

Hip & Knee Replacement Toolkit

“A living document”

Bone & Joint Canada
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The views expressed in this document do not necessarily represent the views of the contributors.

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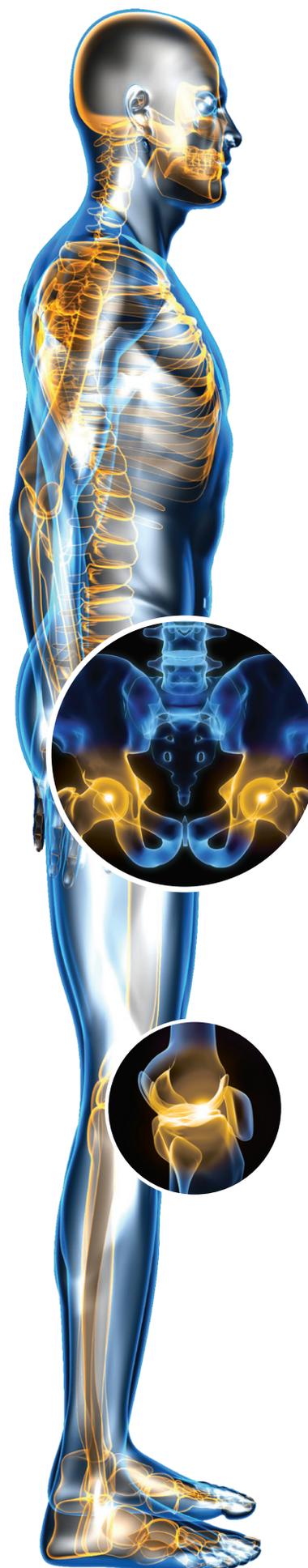


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1. Executive Summary

The Bone and Joint Decade provided a mandate to address access to care for people with musculoskeletal conditions. Bone and Joint Decade Canada identified the specific need to develop and implement a wait list strategy to improve access to primary hip and knee replacement surgery. Bone and Joint Canada (BJC) undertook to develop and promote a consistent continuum of care for patients undergoing hip or knee replacement surgery, to ensure sustainable improvements in access, quality and efficiency of care.

A number of successful programs for primary hip and knee replacement surgery have been developed and implemented across the country; however, it was evident that each province was at a different stage in its understanding of the issues associated with wait times for primary hip and knee replacement surgery and its ability to effectively implement a wait times strategy. There was a recognized need for better coordination across systems, more consistent patient care, improved patient satisfaction and cost benefits. Therefore BJC established the Canadian National Hip & Knee Knowledge Translation Network, with its primary objective to improve access to hip and knee replacement surgery across Canada. BJC achieved this by 1) building consensus regarding key elements of a National Core Model of Care for primary hip and knee replacement surgery and 2) through the compilation and integration of various resources that have been developed across the country into a national Toolkit for primary hip and knee replacement surgery. The support and participation of the provinces in sharing of their clinical tools and their knowledge has been a critical factor in the successful development of this Toolkit. It is anticipated that this Toolkit will assist provinces in the development and implementation of the National Core Model of Care. Further research is needed to develop a “gold standard of care”.

The Toolkit includes the recommended components of the National Core Model of Care for primary hip and knee replacement surgery and a number of resources that address:

- Wait times
- Pre-operative care
- Surgical care
- Post-operative care
- Evaluation
- Implementation

The Toolkit is supported by a Resource Folder on the BJC website (www.boneandjointcanada.com).

The Resource Folder is intended to provide templates to facilitate the development of clinical programs that may benefit from the work already initiated across Canada. The decision was made to include all relevant tools as identified by the various stakeholders engaged in this project, regardless of whether there was supportive evidence for the tool or not, as there are many clinically relevant tools currently being used throughout the provinces that demonstrate appropriate face validity and practical application. The tools have been organized in the Resource Folder under the categories of Pre-Operative, Surgical, Post-Operative and Evaluation.

2. Background

The development of this Toolkit has been an initiative of Bone and Joint Canada, which originated from the Bone and Joint Decade Canada. The Bone and Joint Decade (BJD) was initiated by a group of international healthcare professionals in order to address the impact of bone and joint disorders on society, the healthcare system and the individual.

Within Canada, the 2004 First Ministers' Conference on the Future of Healthcare established a commitment to achieve meaningful reductions in wait times in the five priority areas of care including cancer, heart, diagnostic imaging, sight restoration, and joint replacement. As a result, a number of strategies have been implemented by each province in an effort to increase access to, and reduce wait times for, various diagnostic procedures and treatment interventions, including primary hip and knee replacement surgery.

In 2006, The Alliance for the Canadian Arthritis Program's (ACAP) Report from the Summit on Standards for Prevention and Care of Arthritis outlined 12 proposed standards of arthritis care¹. The standard relating to access to hip and knee replacement surgery for patients with arthritis, stated: "Every Canadian requiring joint surgery must wait no longer than six months from the time the decision to have surgery is made by the patient and physician".

This standard supported Bone and Joint Canada's priority to "develop and implement a wait time strategy to improve access to hip and knee replacement surgery". Healthcare data also supported the need to address access to surgery. "Over the last two decades, the age standardized rates for both total knee replacement (TKR) and total hip replacement (THR) surgeries have increased. In the province of Ontario, the THR rate per 100,000 population went from 48.5 in 1981/82 to 97.8 in 2001/02 for women and from 33.9 to 68.8 for men. Further, the TKR rate per 100,000 population went from 7.8 in 1981/82 to 130.7 in 2001/02 for women and 8.1 to 84.3 for men"². By 2004, a number of provinces across Canada were reporting wait times greater than two years for joint replacement surgery. Arthritis patients were most affected.

Through funding provided by Health Canada³, the Hip and Knee Replacement Surgery Toolkit – A Living Document 2009 was developed. Further Health Canada funding⁴ was provided to support Phase IV: Implementation. Initiatives to improve access and care for hip and knee replacement patients occurred across the country from 2009 to 2011. In 2011, the Toolkit was updated to reflect the learnings from these initiatives.

¹Alliance for the Canadian Arthritis Program. *Arthritis isn't a big deal... until you get it. Report from the Summit on Standards for Arthritis Prevention and Care.* www.arthritisalliance.ca February 2006.

²Badley E, Glazier R. *Arthritis & Related Conditions in Ontario. ICES Atlas Report.* September 2004

³Health Canada: *Healthcare Policy Contribution Program – National Wait Times Initiative*

⁴Health Canada: *Healthcare Policy Contribution Program – Health Human Resources*

3. Toolkit Purpose And Principles

The purpose of this Toolkit is to improve access and care for people requiring primary hip or knee replacement surgery and to provide information on best clinical and operational practice within Canada. The Toolkit defines patient flow through the healthcare continuum based on the National Core Model of Care as well as best practice information for pre-operative, surgery and post-operative care.

This Toolkit was developed to share processes and resources that may be used by healthcare administrators and clinical staff to improve patient care and to provide guidance to hospitals, regions and governments on both the clinical and operational aspects of ensuring best patient experiences. The Toolkit provides an overview of resource allocation modelling tools, but does not provide directive information on funding (including costing and resource allocation) and model implementation. These items are deferred to the appropriate provincial governments and health authorities. However, as resources including human resources and funding differ across the country, this Toolkit provides overall guidance and is sufficiently flexible to be implemented within different locations with varying resources.

GUIDING PRINCIPLES

The 10 rules of Health Care Reform⁵ were used to guide the development of the Toolkit:

- Care is based on continuous healing relationships
- Care is customized based on patient needs and values
- The patient is the source of control
- Knowledge is shared and information flows freely
- Decision-making is evidence-based
- Safety is a system property
- Transparency is necessary
- Needs are anticipated
- Waste is continuously decreased
- Cooperation among clinicians is a priority

The following principles were also identified by the steering committee and the coordinators:

- The model builds on the patient experience, including the expectation that patients will actively engage in their care and self-management.
- The model incorporates input from a broad spectrum of stakeholders from across the country (including patients, orthopaedic surgeons, primary care practitioners, anesthesiologists, rehabilitation, nursing, regional health authorities, and government officials) and as such reflects a diversity of health professional practices and scopes. The model respects professional relationships within the circle of care.
- The model links to chronic disease strategies (e.g. the Arthritis Strategy), which address the broader issues of prevention and follow-up care.
- The model is based on the premise that ongoing evaluation is necessary to guide system improvements and efficiencies. Included in the Toolkit are recommended indicators to be used in the evaluation of the primary hip and knee replacement continuum.

⁵White House Commission on Complementary and Alternative Medicine Policy, pp169-170, March 2002. Appendix B – 10 Rules for Health Care Reform, 28 Focus Areas of Health People 2010 and PEW Taskforce Recommendations. http://www.whccamp.hhs.gov/pdfs/fr2002_appendix_b.pdf accessed March 26, 2009.

4. Toolkit Design

This Toolkit was designed to serve as a “living document” to be updated as information and experience is gained in the management of primary hip and knee replacement patients. This document was based on research review of the human and English language journals published between the years 2004-2011 and was endorsed through informal clinical consensus.

The Toolkit includes a Resource Folder to share materials and resources that have not been published such as operational documents (e.g. sample forms, educational materials, care plans and performance indicators). This Resource Folder is available on the BJC website at www.boneandjointcanada.com and is available to all healthcare practitioners in Canada.

The Resource Folder is intended to provide documents to facilitate the development of clinical programs through access to the work already initiated across Canada. Due to a lack of supporting evidence, BJC does not endorse the individual items in the Resource Folder but makes the information available for consideration by other organizations.

The following sections are outlined in the Toolkit:

BACKGROUND

Provincial Strategies: Hip or Knee Replacement Surgery: This section is intended to enable the reader to identify other communities with similar statistics to their own, as this might be significant in identifying community appropriate solutions. The overview brought to light the variation in wait times and collection processes across the country, which lends credence to the need for such a Toolkit and for a national minimum data set.

National Core Model of Care: This section provides an overview of the model of care and clearly identifies how the continuum of care needs to be considered to meet patient needs.

Wait Times: This section is intended to provide guidance regarding the development of a system to manage the flow of referrals, measure waiting times and to ensure that the information is made available to the various stakeholders.

CLINICAL MANAGEMENT

Pre-Operative Care: This section provides recommendations, resources and tools for the essential components of comprehensive pre-operative care for primary hip and knee replacement patients.

Surgical Care: This section focuses on processes and procedures to make the surgical journey of the primary hip and knee replacement patient effective, efficient and safe.

Post-Operative Care: This section presents recommendations, resources and tools for the care of patients in the acute post-operative and rehabilitation phases, which occurs either as an inpatient or through outpatient and/or community resources.

Evaluation: This section presents the key performance indicators recommended for each of the sections of the Core Model of Care for primary hip and knee replacement surgery (pre-operative care, surgical care and post-operative care).

OTHER

Implementation: This section is intended to guide the development of a change management plan that defines clinical practice, includes input from all stakeholders and manages patient transitions across the continuum and maximizes learning through knowledge translation.

5. Provincial Strategies

Primary hip and knee replacement represents a significant cost to the healthcare system and requires oversight and planning through the provincial governments. Provincial strategies for primary hip and knee replacement surgery vary significantly across Canada. This variation is seen in the strategies for wait list management, surgical rates, and the number of orthopaedic surgeons per population and hospital lengths of stay. As the provinces provide the funding they have the ability to determine the dedicated capacity to meet provincial demand.

This section provides an overview of the provincial strategies currently being used to manage wait times and to enhance access to primary hip and knee replacement surgery. It also provides information on the number of orthopaedic surgeons per population, surgical rates for primary hip and knee replacement surgery and average length of inpatient hospital stay following hip or knee replacement surgery as well as oversight bodies.

OVERVIEW

Provincial strategies: primary hip and knee replacement surgery:

The development of this Toolkit has taken into consideration the work that has been going on within the provinces across Canada since the initiation of the wait times strategy mandate. In 2006, Alberta began a randomized controlled trial that demonstrated that a successful program needed to consider coordinated patient intake processes, pre-operative patient management and improved coordinated post-operative care. Through the development of their Osteo Arthritis Service Integration System, British Columbia demonstrated that a Centre of Excellence could deliver cost effective care. In Ontario starting in 2006 a provincial strategy was rolled out which included central intake, use of advanced practice physiotherapists and streamlining of processes across the continuum that has led to improved efficiencies and consistency of care. In 2007/2008, Bone and Joint Canada assisted a team in Halifax with implementation of central intake. By 2010, central intake and other aspects of the Model had been implemented in parts of BC, AB, ON and across NS.

Through the 2010 - 2011 implementation process, Newfoundland, Prince Edward Island, Manitoba and Quebec used the Toolkit and related resources to implement key components of the Model of Care with significant success. Nova Scotia expanded its use of the Model across the province.

Additional work has been undertaken in British Columbia in the form of a Formal Gap Analysis, Alberta through the development of a change management process called Transformational Implementation Program, and in Saskatchewan through family physician engagement and mathematical modelling of Operating Room processes. These documents and tools have been used to further improve the provinces local system improvements as well as to develop additional tools that can be used by the other provinces for future program refinement.

