Introduction of Clinical Pathways in Orthopedic Surgical Care: The Experience of the Hospital for Special Surgery

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Objectives

- To document the foundation for and the success of the adoption of clinical pathways for the care of patients undergoing routine orthopedic procedures
- To describe the HSS experience which illustrates the benefit given to patients and hospitals through the adoption of clinical pathways for the care of total joint replacement patients
- To discuss the potential value of the adoption of clinical pathways for complex surgery of the spine and to address their increasingly important role in the challenging economic environment associated with healthcare reform

Key Points

- Clinical pathways are structured multidisciplinary care plans which address specific clinical scenarios which help to standardize and coordinate care.
- Clinical pathways are evidence based incorporating proven best practice but ideally can be adopted to any given hospital environment and culture.
- Clinical pathways aim to optimize the quality and efficiency of care. These care plans must address pre-hospital preparation, the in-hospital care, and the post-hospital discharge.
- The patient experience can be optimized leading to improved overall patient satisfaction. The care plan must be focused on the patient experience primarily. Managing patient expectations through pre-hospitalization education and counseling is a key element of success.
- Adoption of clinical pathways demands physician championship which is best achieved by recording and providing feedback on outcomes following adoption of the new care plans.
- In high-volume clinical settings adoption of standardized care plans known as clinical pathways can improve patient outcomes and safety and provide for more efficient and satisfying care.
- The creation of clinical pathways should be based multidisciplinary involving all members of the healthcare team. Each hospital should design clinical pathways based on their unique environment and should be specific to patients undergoing particular medical procedures.
- Through rigorous planning and following of procedures in clinical pathways, hospitals are able to decrease the incidence of complications and length of stay, improve budget planning, and much more.
- Following implementation all clinical pathways must be routinely monitored for success and for modification to ensure that best clinical practices are represented and that continuous process improvement is assured.

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Introduction

The adoption of clinical pathways in patient care has grown from the necessity of providing consistently high quality of care for an increasing demand for clinical services. Clinical pathways are structured multidisciplinary care plans that detail the essential steps in the care of patients with specific clinical problems. Clinical pathways provide hospitals with a consistent template for patient care by creating a predetermined standardized approach to care that should be adhered to by each member of the healthcare team. Clinical pathways are especially suited to the high volume and elective nature of much of orthopedic surgery. In our specialty quality and efficiency must be optimized. To help achieve this clinical pathways are used as standard protocols [1]. Each process, in a clinical pathway, is followed in order to ensure that the desired end results are achieved. The pathway also ensures that each patient is receiving optimum levels of care pre, intra-, and postoperatively. Clinical pathways are evidence based using the common international experience but must be adapted to the culture of any given hospital. Clinical pathways are effective because they standardize care, help develop measures for prevention of patient discomfort and harm, and provide ongoing performance measures that promote effective and useful change in practice.

In the United States, the demand for joint arthroplasty has steadily been increasing, which in turn has been placing pressure on hospitals to provide efficient care delivery models for joint arthroplasty. The demand for total knee replacements is predicted to increase by 673 % in 2030 [2, 3]. In order to provide this high volume, service hospitals have to adjust and develop new strategies which focus on quality, safety, and efficiency or they risk exhausting financial resources that are not incorporated into their budget plans. For instance, hospitals create a budget that provides for a fixed bed capacity and overhead cost, but reimbursement for the surgical procedures performed may have a small profit margin per case. To remain profitable hospital processes must insure a minimum of complications, an efficient length of stay, and high patient satisfaction. Clinical pathways introduce a process, which standardizes care among all caregivers. Individual practitioner practice is standardized into a team approach that allows for better coordination of care, communication, and process improvement based on the post-implementation experience. Clinical pathways are excellent tools, which help hospitals become safer, more efficient, and profitable [3–10].

