

From volume to value: Improving peri-operative elective pathways through a roadmap from fast-track orthopedic surgery

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Abstract

Healthcare institutions face the pressure generated by modern medicine and society, in terms of increasing expectations and financial constraints. Chronic patients need multidisciplinary care pathways to preserve their wellbeing across the entire journey.

The orthopaedic community has been particularly receptive in testing solutions to align good clinical outcomes and financial sustainability, given the increase in elective procedures provided among aging populations to alleviate pain and reduce disability. Fast-track (FT) total joint arthroplasty (TJA) and bundled payments (BPs) offer relevant examples both from the clinical and the financial perspective; however, they have not been evaluated in combination yet.

The aim of this manuscript is to provide a road map to improve the value of high-volume, multidisciplinary elective procedures, with potential applications in a vast number of surgical specialties, (1) based on an integrated financial budget per episode of care (the BP), (2) building on lessons from a review of the literature on FT TJA.

Although clinical outcomes vary from procedure to procedure, the coordination between the single treatments and providers involved across the patient journey; the commitment of patients and relatives; and the systematic adoption of patient-reported outcomes; can add further value for the benefit of patients, healthcare funders and providers, once essential clinical, financial and administrative conditions are guaranteed.

Keywords

patient-reported experience, patient-reported outcomes, population health management, value-based care, peri-operative care, elective surgery

Chronic needs and population health management

Healthcare institutions need to adopt innovative approaches of service delivery and patient management to face the pressure generated by modern medicine and society, especially in terms of increasing demand and financial constraints. Among them, Population Health Management (PHM) is gaining momentum. Population Health Management is a proactive approach to the promotion of well being in patients affected by chronic conditions, who need integrated multidisciplinary pathways to provide continuous patient-centred care.

Population Health Management is expected to meet the targets of the Quadruple Aim Framework¹:

1. Improve patient experience, by enhancing quality of care and involving their families, caregivers or social network (i.e. by means of improved accessibility, easier compliance, coordinated case management and clear communication);

2. Improve the measurement of healthcare benefits by means of clear and validated indicators, including doctor and patient-reported outcomes, which provide the baseline to implement pay-per-performance (P4P) remuneration;²
3. Lower down costs, by reducing inappropriate care and operational waste, that is, high variations in costs and volumes which do not depend on clinical treatment or patient characteristics (i.e. institutional fragmentation, delayed discharge, poor team cooperation);

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4. Improve the experience of healthcare professionals, by enhancing motivation, cooperation, commitment to patients and gain sharing.

The more these goals are met, the more PHM supports the multidimensional dimensions of value³:

1. Personal value, by significantly improving patient wellbeing, quality of life and autonomy (i.e. by reducing chronic pain, or restoring those functions which make the life of patients worthy-living according to their preferences);
2. Technical value, by reaching certain outcomes through the most appropriate and efficient use of resources (i.e. conservative treatment or surgery);
3. Allocative value, by freeing up resources from clinical and operational waste which can be invested in the treatment of other patients and disease;
4. Social value, by extending the benefits of healthcare to society (i.e. by reducing the burden of disability, loss of productivity, and the social fabric erosion).

From theory to practice

In this perspective, the development of PHM requires strong coordination among the different healthcare providers involved in the continuum of care. Such coordination can be achieved through normative or motivational actions. Among the latter, together with emphasis on cultural changes, an important lever could be represented by the introduction of bundled payments (BPs). Bundled payments are financial incentives which aim to align payer and provider in a way that maximizes patient-centric value creation, including doctor- and patient-reported measurements.⁴⁻⁶

The assumption is that financing an entire episode of care, with a clear, planned duration, a specific clinical pathway and a clear expected outcome, will generate more appropriate use of human and technological resources (reducing over-prescriptions, over-treatment, preventable hospitalizations etc.); will reduce fragmentation in health services delivery; and will be more beneficial to patient's recovery; than financing separately each singular treatment provided within that episode, like in a fee-for-service financing model. Therefore, BPs should generate savings for the funder. At the same time, it requires to be well designed in order to ensure the provision of all treatments actually needed by the patient. This risk is mitigated by the strong emphasis on process outcomes, ensuring the safety of the entire care pathway. Moreover, if multiple providers provide their services under the same episode-of-care payment (the bundling payment), they are further incentivized to coordinate in the patient's interest.⁷