WAIT LIST AND WAIT TIME MEASUREMENT

Each province has implemented a wait list coordination system and a registry to monitor wait times and wait lists for primary hip and knee replacement surgery. These registries help to provide detailed wait time reporting by province, health region, and facility, in some provinces by procedure and, in rare cases, by physician.

Data collection is an essential element of wait time management in that it enables determination of the number of people waiting for hip or knee replacement surgery and establishment of the *length of time* individuals wait before they undergo surgery. The use of similar indicators for wait time measurement is important in order to compare and contrast access to healthcare across provinces. The majority of provinces define the beginning of the wait time when the decision to treat is made (patient and surgeon are in agreement to proceed with hip or knee replacement surgery) and the wait time ends when the patient actually undergoes surgery. Over the last few years there has been significant work completed to standardize the reporting of wait times data between provinces; however, in any cross comparison it is recommended that the start time and the completion time need to be considered.

Provincial accountability through public reporting was agreed upon at the First Ministers' Meeting. Currently, all provinces are using established evidence-based benchmarks for wait time reporting. The benchmark for primary hip and knee replacement surgery is 6 months or 26 weeks or 182 days. The frequency of reporting wait time statistics may be quarterly, semi-annually, or annually. There are a few atypical wait time reporting methods such as 90 days preceding a specified date and 3 months ending a specified date.

Summary measures to describe wait lists and wait times vary widely between provinces. Generally all provinces report surgical volumes (number of patients who have undergone hip or knee replacement surgery). There is also reporting of the number of patients waiting for surgery. These metrics differ between provinces. Some provinces report the total number of patients waiting, or, the number and/or percent waiting within the established benchmark. Furthermore, other jurisdictions report wait time statistics including, medians, averages, and percentiles.

In the 2011 CIHI report⁶, provincial comparisons were made based on three indicators: median wait, 90th percentile and percentage of patients receiving care within the benchmarks. The authors of that

report noted that there is still considerable variation in provincial tracking and reporting of wait times but that "... provinces have agreed to move toward the common indicator definitions as wait time registries are redeveloped and evolve".

CIHI reported, "The proportion of patients receiving surgery within the recommended benchmark varied from 57% to 91% for hip replacements, from 42% to 89% for knee replacements ... That said, there were improvements in the proportions of patients receiving hip replacement and cataract surgery within benchmarks for some provinces over the past three years... In seven provinces, fewer than three-quarters of patients received knee replacement surgery within the benchmark of 182 days. Over three years, seven of nine provinces showed no change or a decrease in the percentage of patients who received knee surgery within the benchmark time frame".

Figure 1: Percentage of Patients Receiving Care within Benchmarks, 2010

PROVINCES [†]										
	BC	AB	SK	MB	ON	QC	NB	NS	PEI	NL
Hip Replacement 84%	85%	78%	69%	63%	91%	88%	79%	57%	90%	75%
Knee Replacement 79%	76%	69%	60%	57%	89%	83%	67%	42%	73%	67%

*CIHI: Wait Times in Canada – A Comparison by Province, 2011, Fig. 1, pg. 6
[†] BC=British Columbia; AB=Alberta; SK=Saskatchewan; MB=Manitoba; ON=Ontario;
 QC=Quebec; NB=New Brunswick; NS=Nova Scotia; PEI=Prince Edward Island;
 NL=Newfoundland and Labrador

Figure 2: Provinces Completing at Least 90% of Procedures within Benchmarks, 2010

PROVINCES [†]										
	BC	AB	SK	MB	ON	QC	NB	NS	PEI	NL
Hip Replacement	X	X	X	X	√	X	X	X	√	X
Knee Replacement	X	X	X	X	X	X	X	X	X	X

*CIHI: Wait Times in Canada – A Comparison by Province, 2011, Fig. 2, pg. 8
[†] BC=British Columbia; AB=Alberta; SK=Saskatchewan; MB=Manitoba; ON=Ontario;
 QC=Quebec; NB=New Brunswick; NS=Nova Scotia; PEI=Prince Edward Island;
 NL=Newfoundland and Labrador

Figure 3: Provinces Completing at Least 75% of Procedures within Benchmarks, 2010

PROVINCES [†]										
	BC	AB	SK	MB	ON	QC	NB	NS	PEI	NL
Hip Replacement	√	√	X	X	√	√	√	X	√	√
Knee Replacement	√	X	X	X	√	√	X	X	X	X

*CIHI: Wait Times in Canada – A Comparison by Province, 2011, Fig. 3, pg. 9
[†] BC=British Columbia; AB=Alberta; SK=Saskatchewan; MB=Manitoba; ON=Ontario; QC=Quebec; NB=New Brunswick; NS=Nova Scotia; PEI=Prince Edward Island; NL=Newfoundland and Labrador

Figure 4: Trending for the Proportion of Patients Receiving Joint Replacements within Benchmarks, 2008 - 2010

PROVINCES [†]										
	BC	AB	SK	MB	ON	QC	NB	NS	PEI	NL
Hip Replacement	—	—	□	□	*—	*—	□	□	*□	N/A
Knee Replacement	—	—	□	□	—	—	□	—	—	N/A

*CIHI: Wait Times in Canada – A Comparison by Province, 2011, Table 1, pg. 11
[†] BC=British Columbia; AB=Alberta; SK=Saskatchewan; MB=Manitoba; ON=Ontario; QC=Quebec; NB=New Brunswick; NS=Nova Scotia; PEI=Prince Edward Island; NL=Newfoundland and Labrador
 ↓: At least a 10% percentage decrease in the proportion of patients receiving care within the benchmark
 *: Achieved 90% or greater within the benchmark
 —: No change in achievement within the benchmark
 N/A: Trending is not possible due to changes in reporting
 ↑: At least a 10% percentage increase in the proportion of patients receiving care within the benchmark

Figure 5: Wait Time Trends for Joint Replacements, 2008 - 2010

PROVINCES [†]										
	BC	AB	SK	MB	ON	QC	NB	NS	PEI	NL
Hip Replacement 50th percentile	□	—	□	□	—	—	□	□	□	N/A
Hip Replacement 90th percentile	□	—	□	□	—	□	□	□	□	N/A
Knee Replacement 50th percentile	—	—	□	□	—	□	□	—	□	N/A
Knee Replacement 90th percentile	□	□	□	□	□	—	□	□	—	N/A

*CIHI: Wait Times in Canada – A Comparison by Province, 2011, Table A1, pg. 37
[†] BC=British Columbia; AB=Alberta; SK=Saskatchewan; MB=Manitoba; ON=Ontario; QC=Quebec; NB=New Brunswick; NS=Nova Scotia; PEI=Prince Edward Island; NL=Newfoundland and Labrador
 ↓: Wait Times Decreasing
 ↑: Wait Times Increasing
 —: No Change in Wait Times
 N/A: Trending is not possible due to changes in reporting

SURGICAL RATES

According to CIHI data for 2009⁷, Age standardized rates for hip and knee replacement surgery vary across the country. Among the provinces, Quebec has the lowest rate of replacement surgery (197.8 per 100 000 population⁸), followed by Alberta with the second lowest rate at 247.8 per 100 000 population. In contrast, Saskatchewan has the highest rate at 365.0 replacement surgeries per 100 000 population, followed by Nova Scotia at 314.8 replacements per 100 000 population, and Prince Edward Island, at 208.6 per 100 000. The remaining provinces have rates between 250 and 294 per 100 000, with the national average being 264.3 hip and knee replacements per 100 000.⁹

ORTHOPAEDIC SURGEONS PER POPULATION

There is less variation noted when the number of orthopaedic surgeons per 100,000 population is examined based on estimates of the surgeon population. Generally all provinces have between 3 and 4 surgeons per 100,000 population¹⁰. The exceptions to this are British Columbia, with 5 surgeons per 100,000 population, and PEI, with 2.81 surgeons per 100,000 population. The National Standards Committee of the Canadian Orthopaedic Association states that Canada should have at least 4.5 FTE orthopaedic surgeons per 100,000 population. Based on this figure, British Columbia and New Brunswick are the only provinces meeting these recommendations.¹¹

AVERAGE LENGTH OF STAY

In 2006-2007¹², the national average length of stay (LOS) for primary hip replacement surgery was 5 days and for knee surgery it was 4 days. This represents a significant reduction in LOS over ten years (median LOS for hip replacements went from 8 to 5 days and for knee replacements it went from 8 to 4 days).

In 2010/11, the BJC team liaised with CIHI to define the parameters of future reporting through the CIHI portal. Once in place (expected in 2011/12), the portal will provide up-to-date data on each province.

Currently, CIHI's Patient Cost Estimator provides data regarding LOS; select Case Mix Groups (CMG) 320 for hips and 321 for knees¹³.

PROVINCIAL LEADERSHIP AND GOVERNANCE

There has been significant successful change achieved in each of the provinces to improve access to care for primary hip and knee replacement. To achieve these successes, each province has developed a governance structure to leverage the leadership of the clinical and administrative leaders within their local communities. The mandates and the membership of these governance structures has

varied depending on the activities to be completed; however, included are surgeons, clinical staff, administrative leaders, and government representatives. Working groups have also been used to identify and implement specific clinical changes.

PROVINCIAL ACTIVITIES

Maximizing access to primary hip and knee replacement surgery requires a systems approach that considers patient volumes and resource availability, including ensuring resource availability for other MSK patient populations. The following projects have been undertaken to address these issues and have used modelling and analysis to ensure equitable access.

BRITISH COLUMBIA: Model of care for MSK

Regional Health Authorities in British Columbia conducted a Gap Analysis to determine gaps in musculoskeletal care in B.C., using an integrated musculoskeletal model of care which was developed by the Provincial Musculoskeletal Advisory Group (PMAG). The model encompassed the entire patient journey from initial presentation to treatment and return to function and included the ongoing monitoring of the patient's status, ensuring that the complexities associated with care delivery, and an often fragile population, were addressed. The work was completed over five health authorities spanning the entire province.

This model was tested on four test case scenarios: hip joint replacement surgery, chronic knee pain, hip fracture repair and rotator cuff repair. The on-site visits to regional facilities involved participants such as physiotherapists, psychiatrists, occupational therapists, nutritionists, surgeons and nurses as well as representatives from hospital and community administration. Participants identified any gaps in care against the model. Once all regional sessions were complete, the gaps were then grouped into provincial themes for discussion and recommendations by a provincial focus group.

⁷Data obtained directly from CIHI

⁸Rates based on provincial populations obtained from Statistics Canada – Catalogue no. 91-215-X, Annual Demographic Estimates: Canada, Provinces and Territories, Table 2.1-1.

⁹It should be noted that provinces such as Saskatchewan who are actively implementing processes to reduce the surgical backlog of long waiting patients for Hip and Knee surgery will be performing an increased number of surgeries per 100,000 of the population.

¹⁰Rates based on provincial populations obtained from Statistics Canada – Catalogue no. 91-215-X, Annual Demographic Estimates: Canada, Provinces and Territories, Table 2.1-1.

¹¹Data based on surveys conducted for this report – they represent estimates

¹²CJRR. 2008-2009 Annual Report

¹³http://www.cihi.ca/CIHI-ext-portal/internet/EN/ApplicationIndex/applicationindex/applications_index_main#

ALBERTA: Change Management

The Alberta Bone and Joint Clinical Network (BJCN), with the support of the Alberta Bone and Joint Health Institute, endorsed a standardized, evidence-informed, integrated care pathway for hip and knee replacements. Implementation of the care pathway has been proven to reduce the length of stay (LOS) for hip and knee replacement surgery by reducing practice variations and eliminating inefficiencies. The integrated care pathway is supported by a framework for measuring results against provincial benchmarks using Key Performance Indicators (KPI) of quality and efficiency. This measurement framework has been endorsed by the BJCN and is now being used to report outcomes against provincial benchmarks for waiting time, LOS and other KPIs.

Implementation of the integrated care pathway across Alberta is taking place through the work of multidisciplinary Transformational Improvement Program (TIP) teams that have been established at each of the 12 arthroplasty sites. Each team identified targets for improvement (including the predetermined provincial LOS and wait times targets) and site-specific quality, patient safety and acceptability measures. Each team then developed and implemented improvement plans with ongoing monitoring of results using a Scorecard methodology. Since the TIP was launched in June 2010, all sites have demonstrated improvement.

It is estimated that province-wide implementation of the integrated care pathway could avoid the use of approximately 11,000 acute and sub acute bed-days annually for patients under the age of 80. These resources could be reinvested in the system to improve access and reduce waiting times for patients needing hip and knee replacements.

SASKATCHEWAN OPERATING ROOM SCHEDULING AND ALLOCATION PROJECT

Project Purpose Statement:

To develop and test Operating Room (OR) scheduling and allocation models and to develop an OR Allocation Model Toolkit with step-by-step processes for implementing the mathematical models.

Over the past fiscal year the team has worked with two regions to trial the models, this has included a trial in a regional orthopaedic practise where they sought to maximise surgical flow by smoothing resource allocation of beds and other surgical resources by refining the allocation or surgical blocks.