Since the 1990s Hospital for Special Surgery has adopted the use of clinical pathways for patients undergoing total hip and knee replacement surgery [11]. These pathways include standardized patient orders that ensure that the most important elements of care are routinely addressed. Over the years, modifications to the Hospital for Special Surgery's clinical pathways have been initiated in response to clinical advances, hospital processes, and third-party payer demands. For example, the original clinical pathways were designed to improve the patient experience focusing primarily on improvements in pain management and postoperative physical rehabilitation [11, 12]. In spite of early success in achieving these goals it became clear by 2007 that the pathways needed modification to help reduce the length of stay to accommodate a large increase in the volume of these procedures in the setting of a fixed bed capacity. One of the advantages of standardized pathways is that they lend themselves to evaluation and provide simple ground work for modification based on their own results. Evaluation of our initial clinical pathway results directed the changes needed to address the length of stay and provided the elements of the updated pathway adopted in 2007 (Table 31.1) [3].

The Key Elements of Clinical Pathways Addressing Total Joint Arthroplasty

The success of total joint replacement is ultimately judged by the patient experience. Total joint arthroplasty intends to provide improved quality of life. With that specific goal, the surgical care plan must be safe, predictable, and efficient. The experience can be compared to air travel. A passenger books a flight expecting a predictable outcome with little to no expectation for failure. Air travel is obviously complex requiring a detailed approach to the delivery of a safe and efficient service. The happy passenger is usually unaware of the planning and complex processes involved. The processes used by the airline industry provide a model for us in arthroplasty. Each surgical procedure should be planned with optimal preparation of the patient in the pre-hospital phase, executed with best practice during the hospital stay and a detailed plan for the postoperative recovery ensuring the desired restoration of pain-free mobility and quality of life expected. As such, clinical pathways must address preoperative preparation, in-hospital care, and post-hospital rehabilitation period.

Elements of Pre-hospital Preparation for Total Joint Replacement

Preoperative preparation of patients for total joint surgery is perhaps the most critical element of a successful outcome. It was our experience prior to adoption of our current clinical pathway that many phases of the preoperative process failed to address the complex issues that arose during the hospital stay. In particular we noted that inadequate preparation of

Table 31.1 Comparison of the elements of the old TKR clinical pathway and the new pathway. Comparison of the elements of the old TKR clinical pathway and the new pathway

Features of TKR pathway	Old pathway (1996–August 2007)	New pathway (initiated in August 2007) Changes
Patient education	Patient instructed in TKR Care Plan, use of PCEA, PT protocol, and use of CPM	All elements of old pathway
		Discharge planning addressed
	Class Q and A	Discharge planner attends class
		Individual patient D/C plan formulated
Pain management	Femoral nerve block with epidural monitored daily by acute pain service	Meloxicam 7.5 mg or 15 mg Decadron
		6 mg 1 h prior to surgery
	Discontinued by 48 h based on patient VAS	Ondansetron during surgery
	Nausea management PRN by nursing staff	PCEA demand only: D/C by 36 h
Physical therapy	BID sessions beginning on POD #1	Mobilized to upright position and ambulation attempted on POD 0
		BID sessions on POD #1
Discharge planning education	Begun in post-op period	Plan initiated during pre-op education
		Plan reinforced by pre-hospitalization
		Phone call by discharge planner

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the patients with medical comorbidities led to postoperative complications. We are now convinced that meticulous preparation of patients, especially those with complex medical histories, is required before surgery can proceed. We have developed guidelines for patients with cardiovascular disease and diabetes mellitus which are detailed in the prior chapters of this text. We also established a complex case panel to which our surgeons can refer their complex cases to help develop plans for preparation and execution of surgery in especially high-risk scenarios. We have established a perioperative medical service that provides for preoperative evaluation and preparation of all scheduled arthroplasty patients with the goal that each is medically optimized before the day of surgery. We attribute our recent improvements in the incidence of infection and perioperative cardiovascular and thromboembolic complications, in part, to this process.