However, implementing BPs is not an easy task, as specific disease, patient and facility characteristics are required for a certain service to be eligible. The easier the indicators of

disease, the easier to measure the benefits of treatments. The better room for planning, the better patient-oriented care. The more volumes are delivered, the more organizational and financial benefits are expected on a great scale. Then, BPs promise to unlock best value when applied to integrated healthcare pathways for elective surgical treatments, as preliminary evidence from 272 episodes clearly supports.⁶

The orthopaedic community has been particular receptive in testing management solutions to align clinical outcomes and financial interests,^{4,5} given the considerable increase in elective procedures performed worldwide to reduce pain and severe individual impairment among aging populations. Fast-track (FT) orthopaedic surgery was designed precisely to this purpose, building on cooperative commitment between professionals and facilities (from preoperative education to prosthesis implantation, postoperative rehabilitation and appropriate discharge) and resulting in decreased institutionalization, better patient satisfaction and reduced hospital costs.⁸⁻¹⁵ According to the literature, "the principles of FT surgery can be generalized and such protocols have also been safe and effective in a variety of other surgical specialties",¹⁰ including colorectal surgery, hepatopancreaticobiliary surgery, upper gastrointestinal surgery, urological surgery, gynaecological surgery, thoracic surgery, vascular surgery, endocrine and breast surgery and pediatric surgery.

If FT total joint arthroplasty (TJA) is feasible for remuneration under a BP program, therefore, there is room for application of the same combination under a different number of elective surgical specialties. However, FT TJA and BPs have not been evaluated in combination yet, as searching the literature for the string "fast (-)track AND bundled payments" gave 0 results on PubMed at the moment of writing.

The aim of this manuscript is to provide a road map to improve the value of high-volume, multidisciplinary elective procedures, with potential applications in a vast number of surgical specialties, (1) based on an integrated financial budget per episode of care (the BP), (2) building on good practice, pitfalls and caveats from an evidence-based review of the literature on FT TJA.

Materials and methods

In order to meet these goals, the authors proceeded in two steps.

First, it was performed a narrative review of the literature to retrieve information on the implementation of FT pathways in orthopaedic surgery, searching PubMed for the keywords "Fast (-) Track surgery AND Orthop(a)edic Surgery". 152 studies resulted from the research. Among them, the authors selected those findings consistent with elective TJA procedures. Further information was added from other studies the authors were aware of but not retrieved from the electronic research. 76 papers were finally included in the synthesis.

Second, a road map for the implementation of BPs in orthopaedic surgery was drawn from the extensive work of Bozic and Ward,⁵ in order to collate and summarize evidence across the different stages of the healthcare pathway, and evaluate whether this evidence can be helpful to improve the quality and sustainability of other high-volume elective procedures.

At this purpose, five types of arrangements were identified and aggregated in clusters:

1. Select high-volume pathologies with predictable evolution and standardized treatments;
2. Select multidisciplinary pathways characterised by structural collaboration and interprofessional communication;
3. Map the expected episode to identify the reference pathway(s) for the BP;
4. Define biomedical and patient-related outcomes;
5. Define price and design the gainsharing model.

For each of the five dimensions, examples of good practice, pitfalls, caveats and/or room for improvement are discussed.