The model has shown regions how they can best allocate surgical time to maximise patient flow, what additional resources are required to meet priority surgical wait time targets. This has provided the region and ministry the data needed to determine the impacts of allocating additional resources and has resulted in allocating additional resources for an additional orthopaedic surgeon and an additional operating theatre.

OTHER STRATEGIES

At a provincial level there are a number of other strategies that have been implemented by provinces in order to improve access to primary hip and knee replacement surgery.

These strategies have included:

- Investment of health human resources
- Incorporation of advanced technology and equipment
- Increasing surgical resources to build service capacity for patients requiring hip or knee replacement surgery

Elaboration on these strategies is beyond the scope of this document.

6. National Core Model Of Care

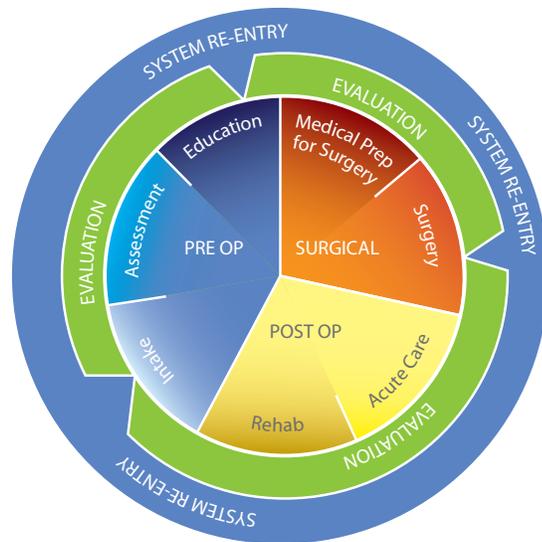
The National Core Model of Care provides an overview of the care continuum that demonstrates how patients flow through the system. Each of the care sectors is inter-related and management of patient flow needs to consider implementation of best practice initiatives at each point that the patient intersects with the healthcare system. This is specifically important as it relates to the educational information provided to the patient. As primary joint replacement is an elective procedure, patients may see a healthcare professional a number of times prior to their surgery and will be required to prepare themselves and their homes for return post surgery. To fully prepare patients it is important that all the key information be reinforced; that, following surgery, protocols within the inpatient units reflect the information provided prior to surgery; and that access to rehabilitation, specifically for knee replacement, is also made available.

HIPS VERSUS KNEES

This National Core Model of Care has been designed to be appropriate for both hip and knee replacement patients. Although, from a process perspective, there are many similarities in the management and flow of these patients, there are differences required in the clinical management of these patients and therefore also the educational information provided. Document and resource tools provided in the Resource Binder are divided into sections for hip and for knee replacement.

Figure 6: National Core Model of Care for primary hip and knee replacement surgery

Model of Care



7. Wait Time Management

Wait time management techniques may be used to ensure patient waiting times can be measured across the system. The Canadian Orthopaedic Association (COA) identified that patients should wait less than 90 days from referral from the Primary care practitioner to surgeon and 182 days from mutual patient/surgeon decision to surgery. These target benchmarks were developed as part of the Wait Time Alliance initiative and are primarily consensus based. While there is considerable evidence from the literature that supports that timely access to total joint replacement (TJR) results in improved patient outcomes, less research is available regarding maximum allowable wait time (MAWT) from a purely clinical perspective. The COA adopted its recommendations based on policies in other jurisdictions (Sweden, New Zealand, Spain, Australia, and United Kingdom) and consensus of the committee. Its benchmarks were consistent with those published by the Western Canada Wait List in which clinical, patient and public perspectives were considered in the development of wait time benchmarks.

In December 2005, the Federal, Provincial and Territorial Ministers of Health announced national benchmarks for hip and knee replacement of 182 days, from decision to treat. Since then, Provinces and Territories have been working toward this 182 day access target. Most health jurisdictions across the country (provincial, regional) have adopted some form of guideline or targets that they are striving to meet. A system needs to be developed to manage the flow of referrals through the system, to measure wait times and to ensure that the information is made available to stakeholders.

Recommended practices in wait times management include:

- System Management of Waiting Times
- Tools for Management of Waiting Times
- Measurement of Waiting Times
- Tools for the Measurement of Waiting Times
- Reporting of Waiting Times
- Target Waiting Times

An environmental scan of practices in wait times management was conducted in 2010 to determine which practices were being used across the country and their perceived impact on the ability to manage wait times.

COA WAIT TIME BENCHMARK (2005)

EMERGENCY CASES	URGENT CASES	SCHEDULED CASES
Immediate to 24 h	Within 30 days (priority 1)	Consultation: within 3 months
	Within 90 days (priority 2)	Treatment: within 6 months of consultation

OVERVIEW

The continuum of primary hip and knee replacement surgery: wait times



SYSTEM MANAGEMENT OF WAITING TIMES

DEMAND-SIDE

- The patient arrival process needs to be well-understood. When demand forecasting is used and data updated in a continuous, timely manner, resource allocation decisions can be made before waiting times are adversely affected. The environmental scan showed that very few locations are using demand forecasting methods at the present time. This may be because the clinics perceive no ability to modify the supply of joint replacements in response to demand forecasts.
- Wait lists need to be actively managed and validated on an ongoing basis to ensure that patients who no longer require the service are removed from the list in a timely fashion, and to ensure that wait time data remains accurate. The environmental scan shows that most locations are actively updating their wait lists as part of reporting wait times.
- As the supply side of the system is improved, adequate data must be gathered with respect to the presenting patient profiles (epidemiological, urgency ratings, technologies required) in order to analyze and understand latent demand, supply-induced demand and to adjust forecasting techniques to incorporate demand patterns not yet seen. The scan indicates that as care pathways have been streamlined for specific patient types, patient mix does affect the supply-side of the system.

SUPPLY-SIDE

- Waiting times are best tolerated by patients when they see fairness and efficiency in the process. This may be achieved through a central or coordinated intake process. These types of intakes ensure that patients are receiving the same care as others while also reducing duplication of tasks and data collection. Ideally, central intakes should serve appropriately-sized geographical areas, representing all surgeons to which the patient could be referred to for Total Joint Replacement (TJR).

- Access to services is best managed through a single, centralized (electronic) wait list that prevents duplication and multiple referrals within the system. This is particularly important when patients have access to multiple intakes.
- With central intakes, or shared wait lists, allowances need to be in place in the event that patients have pre-existing relationships with a specific surgeon (e.g. revisions, non hip/knee issues, etc). The environmental scan shows that many locations are moving towards central intake, allowing patients the choice of next available surgeon, a specific surgical location, or a specific surgeon. This 'hybrid' central intake offers the benefit of reducing wait times while also offering patient choice. Many patients choose next available surgeon.
- The wait time management system needs to identify and address blockages (bottlenecks) across the continuum of care, and identify subsequent resource constraints once additional resources are added to the bottleneck.
- Central intakes encourage process efficiencies through standardized care pathways utilizing physician assistants, case managers, and advanced practice physiotherapists. Evidence demonstrates improved surgeon productivity and high patient satisfaction with the addition of these resources.

- Models to analyse the benefits of several different care pathways were created and are described in the Models section of this Toolkit.

REPORTING

- Until central intake is fully implemented, the system needs to identify current waiting times for all surgeons. When there are differences across the system, patients should be provided with the option of being referred to another surgeon (or intake) with a shorter waiting time.
- Electronic record keeping systems help reduce data entry and maintain consistency across multiple sites
- Data entry should be accurate, timely and electronic
- There should be clear principles to guide the management of the wait time tracking

TOOLS FOR MANAGEMENT OF WAIT TIMES

Information Technology Systems

- Electronic Patient Records facilitate timely and efficient data collection. Data re-entry is a source of delay and is often avoided when systems are well-integrated across the continuum.
- Electronic wait lists/patient registries are the most basic of systems required
- When Operating Room (OR) allocations are transparent, reliable and well-communicated to those managing the surgical schedules for central intakes, surgical services can move towards providing the patient with a definite procedure date rather than an indeterminate position on a waiting list. Patient booking (scheduling) systems can be used to provide not only appointment scheduling for pre/post-operative care, but also for surgery.
- Systems to manage post-operative follow-up and subsequent procedures will reduce adverse outcomes and minimize system costs

Central Intake System

- Fully implemented, central intake includes referral screening, wait list pooling and standardized assessment and patient education.
- Until this can be coordinated, a shared wait list to balance patient wait times across surgeons is an interim compromise.
- If it is determined that surgery is not appropriate for a patient, the central intake system must also provide standardized 'outbound' care back to the referring physician that will include patient education and physician instructions which may include criteria for return to the intake system
- A central intake system benefits greatly from standardized referral screening. Our environmental scan indicated that this role has been successfully implemented through the use of Advanced Practice Physiotherapists (Toronto, Thunder Bay) as well as the resourceful utilization of retired orthopaedic surgeons (Edmonton). Modelling of these systems shows that they allow the surgeon more time for surgery if OR allocations are increased accordingly.

MEASUREMENT OF WAITS

How is Waiting Time defined?

- T1 (e.g. Primary Care Provider referral to specialist consult)
- T2 (e.g. Surgical decision to surgery date)

The time from initial specialist consult until the decision to proceed with surgery should also be tracked in order that the entire wait time from GP referral until surgery is measured. Based on Canadian Joint Replacement Registry (CJRR) data, the Canadian Institute for Health Information (CIHI) estimates that 30% of the wait is at T1, 60% of the wait is at T2, and the remaining 10% is spent between T1 and T2. Patient satisfaction is affected by total wait time.

Some Provinces and Territories have further broken down benchmark wait times by priority. Patient priority/urgency is also tracked to ensure that the most urgent patients receive timely appropriate care, while also maintaining acceptable benchmarks for the lowest priority patients. As wait times are reduced across all priorities and patients are seen in a timely manner, implementation of patient prioritization may not be required, although data capture is essential to ensure full understanding of demand dynamics. Likewise, when wait times are significant, it is essential to manage the various urgency classes appropriately to ensure timely access to care for all patient types.

Patient choice or circumstance may affect their length of waiting time (e.g. delay surgery for personal reasons, choose to wait for a specific surgeon, medical optimization prior to surgery). While it is important to capture these times in the system, it is important that these types of delays NOT be included as patient waiting time for the purposes of meeting targets. This data should be recorded as a separate type of delay rather than a wait time. Systems must be consistent regarding which types of delays are included when reporting waiting time (e.g. System delay vs. Patient-requested delay).

The environmental scan indicated that many locations are now recording DARTS (dates affecting readiness to treat) so that they may be subtracted from the overall wait time and reflect the time that the patient is truly waiting.

Policies pertaining to clearance from the wait lists should be standardized, documented and clearly communicated to the patient. For example, after 2 refusals the patient should be removed from the system.

TOOLS FOR THE MEASUREMENT OF WAITS

The system needs to measure waits and ensure that these are measured against the COA targets of 90 days for Wait 1 and 182 days for Wait 2 for primary hip and knee replacement surgery.

Data must be of sufficient quality for stakeholders to make good decisions including:

- Accuracy (how is it ensured)
- Timeliness (real-time updating is best)
- Meets the definitions of the wait time being measured
- Adheres to data-cleaning standards

REPORTING OF WAITS

Internal reporting is a useful tool to encourage continuous improvement to the system. While reports to the Ministry and public are vital, it is important that the reporting systems help clinicians to see progress, identify bottlenecks and capacity issues, and continuously improve delivery of services. Timeliness, accuracy and relevancy of reporting will ensure a proper feedback loop for clinicians to take a leading role in continuous process improvement.

System access can best be managed when all stakeholders including patients and primary care providers are aware of the waits for surgeons therefore this information should be made readily available through a public reporting system.

How frequently are reports made?

How is the information intended to be used by the public? Is it clear and useful for patient/doctor decision making? In locations where there is no central intake or shared waiting lists, patients need to be provided with the relevant information to ensure they are aware of their options to wait for a surgeon or to choose a surgeon with a shorter wait list.

What targets are various jurisdictions using for performance measurement? Does each jurisdiction meet or exceed COA targets (i.e. 90 days for Wait 1 and 182 days for Wait 2)?

TARGET WAITING TIMES

Health regions should strive to reduce waiting times to meet targets as set out by the Federal, Provincial and Territorial Ministers and/or Canadian Orthopaedic Association. When waiting guarantees are made, it should be clear to all stakeholders what actions will be taken if the guarantees are not met. Target waiting times are most relevant when they also include criteria for different priority/urgency classes.

SUMMARY

Wait times are the most visible aspect of the healthcare continuum for patients, the public, and policy makers to see and judge. Wait times are a complex product of the delivery systems, policies, care pathways and people that help deliver total joint replacement to Canadians. While it is important to provide evidence-based research regarding the high-quality of the services that need to be delivered, it must be recognized that a large aspect of patient perception of quality is the wait time to receive care. Data collection and measurement of wait times are important tools to define better pathways and policies that meet the needs of patients. Modelling can help to further define the resources to meet patient needs.

8. Pre-Operative Care

The primary hip and knee replacement program needs to ensure access to the healthcare system for people experiencing hip or knee pain. The system should be streamlined so that surgical patients can be identified effectively through an interdisciplinary assessment and standardized practices. To ensure equitable access, the system should be transparent with respect to wait lists and should be designed to allow surgical candidates to move between surgeons. All surgical candidates need to be provided with appropriate education to prepare for their surgery.