Additionally, addressing each patient's psychosocial readiness for surgery has been extremely helpful in improving the quality and efficiency of care. Preoperative education of arthroplasty patients has become an accepted standard practice [11, 13–15]. A preoperative education program can effectively address what information patients need prior to surgery and helps to manage and organize the postoperative care. Patients should be encouraged to attend interdisciplinary preoperative total knee/hip arthroplasty educational classes prior to the surgery. The patient educational class describes in detail the expectations and outcomes that any patient should expect from a total knee/hip arthroplasty. The plan of care should be presented so that patients understand what is expected of them and the hospital staff during their perioperative period. In particular, information regarding all aspects of the process should be clearly explained and the daily in-hospital routine should be emphasized. In particular the approach to pain management and physical therapy should be clear, and the details for items such as DVT prophylaxis, hip precautions, pain management, and physical therapy should be covered. Of particular importance is to address patient expectations for their level of pain and physical mobility and dependence by the time of discharge. It was our experience that most patients have little understanding of the nature of recovery following arthroplasty and often anticipate extreme dependency and prolonged disability. By incorporating our experience into the educational curriculum [12] we have allayed patient and family fears regarding a prolonged post-op disability or dependency. This has allowed for acceptance of earlier discharge to home plans. In addition to the class, the hospital's Department of Case Management and the patients' surgeons develop a combined preliminary discharge plan for each patient which is discussed with the patients via phone during the week prior to the surgical admission date. In this way, the discharge plan is firmly established before the admission making the post-admission case management process more automatic and efficient.

Perioperative Pain Management

It is now clearly established that optimal pain management is a critical element in the quality and efficiency of care of orthopedic patients. Poorly controlled postoperative pain delays postoperative mobility, contributes to adverse outcomes, and results in poor patient satisfaction with their

experience [16]. On the other hand, overmedication is also associated with side effects and morbidities that also negatively influence patient outcome [17, 18]. To address this new multimodal, preemptive pain management strategies have been developed which can be easily incorporated into total joint replacement clinical pathways. Multimodal and preemptive strategies to prevent postoperative pain have benefitted from recent advances in the understanding of neuronal plasticity and how undertreated acute pain can lead to chronic pain. Also, clarifying the role that local inflammation plays in injured tissue increasing the sensitization of nociceptors has led to drug therapies incorporating nonsteroidal anti-inflammatory drugs (NSAIDs) and COX-2 agents in preemptively controlling post-op pain. Blocking the pain signal by a variety of methods including narcotics, anti-inflammatories, and peripheral nerve blockade (multimodal) has improved postoperative pain management and the overall quality and efficiency of care [19].

The preemptive pain management procedure involves preoperative administration of medications, which blunt or even prevent post-op pain and other side effects such as nausea. Preemptive pain management strategies usually call for administration of a COX-2 NSAID to reduce the development of post-op pain along with steroid medications which are extremely effective and safe in preventing post-op nausea [3, 16, 18]. Embedded in the latest HSS THR and TKR clinical pathways are a preoperative order set that calls for the administration of a COX-2 agent and oral steroid (dexamethasone 6 mg) to each patient 1 h prior to surgery. In addition, the pathway established the anesthesia practice of administration of ondansetron (Zofran) intravenously to each patient during surgery to reduce the occurrence of postoperative nausea.

New strategies for pain management are rapidly emerging which are designed to rely less on the epidural or the intravenous route focusing on locally applied pain management techniques. It is hoped that these will decrease the side effects and morbidity associated with neuraxial analgesia while permitting more aggressive mobilization. These include local injections of long-acting anesthetics and intraarticular infusion of pain medication [18, 20].