Results

Select high volumes pathologies with predictable and standardized care pathway

The first step to initiate a successful bundle is to identify the specific clinical conditions to which payment applies. Identifying a minimum volume threshold is also necessary as BP will offer opportunity for re-engineering the healthcare process. Otherwise, the risk is to spend more money on reconfiguring the pathway than saving money as a consequence of its optimization.¹⁶

Control for natural variability. The target pathology needs predictable clinical evolution and standardized treatment. The need to identify a relatively homogeneous patient population follows from the need to minimize outliers and clinical contingencies. Outliers are patients subject to significant perioperative variation (clinical contingencies), who require different treatments and more substantial resources with respect to the mean. For instance, in the case of TKA, a minimum volume of 100 cases per year is essential to reduce the effect of variability and outliers.⁶

These patients represent a clinical challenge to care providers and a financial risk to care funders, often resulting in a greater burden for low-volume institutions.⁶ Therefore, identifying the most possible sources of variation is key to design effective, patient-centred BPs across the entire process of care (preoperative, intraoperative, postoperative), improve outcomes, safety, reduce medical (iatrogenic complications and readmissions) and operational waste (inefficient planning

and coordination). The main sources of variability can be natural (patient and disease characteristics) and/or artificial (professional behaviours, administrative and medical management)..

Control for artificial variability. Significant variability in quality and costs is spread all over the perioperative process.

Pre-operative care. Pre-operative education represents the most investigated and controversial factor of variability.^{17,18} The motivation and expectations of patients influence the outcomes of the entire pathway, as (1) better compliance is associated with faster recovery and improved quality of life, (2) unclear pathways trigger more anxiety and exposition to pain,^{10,14} (3) patient engagement often increases patient satisfaction.^{19,20} Indeed, patients who do not comply with pathways may waste the benefits of excellent surgery.

Intraoperative care. Intraoperative care plays the greatest impact on quality and hospital costs.

In general, the estimate impact of operating room is around 51–58% of the total cost of a FT TJA, of which 44–53% are represented by consumables (including implants), 44–50% by personnel, and 3–6% by space and equipment.²¹

Post-operative care. The impact of post-acute care on the overall TJA bundle varies between 36–55% in costs according to the setting where the patient is assisted, with hospital care costing more than skilled nursing facilities, outpatient and home care, in this order.^{21,22} In general, early discharge planning can reduce delays and improve outcomes.⁸ Poor discharge planning may induce to inappropriate extended LOS and the onset of a hospital infection.²³

Select multidisciplinary pathways characterised by structural collaboration and interprofessional communication

In order to support multidisciplinary and coordinated care on an ongoing basis, formal and structural links must be warranted among the single providers or silos, both in terms of individual professionals, wards and healthcare facilities.⁸

Strong leadership and clear strategic direction from the highest levels are required over the entire process of health care delivery. Administrators, nursing coordinators, anaesthesia providers, Post-Acute Care leadership, rehabilitation (physical and occupational therapists) and discharge coordinators are crucial just as surgeons and medical care. Cooperation between different units can also improve device procurement, which is fundamental to optimize clinical outcomes and financial savings on the longer term.²⁴ Healthcare providers that based their decisions on a joint commitment of administrators and surgeons paid on average 17% less for implants than those who did not, while the volume of procedures performed played a significant though

Table 1. Key findings and conclusions.

- Fast-track total joint arthroplasty is a good candidate for bundled payment programs.
- The post-operative portion of care is the less neglected although more expensive.
- Patient engagement and expectations influence the outcomes of the entire pathway.
- Most of the administrative arrangements can be extended to other elective procedures.
- Clinically complex patients should undergo more conventional programs.

small-in-magnitude role in achieving implant-related cost savings (3% reduction per 100 incremental surgeries).²¹

These actions are required to build effective collaboration:

1. Establishing formal links with post-acute community care and rehabilitation;²⁵
2. Design how to manage eventual complications and readmissions in advance.²⁶

Map the expected episode

The episode of care is defined by the time range and specific set of activities remunerated by the BP. In order to ensure patients, providers and funders with a clear understanding of the tasks willing to be performed within the episode, it is necessary to (1) map the episode entirely, (2) fix the expected duration, (3) evaluate the costs of each single task, and (4) identify room for improvement.

Map the pathway. A key feature in case of FT pathways and integrated remuneration episodes is to agree on a written plan addressing all the steps, the expected outcomes and the potential variations, including patient incentives and formal agreements to maximize compliance.²⁷ Maps will come out in the form of lists, algorithms or flow charts.