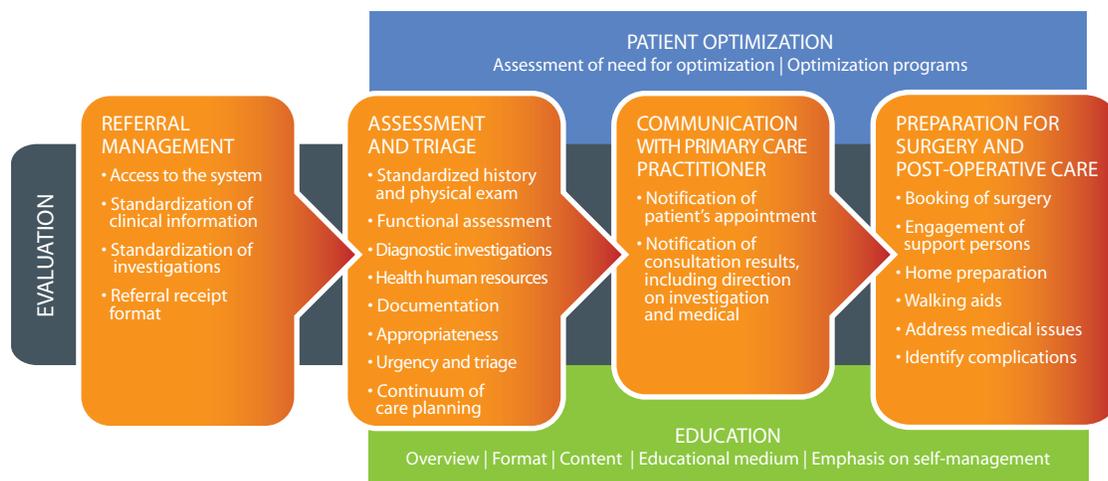
This section will provide the recommended components for pre-operative care prior to hip or knee replacement surgery, along with resources and tools for implementation. The majority of the information is based on clinician recommendations.

The components included in this section are:

- Referral management practices
- Assessment and triage
- Communication with primary care practitioners
- Preparation for surgery and post-operative care
- Patient optimization
- Education

OVERVIEW

The continuum of hip and knee replacement surgery: pre-operative



REFERRAL MANAGEMENT PRACTICES

The referral process is the patient's access into the healthcare system for a specialized opinion on hip or knee replacement surgery related to a hip or knee condition. The process must be patient centred and ensure that the necessary clinical and investigative information is received to determine the patient's needs, to ensure they are seeking consultation with an appropriate practitioner and to determine their urgency for an assessment.

Recommended practice in referral management includes:

- Access to the system
- Standardization of clinical information
- Standardization of investigations
- Referral receipt format

8.1.1. Access to the system

- The Primary Care Provider (i.e. Primary care practitioner, nurse practitioner) is the coordinator of care for patients within the healthcare system. As such, it is recommended that the referral be made by the Primary Care Provider.
- To support the Primary Care Provider in his/her role, the program must consider the time to make a referral and ensure that all information included for the intake process to the program is concise, yet comprehensive and is presented in a simple format, that places minimal burden on the referring practitioner.
- The system needs to be flexible and allow Primary Care Providers to refer to the next available surgeon or to a specific surgeon or hospital.
- Other forms of access such as self-referral should be considered for patients who do not have a Primary Care Provider.

8.1.2. Standardization of clinical information

Referrals are more complete and easier to process when an identified subset of information is provided. This may include:

- Patient name, address and contact information
- Physicians name, address and contact information
- Reason for referral: affected joints, symptoms, duration of symptoms, functional limitations, urgency
- Referral to: surgeon, place of surgery, next available
- Relevant past medical history: previous surgeries and other conditions
- Medical co-morbidities, including allergies
- Medications
- Non-surgical treatment attempted
- Radiographs and other tests including documented results
- A standardized referral form with the above subset of information would facilitate the referral process. An example of a standardized referral form that is in use in Alberta can be found using the following web link: www.albertahealthservices.ca/rf-hip-knee.pdf .

8.1.3. Standardized investigations

Specific investigations are required in the diagnosis and clinical decision-making for hip or knee replacement candidates. The following should be considered with respect to standardized investigations:

- Investigation results and/or films should be provided by the referring practitioner
- Standardization including control for patient positioning, severity grading, and standardized measurements need to be considered to ensure reliable and valid test results
- The following standard radiographs are recommended and need to be completed with the patient position controlled:

Knee

Mandatory:

- Anterior-posterior weight bearing both knees
- Skyline both at 30 degrees
- Lateral both if possible standing

Additional:

- Sky line (patella) of affected side and notch views
- Lateral knee with knee flexed at 90 degrees
- Option for Full length anterior-posterior views after surgeon sees patient

Hip

Mandatory:

- Anterior-posterior pelvis centred at pubis to show proximal one third of both femurs
- Shoot through lateral aspect of affected hip and proximal femur

Additional:

- Anterior-posterior weight bearing of both hips
- Option for Full length anterior-posterior views after surgeon sees patient
- Other investigations for relevant co-morbidities need to be provided by the referring practitioner to ensure the patient is safe to undergo surgery, if indicated.

8.1.4. Referral receipt format

- Referrals may be received through a fax system or, ideally, through electronic transmission.
- Referrals that are received through electronic transmission should be directly entered into the Information Technology system within the program.
- Referrals received through hard copy need to be entered electronically into the Information Technology system within the program.
- The mechanism of receiving files should not influence the clinical assessment protocols or the time to assessment.

ASSESSMENT AND TRIAGING

All patients need to undergo a comprehensive assessment to determine their appropriateness for surgery. This assessment should identify patient urgency as well as any medical or psychological risk factors that may result in postponing or cancelling surgery.

Recommended practices in assessment and triage include:

- Comprehensive standardized history and physical exam
- Functional assessment
- Diagnostic investigations
- Health human resources
- Documentation
- Appropriateness
- Urgency and triaging
- Continuum of care planning

8.1.5. Comprehensive standardized history and physical exam

- Diagnosis and decision making with respect to hip or knee replacement requires a comprehensive assessment which includes social history, past medical history and physical findings.
- If more than one health professional assesses the patient, the assessment findings and recommendations must be shared to prevent duplication and to ensure consistent messaging to the patient.
- The assessment needs to ensure the identification of medical and social factors that may need to be addressed prior to surgery.
- Standardization in the assessment and decision making process ensures patients have equal access to services.
- Translation/interpretation services (by a family member or a professional translator) for patients that do not speak the language of the assessor will ensure accurate information is acquired during the assessment process.

8.1.6. Functional assessment

- A patient's functional tolerance at the time of initial consult will assist in defining their level of disability and urgency rating.
- Functional ability may be measured through self-administered questionnaires and/or through functional testing using valid outcome measures. Examples of outcome measures currently used in programs includes:

Self-administered questionnaires

Western Ontario and McMaster Universities
Index of Osteoarthritis (WOMAC)

Western Canada Wait List (WCWL)

Short Form 36 (SF36)

Lower Extremity Functional Scale (LEFS)

Functional Tests

Timed Up and Go (TUG)

40 metre walk test

Stairs test

8.1.7. Investigations

- All investigative reports and/or imaging should be reviewed as part of the assessment.
- Investigations may be repeated where the investigation results and/or imaging do not meet the needs of the assessment.

There are no tools yet identified for Investigations.

8.1.8. Health Human Resources

- The physical and functional assessments should be completed by a health practitioner (e.g. surgeon, case manager, advanced practice therapist, physician assistant) that has the qualifications and training to assess patients and to make decisions on appropriateness for surgeon consultation or for surgery.
- The health practitioner needs to have the ability to order the necessary investigations required to make clinical decisions with respect to surgical appropriateness.
- Surgeons need to assess all surgical candidates, explain the surgery, review risks, benefits and expected outcomes, answer questions and complete the consent to surgery.

8.1.9. Documentation

The use of standardized assessment documentation should be considered especially in an interdisciplinary program where there is the need to standardize practice.

Assessment forms may consider the following:

- Patient Information
- History of condition
- Pain history
- Medications/allergies
- Physical assessment
- Functional assessment
- Joint stiffness
- Non surgical treatment to date
- Diagnosis
- Plan

The identification of factors that may affect surgery date (co-morbidities needing further investigation, social obligations, etc.) will ensure efficient operative scheduling for patients who are deemed surgical candidates.

Hospital policy and professional practice guidelines should be followed with respect to written and electronic documentation and retention of health records.

8.1.10. Appropriateness for surgery

Surgical patients need to be assessed by a surgeon to make the final decision regarding appropriateness for surgery.

Assessment findings need to be reviewed to determine the patient's appropriateness for surgery using the following criteria:

- Patient's current state
- Disease progression
- Expected benefit from proposed surgery

The risks and benefits of surgery should be explained to the patient and the patient should be charged with making the decision to:

- Accept surgery
- Defer surgery
- Refuse surgery
- Access other treatment options (including optimization)
- Seek a second opinion

8.1.11. Urgency

A standardized urgency rating system may be used to determine a patient's medical need for surgery at the time the patient is deemed to be a surgical candidate.

This should be discussed with the patient and a mutually agreed upon decision should be made which would include:

- Patient's ability to prepare for surgery
- Need for surgical optimization (see below)
- Patient's ability to attend date of surgery

8.1.12. Continuum of care planning

The assessment should consider the patient's condition. This may include the identification of patients who are appropriate for short stay, as well as those at risk for a longer stay.

Patients at risk for complications during or after surgery may need to undergo a pre-operative assessment by an internist or anaesthesiologist to ensure issues are identified and addressed prior to the booking of surgery.

Cross continuum documentation such as care maps help to ensure adequate communication of patient goals and expected outcomes along the continuum for primary hip and knee replacement surgical patients.

Referrals to services outside the acute care institution help to facilitate patient discharge. These may include:

- Inpatient rehabilitation
- Home care services for a pre-operative home visit
- Homecare for a post-operative visit
- Outpatient rehabilitation

PRIMARY CARE PRACTITIONER COMMUNICATION

The primary care practitioner is the first point of contact to the health system for the patient and therefore needs to be aware of the patient's medical status and plans for surgery.

Recommended practice in primary care practitioner communication includes:

- Notification of the patient's appointments
- Notification of the consultation results including direction on further investigations and medical management to ensure medical stability

8.1.13. Notification of the patient's appointments

- Primary care providers need to be notified of receipt of referral for surgical consult
- If referral information is missing, the primary care practitioner should be contacted to ensure all information has been received and is accurate
- Primary care providers need to be notified of all the patient's appointments

8.1.14. Notification of the consultation results, including direction on investigations and medical management to ensure medical stability

- The Primary care practitioner needs to be made aware of the patient's condition and plans related to surgery
- Notification should follow hospital protocol and may be completed through a written or dictated letter
- The primary care practitioner must be notified if there is a need for further medical management or if medical investigations are required to ensure medical stability prior to undergoing surgery

PREPARATION FOR SURGERY AND POST-OPERATIVE CARE

Primary hip and knee replacement surgery is an elective procedure; therefore, there is time prior to the surgery which needs to be used constructively to ensure that the patient is prepared with respect to physical and psychological health, as well as functional and social status. Much of the patient's preparation can be facilitated through patient and family education (see Education section).

Recommended practices in preparation for surgery include:

- Booking of surgery
- Engagement of support persons
- Home preparation
- Prescription of walking aid
- Addressing medical issues
- Identification of complications
- Optimization (see next section)

8.1.15. Booking surgery

As hip or knee replacement surgery is an elective procedure, a date needs to be selected which takes into consideration the following:

- Availability of the surgeon and operating room
- Patient's ability to prepare before surgery
- Patient's medical status
- Psychosocial issues

8.1.16. Engagement of support persons

There is a significant role for support persons to assist a surgical candidate who is about to undergo hip or knee replacement surgery. This may include:

- Assisting with understanding of educational materials
- Accessing additional resources required post-operatively
- Coordinating assessment and medical visits
- Ensuring adherence to recommendations for medical management, optimization and post-operative care
- Following surgery the patient will be limited in his/her ability to complete activities of daily living; therefore, it is recommended that patients have a support person that will assist them with their activities of daily living.
- Once the decision has been made to proceed with surgery, patients will need the opportunity to prepare which includes making arrangements for:
 - Assistance for 1 – 2 weeks following discharge from acute care or inpatient rehabilitation
 - Transportation to and from the hospital
 - Transportation to and from rehabilitation (if required)

8.1.17. Home preparation

Patients and families should consider the set up of their home (including child and pet care and meal preparation) to ensure safety following discharge from acute care or inpatient rehabilitation. Home preparation in the following areas is suggested:

- Bathroom
- Living areas
- Kitchen
- Laundry
- Childcare
- Pet care
- Meals (pre-prepared)

Following surgery there is a need for equipment and/or assistive devices to be in place within the home to assist with function. These may include:

- Raised toilet seat
- Bath seat/chair/bench
- Grab bars
- Non-slip surfaces
- Raised cushion
- Reachers
- Elastic shoe laces
- Long handled scrub brush
- Long handled shoe horn

Information and/or assistance with equipment and home set up, as outlined above, can be accessed through the home care agency or through resources available within the community. These may include:

- Educational materials
- Phone contact with a therapist or nurse
- Home visit by a therapist or nurse

8.1.18. Walking aids

- Following surgery, patients will require one or more walking aids to assist with ambulation. These may include a walker, crutches or a cane. Acquisition of these items should be arranged prior to surgery.
- Fitting of the walking aid(s) by a health professional helps to ensure the correct dimensions for the patient

8.1.19. Medical issues addressed

Patients need to be medically stable prior to elective surgery. Medical issues are typically addressed through the primary care practitioner or the assessment program prior to the surgical date. Medical issues may include:

- Cardiac or respiratory conditions
- Anaemia
- Psychologic status (e.g. depression)
- Relevant co-morbidities

8.1.20. Identification of complications

- Potential complications that may influence the surgical procedure and/or timing of surgery need to be identified through pre-operative activities such as the initial surgical consult and interactions with the primary care practitioner and/or homecare agency.
- When issues are identified, a mechanism needs to be in place to inform the surgeon and to allow for alternate arrangements.