Post-mobilization and Physical Therapy: Fast-Track Rehabilitation

The traditional approach to rehabilitation following joint replacement has in most cases relied on transfer of patients from the acute hospital setting to in-patient rehabilitation facilities where intensive physical therapy is applied to ready patients for the home setting. This approach reduced the expectations for an early in-hospital recovery and thereby directly increased the length of stay and the cost of care per beneficiary. It is not surprising that most health insurance programs currently seek to limit access to post-discharge rehab facilities. Since the coordination of transfer is also time consuming lengthening the acute hospital length of stay, it is also not surprising that hospitals delivering these procedures have sought means for early home discharge as well. Traditional approaches to physical therapy and mobilization have had to be modified to achieve more efficient hospital stays and earlier recovery. Although immobilization and bed rest have been known to contribute to postoperative complications, it has not been until recently that efforts to rapidly mobilize following total joint replacement have been implemented. Postoperative orthostasis, syncope, and falls have been relatively common in our own experience, and we believe that 24–48 h of bed confinement as a result of epidural analgesia contributes to this. New "fast-track" approaches to mobility and physical therapy have been implemented with great success [4, 9, 21–23]. Combined with our new multimodal management strategies early and rapid mobilization has become the norm. Patients are encouraged to stand and ambulate on the day of surgery, and our fast-track protocols include three visits per day from the physical therapists and mobility technicians. With the understanding that recovery of range of motion following total knee replacement is a gradual process, the emphasis of the post-op in-hospital program is on gait training and mobility rather than a range of motion prior to discharge. We have partnered with our local visiting nurse service to provide an accelerated in-home early PT program which front loads a patient's therapy from a 4-week to a 2-week program to continue the pace of early recovery avoiding the need for a rehab hospitalization. We now aim for a 2-day length of stay for THR and 3 days for TKR with an emphasis on home discharge (Fig. 31.1).

Successful Implementation of Clinical Pathways

Adoption of clinical pathways requires a multidisciplinary team approach. All disciplines involved in the care of the patient must be involved. In general we have worked to establish the principles of care for each of the disciplines involved and then implemented these through the creation of standardized order sets which are now a part of our electronic medical record and computerized order entry. Physician and surgeon buy-in is critical to the success of this process, and every effort has been made to involve them in the process. The most effective tool in physician recruitment is the generation of evidence that the pathways work leading to better quality of care, fewer complications, shorter length of stay, and improved patient satisfaction. At HSS we now have achieved an overall length of stay below 4 days with

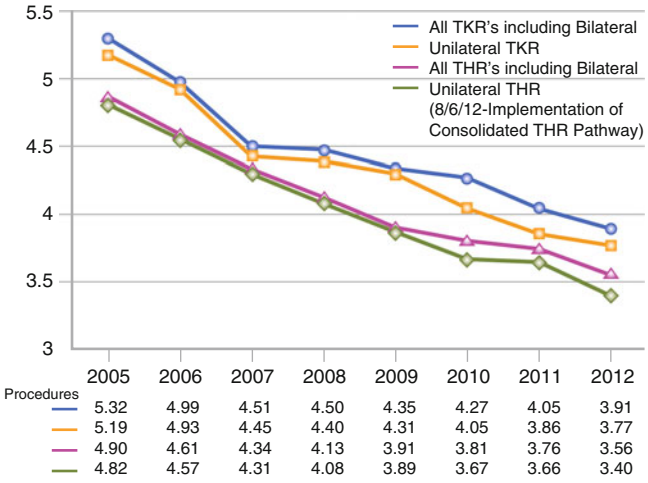

Fig. 31.1 Average length of stay trends from 2005 to 2012 at HSS for TKR/THR patients. The first clinical pathway was enacted in 2005. Updates with new protocols were introduced in 2007 and 2011. Continual reductions in length of stay have been achieved in spite a large increase in surgical volume. Readmission rates have remained stable throughout this period

the highest patient satisfaction ratings as recorded by Press Ganey in our history. We continually review the established pathways searching for improvements as our post-implementation experience develops. Our success is mirrored by the success in many other hospital settings [24]. Based on the success we have achieved with total hip and knee arthroplasty we have developed and adopted clinical pathways for both simple and increasingly complex spinal surgery.

One concern often voiced regarding efforts to shorten length of stay reflects a common belief that decreasing the hospital length of stay would increase the incidence of complications in patients with a need for readmission. This belief has been proven to be inaccurate. Studies have shown that decreasing the length of stay to less than 5 days does not have any correlation with increased risks of complications or hip dislocation [6, 7]. Contrary to the dogma, decreasing the length of stay also benefits patients by allowing them to return to their natural environment, which is generally the patient's home. A patient's natural environment is usually safer and more comfortable for them, as patients have created this environment to reside in, as a niche. Patient in-home care, which provides physical therapy and visiting nurse services, allows the patient to recover at a pace comfortable to them and still be satisfied with the environment in which he or she is recovering. Many studies have also demonstrated that an increase in the length of hospital stay after total joint arthroplasty does not improve patient outcome. Instead it simply decreases patient satisfaction [6, 8].