Define the expected duration. The trigger should be a clearly definable standard event, like the diagnosis of a certain condition or the first activity delivered to take charge of it. Episodes are defined in relation to a fixed number of days after the initial discharge from hospital or inpatient clinic.

Map the costs. The estimations of costs should be driven precisely by the clinical pathway draft. For that purpose, it could be useful to adopt accounting methodologies based on the principles of Activity-Based Costing (ABC).²⁸

Define outcomes and expected performances

The ability to track performance on an ongoing basis is crucial to the BP success. In order to measure the effectiveness of a pathway, a clear set of performance metrics must be established in advance. Drawing from there, it is possible to measure the performance achieved by each task, identify the reasons behind pitfalls and strengths, adopt the best

possible arrangements and/or share penalties or rewards. Then, evaluate and iterate.

Design performance (patient-centred) metrics. Performance should be defined on clinical, operational and financial dimensions.

Integrating objective clinical outcomes with subjective patient-related measurement is fundamental to evaluate whether the same pathway performs differently on different populations of patients. Patient-Related Outcome Measurements (PROMs), Patient-Related Experience Measurements (PREMs) and the Lean continuous improvement methodology offer opportunities to catch the patient perspective across the entire healthcare pathway. Patient-Related Outcome Measurements are questionnaires where patients describe personal symptoms, functional status and health-related quality of life. Patient-Related Experience Measurements are indicators of health-care delivery features such as continuity of care, good communication, clear explanation and engagement, adequacy of pain control, sufficient discharge information.²⁹ The clearer correlations between outcomes, patient-characteristics and perioperative factors, the more opportunities to unlock value from FT pathways and BP remuneration. Care performances can provide benchmarks against national or local achievements, in order to advance technical value.

Evaluate and iterate. According to Bozic and Ward, clinical and financial performance must be tracked on an ongoing basis, based on agreed-upon metrics and reporting mechanisms; a multidisciplinary steering committee should (1) be accountable for regular review and (2) have the authority to adopt the operational arrangements eventually needed; the steering committee should include clinical champions from all health care teams, facilities and wards included in the pathway, rely on unit nursing leadership, and involve representatives from finance and quality services.⁵

Define price and design the gainsharing model

The first variables to be considered when pricing the bundle are the map of costs, the expectations on volumes and adjustments for contingencies and outliers. Then, further attention should be placed on specific social, organizational and psychological determinants of higher or minor compliance i.e. patient cognitive function, care giver availability, degree

of support across the healthcare environment transitions and ability to rely on integrated IT systems available to different provider units. Most of these determinants are key to the effectiveness of rehabilitation and the cost-effectiveness of the pathway.^{13,14}

When a BP is implemented for the first time, a reasonable estimation of costs is offered by the sum of retrospective payments awarded to each single facility to provide care for similar episodes based on current fee-for service infrastructures. Although traditional FFS reimbursement is still a large percentage of income for hospitals, the shift towards P4P value-based programs is accelerating rapidly.² In a realistic transitional scenario, the transition from volume to value needs competing incentives in a hybrid payment environment.³⁰ For instance, it is recommended to compensate short-term losses to encourage broader participation in care re-design.⁵

Gainsharing means to share the benefits or losses generated by a certain pathway among the providers who were involved. The intention is to focus providers on optimizing outcomes and reducing costs. Gainsharing is meant to be functional to achieve better care at sustainable costs, therefore, it must never be detrimental to the quality and safety of care: at this purpose, it is fundamental to set quality thresholds and safety requirements to be met regardless of remuneration.

The benefits of gainsharing must be carefully assessed against the burden of complicated reporting methodologies, which may be detrimental to (1) the effectiveness and efficiency of the single procedures; (2) the collaboration and commitment of professionals; (3) the time and quality of care dedicated by healthcare professionals to their patients. For these reasons, it is recommended to introduce gainsharing gradually, and evaluate pros and cons depending on local context and professional reactions.