PATIENT OPTIMIZATION

Many patients who present as candidates for hip or knee replacement surgery present with lifestyle factors that may influence outcomes, such as obesity, lack of exercise and smoking. These may be addressed through education focused on health promotion, disease prevention and lifestyle changes.

Recommended practices for patient optimization include:

- Optimization benefit/risk
- Assessment for optimization
- Programs for optimization

8.1.21. Optimization benefit/risk

Health optimization prior to hip or knee replacement surgery may require intervention to address the following:

- Weight loss
- Nutrition counselling
- Smoking cessation
- Exercise

Although there are benefits to health optimization that can increase patient function and decrease surgical risk, the benefits of undergoing early surgery with the resultant decrease in hip or knee pain and increase in functional tolerance is to be considered. This decision can be made on a case by case basis.

If there is risk related to delaying surgery and the surgeon and/or facility is unable to manage the surgery due to one or more lifestyle factors (e.g. weight), the patient may be referred to an alternate surgeon and/or facility where the patient can be managed.

8.1.22. Assessing the need for optimization

- The use of standardized questionnaires may be used to determine lifestyle factors and to aid in assessing the need for optimization.
- Valid and reliable measures for readiness to change may be used to define a patient's willingness to actively participate in lifestyle modification.
- Achieving the benefits from changing lifestyle factors can take an extended period of time. It is recommended that the patient be made aware of these and appropriate goals be established. This should include an explanation of how this may positively impact his/her surgery.

8.1.23. Programs for optimization

- Components of an optimization program to prepare patients for surgery can be part of the pre-surgical program (where resources are available).
- Patients can be linked to other health optimization programs within the community to reinforce the message through formal groups and informal networks (e.g. the Canadian Orthopaedic Foundation's Your Bone and Joint Health¹⁴, The Arthritis Society's Lifestyle Makeover Challenge¹⁵, Weight Watchers¹⁶, smoking cessation programs, etc).
- Optimization programs typically include education through different mediums and include access to materials for education such as DVDs, web site, brochures.

¹⁴<http://www.canorth.org/en/patientresources>

¹⁵<http://www.arthritis.ca>

¹⁶<http://www.weightwatchers.ca>

EDUCATION

Providing patients and families with comprehensive education enables them to prepare for surgery. Organizations need to ensure that patients are ready and able to have hip or knee replacement surgery. Furthermore, patients and their families may benefit from education on how to participate in a successful recovery. As patients have different learning styles, it is recommended that this education be provided through a number of mediums and that it include the opportunity for patients and families to ask questions and to access materials according to their needs.

Recommended practices for education include:

- Education overview
- Education format
- Education content
- Other educational mediums
- Self management

8.1.24. Education overview

Education needs to be consistent and reinforced throughout the continuum of care during:

- Primary care practitioner visits
- Visits with other health professionals
- Surgeon visit
- Pre-operative home care visits (where provided)
- Pre-operative clinic visit
- Surgical stay
- Post-operative therapy
- Post-operative follow up visits with surgeons or other health professionals
- Education to ensure patients are fully prepared for their hip or knee surgery needs to be reinforced through the pre-operative clinic visit.

8.1.25. Education format

- Educational materials that are available in written format help to ensure that patients have the opportunity to review the materials at their own pace and with families.
- Education provided through verbal and visual means, such as an educational session or home visit, allows individuals the opportunity to hear the information, see equipment and to ask questions. This approach also addresses the needs of those individuals who are illiterate.
- To ensure patients have the ability to attend educational events, consideration should be given to providing classes at different times of the day, including evening sessions.
- Families or friends that will be involved with the patient prior to, and after surgery, need to be offered and, as much as possible, included in educational opportunities.
- Educational materials may be divided into sections providing information and instruction on the components of the patient's journey that include: general information and expectations pertaining to: surgery, the hospital stay, discharge, activity at home, and return to function.
- Educational materials provided in languages appropriate for the community are recommended. Provision of a translator may be required to ensure patient understanding of the surgical journey.
- Materials should follow patient education material guidelines that include: Grade 6 writing level, minimal text, illustrations where appropriate, and consistent appearance.
- Education needs to be reinforced throughout the continuum of care by all health professionals. This may be enhanced through the use of multiple modes of communication.

8.1.26. Education content

- Patient education should address all information needs.
- Education should address the entire continuum of care and ensure consistent messaging from all healthcare professionals involved with patient care.
- All patients need to be made aware of their responsibility to participate in their recovery. This includes participation in rehabilitation and exercise in the hospital and after discharge.
- Program changes need to be widely communicated to all healthcare professionals involved in the continuum of care to ensure they are able to adapt educational content for future patients.

Education content may include:

- General Information
- Structure and function of joint
- Surgical procedure
- Risks and benefits of surgery
- Before surgery
- Pre-admission clinic visit
- Home set up
- Equipment requirements including suppliers
- Day before surgery
- Hospital stay
- Day of surgery
- Anaesthesia
- Pain management
- Day 1 – 4 after surgery
- Discharge and activity at home
- Signs and symptoms of complications
- Redness, swelling, draining wound, fever, extreme pain, numbness in foot, swelling/pain in calf or thigh
- Nutrition
- Wound/incision care
- Medication including anti-coagulation
- Exercise and/or restrictions
- Functional activities
- Toileting, dressing, bathing, car transfers, homemaking, bed transfers, stairs
- Resumption of sexual activity
- Return to function
- Removal of restrictions as indicated
- Increased functional endurance
- Return to work/sports
- Follow up care
- Primary care practitioner and surgeon follow-up visits
- Additional information
- Hospital policy, e.g. phone, TV, visiting hours
- Contact information
- Notes

8.1.27. Other educational mediums

As patients have different learning styles, it is recommended that the information be reinforced through a number of mediums such as: DVDs, websites, patient networks, etc.

8.1.28. Self management

Education needs to reinforce the need for patients to be actively involved with their program and to take responsibility for their rehabilitation.

SUMMARY

Pre-operative activities need to be designed to: provide patients with access to the system; assess and identify surgical candidates, and ensure patients are educated and prepared to undergo hip or knee replacement surgery. This should include a clear understanding of the patient's responsibilities in the management of their post-operative recovery. The implementation of comprehensive pre-operative activities will aid in the achievement of optimal outcomes following hip or knee replacement surgery.

9. Surgical Care

The journey of the surgical patient should be seamless. To support this flow across the joint replacement care continuum, the team of healthcare providers and support services need to work together to avoid fragmentation of services. Processes and procedures that are put in place to make the surgery effective, efficient and safe can produce this seamless environment for the patient.

While all healthcare resources are valuable, the operating room is a particularly costly resource making the collaboration of healthcare providers and support services that may impact patient flow in this area essential. Everyone needs to be accountable and responsible for their contribution towards the surgical patient journey, making it effective, efficient and safe.

This section will provide the recommended components for surgical care related to hip or knee replacement surgery, along with comprehensive resources and tools for implementation. The majority of the information is based on clinician recommendations.

Overall principles for surgical care include:

- Patient centred
- Best practice literature/guidelines
- Consideration of systems impact
- Efficient use of resources
- Evaluation of model of care

To facilitate building a model for effective, efficient and safe hip and knee joint replacement surgery, the surgical portion of this Toolkit has incorporated stakeholder input and tools covering the following sections: medical preparation for surgery, operating room scheduling, surgical intake, operating room, post-anesthetic care unit, sterile processing and surgical evaluation.

To aid cross continuum focus in patient flow and to utilize the resources within the surgical area effectively, efficiently and safely, coordination across the healthcare disciplines, surgical departments and support services is imperative. The surgical departments and support services include, but are not limited to, pre-admission or surgical screening, operating room scheduling, and the operating room (OR), the post-anesthetic care unit (PACU), and the sterile processing department (SPD), distribution, cleaning, portering, and supply management. In essence, this is the surgical team. Facilities across Canada may use a variety of names for like departments and services.

In the development and implementation of new models of care, optimizing patient safety is a priority consideration. This includes reducing surgery related complications and potentially avoidable adverse events that may be caused by human healthcare resource issues and added complexity due to changing technologies and standards. Many resources are available to assist with a patient safety culture in the peri-operative stage including Safer Healthcare Now, World Health Association, and the Institute for Healthcare Improvement. These resources provide information and tools such as safe surgery checklists, OR time outs or surgical pauses, and correct procedure and site identification.

Resources

- Safer Healthcare Now Website (Surgical Site Infection), <http://www.saferhealthcarenow.ca/EN/Pages/default.aspx>
- World Health Association (WHO): Safe Surgery Saves Lives! (Safe Surgery Checklist) <http://www.who.int/patientsafety/safesurgery/en/>
- Institute for Healthcare Improvement Website (Pausing for Safety), <http://www.ihl.org/IHI/>

⁵White House Commission on Complementary and Alternative Medicine Policy, pp169-170, March 2002. Appendix B – 10 Rules for Health Care Reform, 28 Focus Areas of Health People 2010 and PEW Taskforce Recommendations. http://www.whccamp.hhs.gov/pdfs/fr2002_appendix_b.pdf accessed March 26, 2009.

An electronic surgery management system supports a cross continuum patient care model, assisting with effective and efficient process flow and evaluation. The ideal scenario is a system that manages across the care path, including wait list management, OR scheduling, OR intake and room information management, PACU information management, SPD inventory control and procedure card (case cart preparation lists) management and which is part of, or interfaces with, other electronic systems in the organization such as patient admissions, bed management and discharges. At this time, the ideal scenario may not be available at every facility for various reasons. Having even a few components in place such as wait list management, OR schedule and SPD procedure card management will aid in cross continuum focus and collaboration amongst the surgical departments and support services.

This section will provide the recommended components for the surgical care of primary hip and knee replacement patients, along with resources and tools for implementation. These components will include:

- Medical preparation for surgery
- Operating Room scheduling
- Surgery intake
- Operating Room (OR)
- Post- Anaesthetic Care Unit (PACU)
- Sterile processing department (SPD)

MEDICAL PREPARATION FOR SURGERY

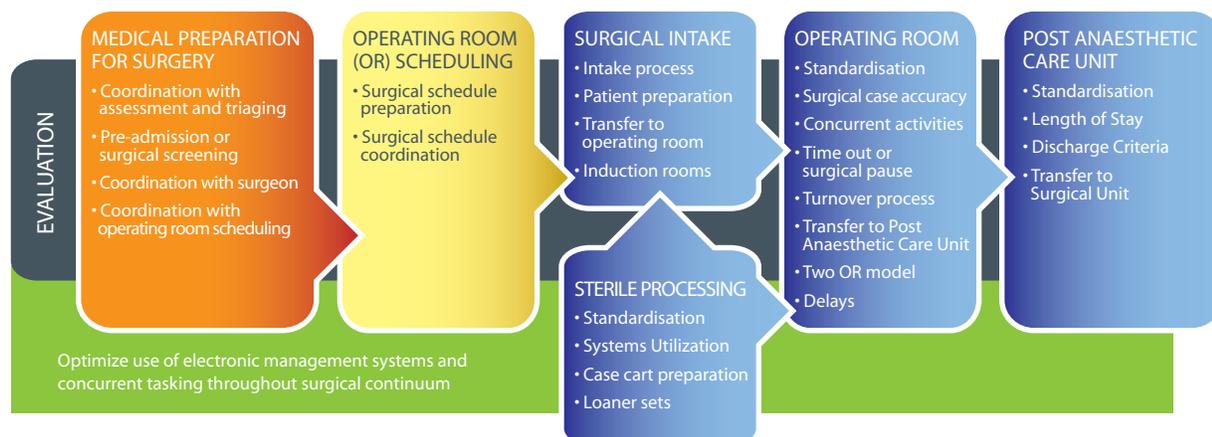
Medical preparation of the patient for surgery is an important part of the patient’s journey as it is the final review of a patient’s readiness for surgery. It may be referred to by different names such as pre-admission or surgical screening.

