-discharge management for a specific group of patients. Commitment to the goals from multiple disciplines in establishing protocols and implementing clinical pathways ensures their buy-in, easing the transition from a traditional surgical practice to a standardized and coordinated care delivery model.

In practice, the clinical pathway should be displayed using process mapping techniques on a large spreadsheet with all tailored protocols and standardized clinical assessment and management protocols (SCAMPs) [24]. A steering committee (PSH team, including a dedicated nurse [54]) is created and should meet regularly to follow PSH implementation and SCAMPs. The use of Lean Six Sigma engineering and metrics provides a strict monitoring system for the clinical pathway with any deviations managed by the PSH team. The orchestration of the PSH implementation process by a quality improvement specialist and a project coordinator can be very useful. As previously mentioned, outcome measures need to be quantified by metrics from a health care database, including process outcome, clinical outcome, and financial outcome metrics.

### 4.4. Potential challenges to the implementation of a PSH model

Several barriers can appear on the road to PSH implementation: finding physicians with proper leadership skills, achieving consensus between all stakeholders (particularly with surgeons and administrations), and adherence to the standardization of care. One way to convince physicians and ensure their engagement is to audit actual practice by choosing a common surgery in an institution and to evaluate patient satisfaction, cost, morbidity, LOS, and recovery. This analysis brings up a second potential problem: the cost of analysis, development of electronic medical record order sets, and dedicated employees to work on PSH. Funding up front may be difficult but the financial benefits after a successful implementation far outweigh the initial investment. Finally, another difficulty could be physician compensation expectations. One simple way to keep staff motivated is to report outcome progress and maintain PSH educational opportunities that could help in improving multidisciplinary care team dynamics

### 4.5. Education to drive the concept of PSH

Educational measures and the corresponding computer software are essential for the success of any new care strategy. Current medical studies focused on pathology, diagnosis, and treatment should transition to include factors describing quality of care (safety, effectiveness, patient-centeredness, timeliness, efficiency, equitability) [55], as well as those derived from the sociologic and economic health sciences. Simulation is also a novel learning tool that contributes to improving individual tasks [56] and teamwork (to explore interactions between care providers, patients, team management, etc.) [57]. Importantly, in order to highlight the new role of the anaesthesiologist as a perioperative physician, PSH education should be included in residency training. Fellowships are also an effective approach for training and dispersing such a novel paradigm shift in clinical care. Education of the general population and medical community is also warranted (national advertising campaigns and relevant publications) to optimize positive impacts [58]. Patients should also be held accountable for their care and accept the collaborative role between themselves and their physician in order to be better satisfied with the delivery of their health care [27].

### 5. Conclusion

The PSH model may be a precursor to a future perioperative health care system by not only more effectively treating disease but also by benchmarking patient recovery in a cost-effective manner. Additionally, the PSH paradigm may help institutions respond to potential reimbursement cuts secondary to future bundle payments, penalties for readmissions and the movement from volume to value. Such a new approach requires us to be open minded in accepting constant evaluation, integrating automated processes, and overseeing the patient rather than maintaining a fragmented role. PSH necessitates major structural and work-flow changes and questions our work habits through direct and indirect measurement of our skills, examining medical practice as a science but also with the goal of reaching a higher patient satisfaction level. Anaesthesiologists are ideally positioned to lead PSH initiatives and should benchmark higher standards of care by being active team leaders for this individualized, patient-centred, perioperative pathway. As with every new concept, discussion is necessary: PSH implementation will require significant financial resources and concrete evidence to prove its cost-effectiveness, sustainability, and improvement in both patient and physician satisfaction.

### **Disclosure of interest**

The authors declare that they have no competing interest.

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