Discussion

The clinical and financial benefits of FT elective surgery relied from the very beginning on “first doing it better, than doing it quicker”, “by improving all parts of the perioperative hospital stay and thereby addressing all parts of the convalescence”; the following focus on the organizational determinants of outpatient rehabilitation effectiveness and efficiency clearly support that FT is “the right track”.¹¹ Combining the substantial amount of studies retrieved here and the road map for BP implementation in orthopedic surgery provided by Bozic and Ward,⁵ FT TJA results a good candidate to be covered under the latter remuneration program. The way the single treatments and care providers are coordinated within the pathway is what makes the difference in terms of clinical and financial benefits. Therefore, the roadmap seems to be generalizable to other elective procedures organized and provided in FT clinical pathways, with some general pitfalls and caveats to be considered before planning.

The more high-volume, relatively standard procedures on a relatively homogeneous population are provided each year, the more opportunities to benefit from the revision of the entire healthcare process. Pre-operative education represents the most investigated and controversial factor of variability, as the degree of fragmented healthcare provision on the one side, and the motivation, expectations and engagement of patients on the other side do both frequently influence the outcomes of the entire pathway. The more compliance and/or social capital from the patient, the more opportunities to overcome fragmented healthcare. At the opposite, the post-acute portion of care currently received the least attention in research efforts and pathway design, though the *site* of rehabilitation represents the main determinant of cost variation. Cost-shifting from high-volume acute care settings should therefore be considered carefully in advance, just like advanced perioperative pathways will increase access to health care only when adequate rehabilitation will be planned and available around hospitals.

Early discharge planning can reduce operational waste, delayed provision of appropriate support and improve the outcomes of the overall pathway, together with formal links with post-acute community care and rehabilitation depending on different clusters of patients associated with frequent complications and predictable triggers (based on physical, psychological and social determinants). For this reason, patients at high risk of a clinical variability (i.e. affected by critical comorbidities and/or social isolation) are recommended to undergo more conventional programs.

Bundled payments encourage institutions to go beyond departmental or specialist divisions, in order to share processes and goals towards the benefit of patient outcomes and reduced costs. However, defining the expected duration of the pathway is probably the most complex issue, as different interests may conflict. Extending the episode length increases the risk of exposure to readmissions and complications, then, from the perspective of the provider, the shorter the length of the episode, the more the bundle is likely to be successful. From the perspective of the funder, the more the total episode length increases, the greater share of costs is expended on post-acute services. From the perspective of patients, the more healthcare is included in the bundle, the less they have to spend from out-of-pocket resources. Then, depending on the local healthcare system, the challenge is to align the interest of different stakeholders to reach a sustainable and reasonable compromise, as recent research already highlighted.⁵ The more healthcare is fragmented, the more need and difficulty to align the incentives.

Although clinical arrangements vary from procedure to procedure, the organizational and financial arrangements discussed in this paper can be applied to any other elective surgery. The review here performed supports that the way treatments are provided into a coordinated multidisciplinary pathway, more than the different technical expertise and skills required to treat a certain disease, is what adds value to patients

(improved outcomes), healthcare funders (reduced waste of resources) and providers (improved volumes), provided the essential clinical, financial and administrative conditions before mentioned. Of course, the more evidence about clinical effectiveness and costs is available from the treatment of any other elective condition, the more is possible to improve its management across the entire pathway, reason why a reciprocal dialogue between clinicians, researchers and administrators is key to improve quality and sustainability.²³ The amount of literature published on TJA procedures can pave the way for similar developments in other fields.

Conclusions

The road map is expected to provide a general framework for all the researchers, administrators, policy-makers and practitioners interested in improving the continuum of patient-centred care in any elective procedure characterised by an integrated perioperative approach, where clear individual responsibilities and team goals can be established in advance.

Many implications follow for patients, clinicians and managers at different levels. All the patients who are able to sustain FT elective surgery can benefit from reduced hospitalization given equal or better clinical outcomes (personal and technical value). Increasing patients prove eligible for these pathways, reducing the burden of waiting lists and disability on family care givers (allocative and social value). Managers and policy makers supported by clinicians can distinguish between patients who are able to undergo such a clinical and financial program, and patients who are better off undergoing more conventional clinical pathways and financial programs, in order to expect benefits from the former while ensuring safety to the latter (Table 1).

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