Recommended practice for medical preparation for surgery includes:

- Coordination with Assessment and Triaging
- Pre-Admission or Surgical Screening
- Coordination with Surgeon
- Coordination with OR scheduling

OVERVIEW

The continuum of primary hip and knee replacement surgery: surgery



9.1.1. Coordination with Assessment and Triage

To facilitate seamless patient flow, medical preparation of the surgical patient needs to be coordinated with the assessment and triage component of the model. This includes communicating assessment results of specialists for patients identified as “at risk” for complications during or after surgery with appropriate members of the surgical team.

9.1.2. Pre-Admission or Surgical Screening

- To facilitate effective, efficient and safe medical preparation for surgery, a standardized process for pre-admission or surgical screening may be developed in a collaborative manner with input from various healthcare providers including anaesthetists, nursing, surgeons, and other disciplines who may impact patient preparation.
- The use of standardized documentation should be considered.
- Specific investigations for medical preparation need to follow best practice and standardization should be considered.
- To avoid empty OR time due to late cancellations, pre-admission or surgical screening is conducted in an appropriate time frame prior to surgery date. Note: Under Operating Room Scheduling it is suggested that elective cases be scheduled in advance.

9.1.3. Coordination with Surgeon

Any changes required to the surgical schedule, identified as a result of pre-admission or surgical screening, need to be communicated with the surgeon.

9.1.4. Coordination with OR Scheduling

Any changes required to the surgical schedule, identified as a result of pre-admission or surgical screening, need to be communicated with OR scheduling.

OPERATING ROOM SCHEDULING

The surgical schedule sets the scene for the operative day and not only contains information appropriate to facilitate an effective patient flow, but also the effective and efficient use of surgical resources so the maximum number of patients can benefit. To achieve this, along with a seamless patient flow, it ought to be prepared in a collaborative manner across various surgical departments and service support areas.

Recommended practice for Operating Room scheduling includes:

- Surgical schedule preparation
- Surgical schedule coordination

9.1.5. Surgical Schedule Preparation

OR Scheduling policies and procedures should be in place to support the scheduling process, such as:

- OR Block allocation
- Information required to schedule (book) cases
- Timing of schedule requests

- Duration of cases
- Approval of surgical schedule
- To facilitate efficiency during the surgical day, OR allocation may be provided in day blocks by service whenever feasible, based on clear criteria. This allocation would be provided 4-6 months in advance. Various forms of OR block allocation procedures exist, with most being reviewed and reallocated on a regular basis.
- A bed mapping model (bed utilization model) may be utilized to facilitate preparation of the surgical schedule, identifying and confirming available surgical beds. The number of surgical beds available to each block would be identified on the OR block allocation provided 4-6 months in advance.
- Surgical schedules should be scheduled for effective, efficient and safe usage of operating room time in order to maximum the number of patients that may be scheduled.
- Elective cases may be scheduled in advance (e.g. 4 weeks) to facilitate, medical preparation, pre-operative assessment and education processes.
- The duration of scheduled case times should be surgeon specific based on historical actual case times.
- Surgical schedules need to include information regarding special needs of patients that may affect patient flow throughout surgical day. For example, if special equipment or a translator is required.

A collaborative review and approval process ought to be utilized to identify and address issues that may affect the OR, PACU, SPD and surgical unit prior to the surgery day. This may be facilitated by:

- Review of tentative surgical schedule one week in advance of surgery day
- Review and approval of final schedule by noon the day prior to surgery day
- An electronic surgery management system may be used to facilitate wait list management, OR scheduling, SPD procedure card generation and surgical schedule distribution.

9.1.6. Surgical Schedule Coordination

- Surgical schedule preparation needs to be coordinated with the OR, PACU, SPD and surgical units to facilitate efficient OR usage and avoid cancellations due to resource issues such as lack of equipment or beds.
- Surgical schedule preparation needs to be coordinated with pre-operative assessment, education and medical preparation for surgery to facilitate patient preparation and avoid last minute cancellations.

SURGICAL INTAKE

Surgical intake is the final point of patient preparedness for the operating room. Through collaborative best practice processes the patient is made ready and transferred to the operating room for surgery.

Recommended practice for surgical intake includes:

- Intake process
- Patient preparation
- Transfer to OR
- Induction Rooms

An electronic surgery management system may be used to facilitate OR intake information management, including intake information such as arrival and discharge times.

9.1.7. Intake process

- Patients may be pre-admitted at the time of their pre-admission or pre-assessment appointment to facilitate patient flow the day of surgery.
- Patient arrival time needs to be early enough to facilitate preparation for the OR.
- An electronic surgery management system may be used to facilitate OR intake information management, including patient intake information.

9.1.8. Patient preparation

- The process for patient preparation needs to be developed in a collaborative manner with input from intake nursing, OR nursing, anaesthetists, surgeons, porter, SPD technicians and other disciplines who may impact patient preparation.
- Standardized care paths may be utilized, including pre-printed physician orders.
- Concurrent tasking is employed where possible to facilitate efficiency and patient flow.
- All patients need to have the correct site identified and initialled by the surgeon and confirmed by the patient before surgery.
- All patients receiving implantable orthopaedic devices are given prophylactic antibiotics to reduce surgical site infections.
- Communication is maintained between intake area, the OR and portering to facilitate transfer to OR.

9.1.9. Transfer to OR

- Communication is maintained between intake area, the OR and porters to facilitate transfer to OR.
- Concurrent tasking is employed where possible to facilitate efficiency and patient flow.

9.1.10. Induction Rooms

- Where patient volume and resources such as space, equipment and anaesthesiologists allow, induction or block rooms may be utilized.
- Torkki et al (2005) found that, “Mean turnover times and the time spent in the operating room (OR) can be reduced by concurrent induction of anesthesia.”¹⁷ A separate nursing/anaesthesiologist team provides parallel induction in a separate room.
- The decision to implement an induction or block room should be decided through a collaborative process, with each facility evaluating the effectiveness, efficiency and safety of implementing such a room.

OPERATING ROOM

Best practice, standardization, concurrent tasking and a collaborative approach aid in smooth patient flow and efficient usage of operating room time.

Recommended practice for the Operating Room includes:

- Standardization
- Surgical Case Accuracy
- Concurrent Activities
- Time Out or Surgical Pause
- Turnover Process
- Transfer to PACU
- Two OR Model
- Delays

An electronic surgery management system may be used to facilitate OR information management, including OR information such as surgical times and delays.

¹⁷Anesthesiology. 2005 Aug; 103(2):401-5.

9.1.11. Standardization

- Standardization of operating room processes and procedures for joint replacement cases is implemented to aid in patient safety, flow and efficient use of OR time.
- Standardization of internal instrument sets, such as bone sets, may be implemented to facilitate setup, surgery and turnover of cases.
- Standardized custom packs may be implemented to facilitate setup, surgery and turnover of cases.
- Standardization of processes, equipment and instrument sets should be achieved in collaboration with appropriate disciplines including surgeons, anaesthetists, OR nurses, and SPD technicians.

9.1.12. Surgical Case Accuracy

- All members of the surgical team should work together to ensure surgical case accuracy, including actual time being as close to expected surgery time.
- A predetermined time from the surgical schedule such as start set-up, patient-in-room or cut, may be used as a benchmark to ensure scheduled cases are on time.

9.1.13. Concurrent Activities

- To achieve maximum efficiency within the operating room, concurrent tasking ought to be employed.
- Concurrent tasking will not have a negative impact on patient safety.
- All disciplines involved in the running of the operating room should be involved in establishing the concurrent tasking processes, including surgeons, anaesthesiologists, OR nurses, SPD technician, cleaners, porters, to name a few.

9.1.14. Time Out or Surgical Pause

A “time out” or “surgical pause” procedure is used to support team communication and safe practices. The entire surgical team pauses – before the surgery starts – and verbally confirms the correct patient, procedure, location of surgery, implant, plan for the case and other details.

9.1.15. Turnover Process

- The process for OR turnover should be developed in a collaborative manner with input from OR nursing, anaesthesiologists, surgeons, PACU nursing, porter, SPD technicians and other disciplines who may impact patient preparation.
- A clear and agreed upon definition of what “turnover” means should be established in a collaborative manner with the surgical team.
- Concurrent tasking may be utilized during the process for OR turnover.
- Appropriate human resources should be available during the turnover period to facilitate the process.

9.1.16. Transfer to PACU

- Communication should be maintained between the OR, PACU and portering to facilitate transfer to PACU.
- Concurrent tasking may be employed where possible to facilitate efficiency and patient flow.

9.1.17. Two OR Model

Facilities may adopt a two OR model to increase the number of primary hip and knee replacement surgeries they can perform in a day. In addition to the recommended operating room practices, the following practice principles are proposed for the two OR Model:

- To maintain patient, surgeon and anaesthesiologist safety, the induction and surgery times will not be shortened, rather they will be based on historical actual surgeon/anaesthesiologist times. Surgeons or anaesthetists with actual times considerably longer than the combined averages may not be candidates for the two OR days.
- To facilitate efficiency in turnovers and case times, implant systems may be limited to one or two standard systems on the two OR day.
- A procedure for adding new systems to the two OR day should be established to facilitate new technology while maintain efficiency through planning.
- To avoid cancellations or delays due to instrumentation, a predetermined order of cases for scheduling should be established. For example, if a combination of hips and knees is required due to availability of instrument sets.
- The use of physician assistants may be utilized to facilitate surgery and turnover times.

9.1.18. Delays

Regular review of delays to OR processes should be held to aid in addressing issues and adjusting processes and tasks as appropriate to ensure the continued efficient use of OR time.

POST-ANAESTHETIC CARE UNIT (PACU)

Development of best practice standardized care paths for patient recovery and discharge from the PACU will assist with the safe and smooth flow of patients through PACU to the surgical unit.

Recommended practice for the PACU includes:

- Standardization
- Length of Stay in PACU
- Discharge Criteria
- Transfer to Surgical Units

An electronic surgery management system may be used to facilitate PACU information management, including PACU information such as discharge times and delays.

9.1.19. Standardization

- Standardization of PACU processes and procedures through use of care paths should be implemented to aid in patient flow and discharge to surgical units.
- Standardization of processes and procedures (development of care paths) should be achieved in collaboration with appropriate disciplines, including anaesthesiologists, surgeons, PACU nurses, surgical unit nurses, to name a few.
- An electronic operating room management system may be used to facilitate OR information management, including patient intake information.

9.1.20. Length of Stay in PACU

Target PACU length of stay should be determined based on best practice literature and through collaborative discussions with patient care providers.

9.1.21. Discharge Criteria

- Appropriate discharge criteria should be developed through best practice literature and discussion with patient care providers.
- Discharge criteria should be included in the standardized patient care path.
- Pain management classification should be agreed upon and clearly understood by the team. Common practice is that a patient's pain must be tolerable and comfortable with some movement, prior to discharge to the surgical unit.

9.1.22. Transfer to Surgical Units

- Communication should be maintained between the PACU, surgical units and portering to facilitate transfer of patient to surgical units.
- A verbal report of patient status should be delivered to the surgical unit by PACU.
- Concurrent tasking may be employed where possible to facilitate efficiency and patient flow.
- Delays to patient transfer should be reviewed on a timely basis and resolved as appropriate.

STERILE PROCESSING

The sterile processing department should work in partnership with other surgery departments to facilitate efficient and effective patient flow. Standardization of equipment and work processes will assist in efficient delivery of these services.

Recommended practice for the sterile processing department includes:

- Standardization
- Systems Utilization
- Case Cart Preparation
- Loaner Sets

An electronic surgery management system may be used to facilitate SPD information management, including procedure card maintenance and inventory control.

9.1.23. Standardization

- Standardization of instrument sets should be implemented to facilitate setup, surgery and turnover of cases.
- Standardization of SPD processes and procedures should be implemented to aid in work flow.
- Standardization of equipment and instrument sets should be achieved in collaboration with appropriate disciplines, including surgeons, anaesthesiologists, OR nurses and SPD technicians.

9.1.24. Systems Utilization

- Where available, systems may be utilized to assist in managing instrumentation, and cleaning and sterilizing processes. These systems will help track instruments and sets, and manage cleaning and sterilization processes.
- Where available, systems may be utilized in the development of procedure lists (or pick tickets) used in the assembly of instrumentation and supplies (case carts) for individual cases.

9.1.25. Case Cart Preparation

- The surgical schedule should be finalized by noon the day before surgery to facilitate case cart setup, providing time to address any outstanding issues with instrumentation.
- A tentative surgical schedule should be reviewed one week prior to the surgical date to identify and address issues of double booking, scarce or broken instrument/equipment.
- Wherever possible, flash sterilization should be kept to a minimum to preserve the life of equipment/instruments.
- An SPD technician should be available to address any incomplete case cart setups prior to each surgical case.

9.1.26. Loaner Sets

Loaner sets refer to the various Vendor instrument systems required for placement of implants. Due to costs, space restrictions and the number of changes in technology, implant systems are not usually purchased by healthcare facilities. Instead they are provided by Vendors on a “loan” basis.