Patient satisfaction is a vital component to patient care. Satisfaction is a state of mind that allows patients, or individuals, to be pleased with the work they or others have performed. Patients that are satisfied with the surgical or the medical procedures performed on them have a higher recovery rate with less probability of complications. Satisfied patients generally believe that their surgeons/physicians have provided the best possible care in an environment that values their safety and comfort. Studies have indicated that hospitals that create clinical pathways that decrease the patient's length of stay in hospitals have a higher number of satisfied patients [6]. Patients who are satisfied have a higher rate of compliance with prescribed medications as well as other instructions given to them. This is particularly important in total joint arthroplasty to avoid complications such as falls and dislocation of the prosthetic joint and to ensure that the proper approach to physical therapy and rehabilitation is followed.

Adoption of clinical pathways can be met with skepticism and resistance from any member of the multidisciplinary team involved in patient care. Because clinical pathways standardize care they reduce reliance on individual decision making or traditional approaches to care. Every effort must be made in adopting new clinical pathways to educate and inform the multidisciplinary team of the evidentiary basis on which the principles of the new pathway are based. Physician, nursing, and administrative champions must work together to develop and institute new pathways. The process should be communicated in a completely transparent manner. The thought processes involved should be clearly documented, and every member of the patient care team must be trained and oriented to the new process. Following implementation documentation of important clinical indicators should be monitored and regular reports of outcome must be communicated back to the hospital staff. The pace of implementation must be geared to the tolerance of the staff at each individual hospital. Often implementation should be conservative with realistic expectations. As success is garnered more progressive modifications to the pathway based on real outcomes can be pursued. It is critical that the clinician champions involved in this process be sensitive and realistic as well as willing to devote their time and energy to the process.

Summary

Hospital for Special Surgery has benefitted from the fact that it is a hospital dedicated solely to the care of musculoskeletal disease. This focus has allowed the hospital to develop specialized care plans and a patient-centered approach to care that would be a greater challenge in other more general hospital settings. However, this specialization has led to the development of approaches to care that can benefit patients in any hospital setting. The adoption of clinical pathways has

led to safer and more efficient care that has reduced perioperative complication and hospital length of stay and significantly improved patient satisfaction as well as the hospital's reputation as a center of excellence. This experience has also been achieved in many hospital settings throughout the world. It is now clear that hospitals, as well as patients, benefit from the creation and implementation of clinical pathways.

The procedures adopted in clinical pathways must be created through the cooperation of all members of the healthcare team. Physician champions are especially important to help educate and train their colleagues and to provide the convincing evidence that the pathways are successful in improving overall care. Each hospital must customize the clinical pathways to their own environment and subspecialty focus. Following implementation, the success of the pathway must be routinely monitored to encourage continued participation of the healthcare team as well as to allow modification of the pathways based on evidence and experience. Surgical procedures such as total joint arthroplasty and spinal reconstruction are extremely amenable to adoption of standardized approaches to care, and the implementation of clinical pathways in these subspecialties has been met with success throughout the world.

Summary Bullet Points

- In high-volume clinical settings adoption of standardized care plans known as clinical pathways can improve patient outcomes and safety and provide for more efficient care. Clinical pathways have been shown to improve the patient experience.
- The creation of clinical pathways should be multidisciplinary involving all members of the healthcare team. Each hospital should design clinical pathways based on their unique environment and should be specific to patients undergoing particular medical procedures.
- Clinical pathways aim to optimize the quality and efficiency of care. The patient experience can be optimized leading to improved overall patient satisfaction. These care plans must address prehospital preparation, the in-hospital care, and the post-hospital discharge. The care plan must be focused on the patient experience primarily. Managing patient expectations through prehospitalization education and counseling is a key element of success.

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