- Loaner set policies should be in place detailing vendor procedures and approved reprocessing practices.
- To facilitate setup and preparation, loaner sets should be on-site 48 hours in advance of the day of surgery
- To facilitate spaces issues within SPD, Loaner sets should be off-site within 24 hours of surgery.
- Vendors will supply in-services, written setup information and set photographs for loaner sets.

SUMMARY

By working in a collaborative manner, incorporating best practice and expert opinion, and utilizing resources within the surgical portion of the model effectively, efficiently and safely, the surgical team will contribute to the seamless journey of the surgical patient. Following the overall principles for surgery, including being patient centred, considering systems impact, continually evaluating resource utilization, will aid in building the model across the surgical continuum of medical preparation, OR scheduling, surgery intake, operating room, post-anaesthetic care unit and the sterile department.

10. POST-OPERATIVE CARE

Post-operative care encompasses all care received by the patient in the acute post-operative period, including rehabilitation, that occurs either as an inpatient or through outpatient community resources. The acute care aspect focuses on the immediate needs of the patient and is supported by the healthcare team through the use of standardized care maps. Rehabilitation practices vary according to patient need and functional status. Follow-up care in the community by both the primary care practitioner and the orthopaedic surgeon is essential to ensure that the patient's progress and optimal recovery is relative to their pre-surgical functional and medical status.

This section will provide the recommended components for post-operative care following hip or knee replacement surgery, along with resources and tools for implementation. The majority of the information is based on clinician recommendations.

The components of post-operative care include:

- Acute post-operative care
- Rehabilitation
- Post-discharge follow-up from acute care

ACUTE POST-OPERATIVE CARE

Comprehensive pre-operative patient assessment and education have a direct impact on the acute care surgery experience of the hip or knee replacement patient. Standardization of care practices is important in the attainment of optimal outcomes. Acute care post-operative practices for primary hip and knee replacement surgery may be standardized to ensure seamless transition throughout the continuum, while achieving the best possible outcomes for this population.

Recommended practices for acute post-operative care include:

- Comprehensive pre-operative education
- Implementation of national standards for anti-coagulation therapy
- Established pain management regimes
- Standardization of clinical practice
- Interdisciplinary teams to facilitate discharge planning
- Targeted length of stay

OVERVIEW

The continuum of primary hip and knee replacement surgery: post-operative care



10.1.1. Comprehensive pre-operative education

- Pre-operative education and comprehensive assessments by trained health professionals in the pre-operative phase is thought to improve post-surgical patient outcomes through the management of patient and care provider expectations along the continuum of care.
- Knowledge of the acute care continuum reduces patient anxiety regarding the surgical experience.

10.1.2. Implementation of national standards of anti-coagulation practices

- Evidence shows that patients undergoing joint replacement surgery are at high risk for Venous Thrombo-Embolus (VTE); therefore, routine thromboprophylaxis is the standard of care.
- National standards need to be considered with the use of anti-coagulation medications.
- Further research on the efficacy and effectiveness of new oral anti-coagulation protocols needs to be considered in the management of this complication.

10.1.3. Established pain management regimes

- Evidence shows that pain management is imperative in the care of the joint replacement population. Post-operative pain relief should be integrated into both the acute and rehabilitation care of patients to facilitate recovery.
- Currently, pain management practices vary within organizations and can be provided through the orthopaedic team or through the pain team (e.g. via anaesthesiologists). Clinical practitioners involved in this project supported the need for standardization of such practices.

10.1.4. Standardization of clinical practice

- Clinicians endorsed that all standardized clinical practices should be evidence-based.
- The use of clinical pathways or care maps provides a consistent approach to the management of the primary hip and knee replacement populations. Care maps should be used with clinical judgement as adjustment may be required for a subset of the population that is unable to meet criteria due to co-morbidities or post-operative adverse events.

Key clinical activities comprise the foundation for standardization of care across the continuum for primary hip and knee replacement populations. Practices that are generally addressed within care maps include the following:

- Tests (standardized post-operative radiographs and labs)
- Interdisciplinary clinical assessments
- Treatments
- Medications:
 - Pre-operative induction of antibiotics
 - Post-operative antibiotic therapy
 - Pain management (including multimodal approach)
 - Adherence to medications normally used to manage associated co-morbidities.

- Nutrition
- Bowel and bladder routines
- Discharge Planning/Discharge Criteria
- Patient Education
- Expected patient outcomes/milestones:
 - Goals of care agreed upon by the patient and family must be incorporated into the overall care plan.
- Mobilization and weight bearing activities:
 - Exercise and functional protocols should be standardized for hip or knee replacement patients.
- Standardized discharge goals for publicly funded rehabilitation programs need to be clearly identified for the programs and communicated to the patient.
- Rehabilitation needs to be evidence based and focused on physical and functional tolerances.
- Predetermined physician order-sets ensure a consistent and standardized approach for post-operative care. Clear identifiers must be utilized to ensure patient allergies are indicated. Individually modified care plans should be developed to meet the needs of the patient based on co-morbidities or adverse post-operative events.
- Communication between care providers (shift-to-shift and day-to-day) is important to the overall care plan and enhances the continuity of care.

10.1.5. Interdisciplinary Teams to facilitate discharge planning

- Development of a model of care that reflects best practices, integrates the needs of patients and care providers, and utilizes the available resources will help to promote seamless transitions throughout the continuum.
- All team members need to be aware of the roles and responsibilities of all other care providers to support the patient's plan of care.
- Pre-operative patient assessment and education are integral to the identification of resources required after surgery. Assessment and education need to be considered throughout the patient's post-operative rehabilitation.
- Appropriate arrangements for discharge prevent unnecessary delays in discharge from acute care or inpatient rehabilitation.

10.1.6. Targeted length of stay

- Average acute care length of stay for the healthy hip or knee replacement patients with adequate social supports should be within national benchmarks.
- Length of stay for elderly patients with significant co-morbidities, and lacking social supports must not be considered within benchmarking parameters.
- Many factors may contribute to a patient's length of stay in the acute care environment, such as: co-morbidities, adverse events and the ability of the patient to achieve designated outcomes of the care pathway. Patients that do not progress through the care map due to co-morbidities or complications must receive appropriate care and referral to slow stream rehabilitation if required.
- Fast track protocols facilitate shorter length of stay for primary hip and knee replacement populations, thereby maximizing efficiencies within the program. A patient's profile is inclusive of selected criteria that must be met to qualify for the Fast-Track pathway option and a shorter length of stay.

REHABILITATION

Clinicians endorsed that rehabilitation is a key component for the successful recovery of patients following hip or knee replacement surgery. Healthcare systems need to ensure that appropriate rehabilitation services are timely and accessible for patients requiring these services following hip or knee replacement surgery. Care needs for these patients vary. Services for these populations may be available through homecare, inpatient rehabilitation or outpatient programs.

Recommended practices regarding rehabilitation include:

- Referral Practice
- Rehabilitation at home
- Outpatient Physiotherapy
- Inpatient rehabilitation
- Access to ongoing education
- Availability and access to services based on geographical region

10.1.7. Referral Practices

- Referral processes must be standardized and streamlined to facilitate a seamless transition throughout the continuum
- Following hip or knee replacement surgery, the majority of patients are able to manage their rehabilitation at home. As such, a system should be designed to support home discharge when possible.
- Referral should include information regarding the patient's current health status, weight bearing status, mobility restrictions and post-operative course of treatment.

10.1.8. Rehabilitation at home

- As the majority of patients are able to successfully recover at home following hip or knee replacement surgery, the program should encourage patients to participate in rehabilitation through standardized exercise and functional activity which should be taught and reinforced throughout the patient's pre-operative care and hospital stay.

- With respect to homecare, consideration should be given to physiotherapy, occupational therapy, nursing, and personal support based on the criteria for admission to these services within the region.
- When referral to homecare is considered appropriate, the services must be ordered prior to the patient's discharge from hospital.
- Where a pre-operative home visit has been completed, the program should reinstate home therapy with the same provider where possible.
- Weight bearing orders and mobility restrictions should be standardized where possible to increase the efficiency of the home visit. Where there is deviance from the standard orders, the referral for homecare services needs to include weight bearing orders and mobility restrictions.
- Referral to outpatient therapy needs to be considered for patients that require ongoing therapy to achieve functional goals following discharge from homecare.

10.1.9. Outpatient Physiotherapy

- Weight bearing orders and mobility restrictions should be standardized where possible to increase the efficiency of the outpatient visit. Where there is deviance from the standard orders, the referral needs to reflect this.
- To ensure access to care, it is recommended that patient appointments be booked prior to discharge and that patients be provided with written instructions regarding post-discharge therapy appointments.
- The majority of the patient's care will take place at home; therefore, throughout the program, the patient needs to be provided with instruction and ongoing education regarding exercise and functional activities to be completed at home.
- The rehabilitation for knee replacement patients includes intensive exercise to achieve range of motion and function through the first 12 weeks post-surgery.
- The rehabilitation for hip replacement patients is limited by surgical restrictions. It tends to be required following the first surgeon visit and up to 3 months following surgery. The general goal of rehabilitation is to address muscular deficits resulting from the surgical restrictions.

- Discharge from therapy will occur once the patient has achieved the functional goal of independence with respect to their normal activities of daily living, or where there has been a plateau in progression.
- Communication regarding the patient's progress will occur throughout the program with the surgeon and the primary care practitioner.
- On discharge from the publicly funded system, the patient should be provided with options for further rehabilitation, either through the independent continuation of exercise or through ongoing rehabilitation through a private provider.

10.1.10. Inpatient Rehabilitation

- Inpatient rehabilitation is required for the minority of patients following hip or knee replacement surgery, and is generally related to co-morbidities or post-operative complications.
- Patients accessing inpatient rehabilitation do so for varying reasons; therefore, an individualized care plan needs to be developed.
- A care map should be developed that measures the patient against their required activities of daily living.
- Where possible, weight bearing orders and mobility restrictions should be standardized to increase the efficiency of the outpatient visit. Where there is deviance from standard orders, the referral needs to reflect this.
- Patients must adhere to their exercises and attend scheduled therapies to guarantee optimal outcomes in their post-surgical recovery and rehabilitation.
- Patients and their designated supports require clear instructions to ensure their plan of care is understood and followed in order to achieve short and long term goals.
- Referral to outpatient therapy or homecare should to be considered following inpatient rehabilitation.

10.1.11. Access to Ongoing Education

- Up to and beyond one year following surgery, both primary hip and knee replacement patients may require ongoing advice and/or education for increasing physical and functional activity levels. Recommendations for functional activity and progression should be standardized where possible.
- Education should be consistent and available through many mediums including written materials, websites, primary care practitioners, telephone calls and teleconferences.

10.1.12. Availability and access of services based on geographical location

Access to programs and resources can vary by geographic location (urban, rural or remote). Healthcare providers from the discharging facility need to ensure an appropriate care plan is developed based on the availability of resources.

POST-DISCHARGE FOLLOW-UP FROM ACUTE CARE

Post-operative care includes all care practices leading up to, and including, post-discharge care, which needs to include: outpatient therapy appointments, primary care practitioner and surgeon follow-up appointments.

Recommended practices in follow up care include:

- Patient appointments following discharge
- Follow-up care is required to ensure that short and long term outcomes are achieved
- Communication across the continuum
- Outcome reporting (short and long term)

10.1.13. Patient appointments following discharge

- Patients must be provided with written instructions on post-discharge follow-up care (i.e. surgeon, primary care practitioners, and physiotherapy appointments).
- Patients should be provided with telephone contact numbers of appropriate healthcare team members, as necessary.

10.1.14. Follow-up care is required to ensure that short and long term outcomes are achieved

- Patients must understand the importance of regular attendance for scheduled appointments with healthcare providers (surgeon, physiotherapy, primary care practitioner).
- Post-operative follow-up care with the surgical program can occur through the assessment program, through the surgeon's office or through a fracture clinic appointment. This requires standardization, but some clinicians reported that currently this would occur 3 times in the first year post-operatively; approximately 3 times in the next 10 years and then annually thereafter.
- Expedited access to the surgeon by either the primary care practitioner or the patient is required if post-operative complications arise. Primary care providers must be allowed timely access to surgeons when the patient's condition warrants consultation.

10.1.15. Communication across the continuum

- Orthopaedic care and arthritis management should follow an integrated care practice approach.
- Management from both a primary care practice and specialist perspective is important for optimal outcomes. Patients and family members should have a clear understanding of when and how to access the family practitioner, surgeon and rheumatologist.
- Communication with primary care providers by the healthcare team must be timely and reflect the patient's surgical treatment and post-discharge plan.

SUMMARY

Transition to rehabilitation and the community is made seamless through care planning and the communication of interdisciplinary teams. Communication and referral practices enable the treatment team to effectively shift the patient's needs from acute care to rehabilitation with ease. Standardizing information via referrals and discharge summaries allows for the patient's care plan to extend beyond the acute care setting. Community resources need to be partnered with both the acute care setting and the primary care practitioner to facilitate comprehensive rehabilitation post-surgery.

Organizations and healthcare teams must ensure that patients, families and caregivers are provided with written instructions regarding follow-up care. Patient information should be coordinated and communicated along the care continuum to ensure that information is comprehensive and timely. Patients and families need to know how and when to access care from their primary care practitioner and/or surgeon to ensure optimal care in their post-surgical recovery and rehabilitation. Clear articulation of the role of the primary care practitioner and surgeon will enhance care and the patient's post-surgical experience.

11. Evaluation

Health organizations identify and measure Key Performance Indicators (KPIs) as a method to compare performance, set targets and promote improvements in the quality of care. This allows healthcare providers, administrators and decision-makers to monitor performance and enhances their ability to effectively target areas for change. Performance of healthcare is multidimensional, with providers having legitimate interest in a diverse variety of KPIs that address outcomes from both clinical and administrative perspectives.

An evaluation framework of KPIs was identified and KPIs that would assess and guide improvements after the implementation of the Toolkit for primary hip and knee replacement surgery were recommended. The foundation for the development of the evaluation framework required KPIs to be quantifiable and critical to the goal of addressing access to surgical care for primary hip and knee replacement surgery.

IDENTIFICATION OF KEY PERFORMANCE INDICATORS

The Dimensions of Quality within the Alberta Quality Matrix of Health [<http://www.hqca.ca>] (Table 3) is used as the framework for the Key Performance Indicators recommended within the Toolkit. The list of KPIs recommends indicators that are necessary, as well as those, while important, are not as critical to an evaluation framework, due to issues of capacity and limitations in some areas. For providers to obtain a comprehensive evaluation of the performance of their model for primary hip and knee replacement care, it is recommended that the KPIs listed in the evaluation framework be assessed accordingly.

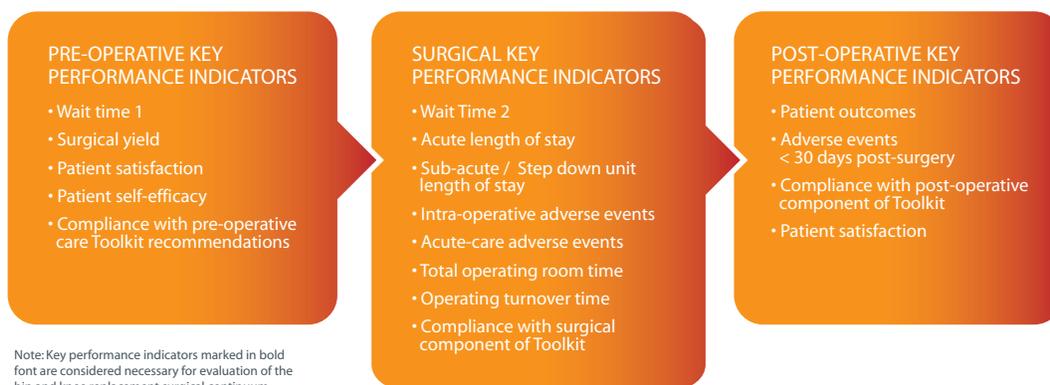
Table 1: Alberta Quality Domains for Health

QUALITY DOMAIN	DEFINITION
Acceptability	Health services are respectful and responsive to user needs, preferences and expectations
Accessibility	Health services are obtained in the most suitable setting in a reasonable time and distance
Appropriateness	Health services are relevant to user needs and are based on accepted or evidence-based practice
Effectiveness	Health services are provided based on scientific knowledge to achieve desired outcomes
Efficiency	Resources are optimally used in achieving desired outcomes
Safety	Mitigate risks to avoid unintended or harmful results

The KPIs recommended are inter-related and it is anticipated that improvements in all of the KPIs could result in a national reduction in waiting times for primary hip and knee replacement patients. It is important to note however, that the success of the evaluation framework is directly dependent on the reliability, accuracy and timeliness of the reporting of KPIs to their respective audiences. It is recommended that the KPIs be measured and reported for all types of hip and knee replacement patients (e.g. primary, revisions etc); however it is important to also stratify KPI results by primary hip and knee replacement patients as there are significant differences in these patient groups with respect to prevalence, procedures, benchmarks and post-operative time to recovery.

OVERVIEW

The continuum of primary hip and knee replacement surgery: evaluation



PRE-OPERATIVE KEY PERFORMANCE INDICATORS

A total of 5 KPIs were recommended for the Pre-operative component of the Toolkit. While all of these are defined as important, 2 are considered necessary (these are indicated in bold) for evaluation. These include:

- **Wait Time 1**
- **Surgical Yield**
- Patient Satisfaction
- Patient Self Efficacy
- Compliance with Pre-operative Care Toolkit Recommendations

11.1.1. Wait Time 1

Wait Time 1 is defined as the waiting period from the primary care practitioner patient referral date to an orthopaedic surgeon and the date of the first orthopaedic consult. Wait Time 1 is a critical KPI that contributes to the assessment of the Access Health Quality Domain. It is recommended that all information required for the measurement of Wait 1 be captured electronically. It is recommended that Wait 1 be reported quarterly at the local, provincial and national level.

11.1.2. Surgical Yield

Surgical yield is defined as the percentage of orthopaedic primary hip and knee replacement referrals that receive surgery. Surgical yield was determined a critical KPI within the Access Health Quality Domain. As with Wait 1, it is suggested that all information required for the measurement of Surgical Yield be captured electronically. To compensate for the wait time to surgery, it is recommended that this KPI be reported annually at the local, provincial and national level.

11.1.3. Patient Satisfaction

Patient satisfaction is defined as the patient's assessment of their overall experience of their hip or knee replacement, including their pre-operative care. The pre-operative experience includes the acceptability of their waiting time for first orthopaedic consult. This KPI was not determined a critical indicator for the evaluation framework; however, it was noted as a useful measure that would provide information regarding patient Acceptability. As this indicator may be too complex to report for all patients, it is recommended that this KPI be measured on an "as needed" basis via a patient questionnaire administered to a random cross sectional sample of patients. For example, it may be advantageous to report patient satisfaction at the implementation of a primary hip and knee replacement care model, and then annually thereafter. The reporting scope for the pre-surgery patient satisfaction KPI was recommended at the local level. Examples of patient questionnaires utilized by organizations throughout Canada for measuring patient satisfaction are included in the referenced tools.

11.1.4. Patient Self Efficacy

Patient self efficacy is defined as a patient’s ability to understand, cope and care for his or her disease, which is likely to be improved via successful patient education. As with Patient Satisfaction, this KPI was not considered critical for the evaluation framework; however, if organizations have the ability to measure it, it can provide insightful information regarding the Effectiveness of the pre-operative services. It is recommended that this KPI be obtained via a patient administered questionnaire, on a random cross sectional sample of patients, on an “as needed” basis. The Stanford Arthritis Self Efficacy Questionnaire is a validated patient questionnaire commonly used to assess self efficacy (<http://patienteducation.stanford.edu/research/searthritis.html>). Other examples of self efficacy questionnaires designed and used by other organizations throughout Canada are included in the referenced tools. Reporting of this indicator is recommended at the local level.

11.1.5. Compliance with pre-operative Toolkit

It is understood that accurate reporting of compliance will require a significant amount information and effort to measure. Although this KPI addresses the feasibility and Efficiency of the pre-operative toolkit, this KPI is not deemed necessary and recommendations include intermittent measurement, as needed, with reporting at the local level only. Review of adherence to procedures on a random cross sectional sample will likely suffice for monitoring this KPI.

SURGICAL AND IN HOSPITAL KEY PERFORMANCE INDICATORS

A total of 9 KPIs were recommended for the surgical component of the toolkit, of which 6 are considered necessary (indicated in bold). These include:

- Wait Time 2
- Acute Care Length of Stay (LOS)
- Discharge disposition
- Sub-acute/Step down unit LOS
- Intra-Operative Adverse Events (AEs)
- Acute Care Adverse Events (AEs)
- Total operating room (OR) time
- Operating turn over time (TOT)
- Compliance with Surgical/Acute Care Stay component of the Toolkit

11.1.6. Wait Time 2

Wait Time 2 is defined as the waiting period from the date of first orthopaedic consult to the date surgery was completed. Wait Time 2 is a critical KPI that addresses the Access Health Quality Domain. Similar to Wait 1, it is recommended that all information required for the measurement of Wait 2 be captured electronically. It is recommended that Wait 2 be reported quarterly at the local, provincial and national level. This indicator is available on a provincial level and in many provinces is reported on a public basis.

11.1.7. Acute Care Length of Stay (LOS)

LOS is defined as the time from patient admission to patient discharge from an acute care facility where the patient received joint replacement surgery. This indicator was determined a critical KPI. Information for measuring LOS should be captured electronically and reporting recommendations for this KPI are for all patients, on a quarterly basis at the local, provincial and national level. To address potential concerns regarding the increased utilization of other resources due to reduced acute care LOS, this KPI needs to be considered in conjunction with “Discharge Disposition” identified below and it is suggested that the KPI be stratified by patients discharged home versus those discharged to another destination. This indicator is available through the Canadian Institute of Health Information

11.1.8. Discharge disposition

The indicator for discharge disposition defines where patients are discharged to following their surgery. The focus of any surgical program is to create a recovery pathway to discharge patients home in the optimum time period. Discharge disposition defines the number of patients who are discharged home and is most effectively used when used in conjunction with length of stay. Reporting on this KPI should be considered on a local, provincial and national level. This KPI is available through Canadian Institute of Health Information.

11.1.9. Sub-acute/Step down unit LOS

To obtain a comprehensive assessment of a patient’s entire LOS for hip or knee replacement surgery, measurement of time spent in a sub-acute or step down unit should be incorporated. However, as many patients are discharged to another facility it is understood that capturing or administratively linking the data necessary for this indicator is complicated and unclear. Therefore, this KPI was not determined to be critical at this time. If collected, recommendations for the scope of reporting are the same for the acute care LOS KPI.

11.1.10. Intra-Operative Adverse Events (AEs)

Intra-operative AEs are any unexpected or undesirable event occurring during hip or knee replacement surgery. This KPI that addresses Safety was determined to be important and is recommended to be captured electronically and reported for all patients. Recommendations for the scope of KPI reporting are at the local, provincial and national level at quarterly intervals.

11.1.11. Acute Care Adverse Events (AEs)

Acute Care AEs are any unexpected or undesirable events occurring during the acute care stay for primary hip and knee replacement surgery, excluding AEs occurring during the surgical procedure. Similar to intra-operative AEs, this KPI was determined necessary and is recommended to be captured electronically and reported for all patients. Recommendations for the scope of KPI reporting are at the local, provincial and national level at quarterly intervals. Reported AEs should be determined as serious - reporting complications such as nausea post-operative is too prevalent and too detailed. Acute Care AEs are a measure of Safety.

11.1.12. Total operating room (OR) time

Total OR time is defined as the time from when a patient enters the OR to the time the patient leaves the OR. This KPI was recommended as necessary and is categorized within the Efficiency Health Quality Domain. Information pertaining to OR times should be collected and maintained electronically, and the total OR time KPI should be reported for all patients. Recommendations for the scope of reporting are on a quarterly basis at the local, provincial and national levels.

11.1.13. Operating turn over time (TOT)

TOT is defined as the time a patient leaves the OR to the time another patient enters the OR. TOT was determined to be an important measure of system Efficiency. Although the collection and reporting of TOT may be complex, this indicator is determined necessary. In order to enhance reporting capabilities, TOT should be measured using strategies implemented within an electronic medical system. It is also recommended that TOT be captured for all patients and be reported at quarterly intervals at the local level

11.1.14. Compliance with Surgical component of the Toolkit

It is understood that accurate reporting of compliance will require a significant amount of information and effort to measure. Although this KPI addresses the feasibility and Efficiency of the surgical and acute care sections of the Toolkit, this KPI was not deemed necessary. If measured, recommendations included intermittent measurement, as needed, with reporting required at the local level only. Review of adherence to procedures on a random cross sectional sample of patients would likely suffice for the successful monitoring of this KPI.

POST-DISCHARGE KEY PERFORMANCE INDICATORS

A total of 5 KPIs were recommended for the Post-operative component of the Toolkit, of which 3 are considered necessary (indicated in bold).

These include:

- **Patient outcomes**
- **Adverse Events (AEs) < 30 days post-surgery (readmission)**
- **Revision rates**
- Compliance with Post Surgical Component of the toolkit
- Patient Satisfaction

11.1.15. Patient outcomes

Patient outcomes are defined as measures of change in patient function and pain from pre-surgery to defined time points post-surgery. This KPI was determined necessary for the evaluation framework, and is a measure of system Effectiveness. As recovery times and expected time to improvement differs between hip and knee surgery, the collection of the post-operative patient outcome data should therefore be at appropriate intervals. It is recommended that patient outcomes be collected via patient administered questionnaires. Validated instruments such as the Oxford Hip are available for use, and examples of outcome questionnaires utilized by organizations throughout Canada for the assessment of patient function and post-surgery pain are available in the Toolkit Reference Folder. Variation in the content of patient outcome questionnaires will reflect the needs, resources and preferences of the users at the local level; therefore, it is recommended that this KPI be reported for all patients, annually, and at the local level. Caution is advised regarding the comparison of patient outcomes across providers, to ensure outcomes are not biased by patient selection. This KPI requires the implementation of robust statistical methods for patient risk adjustment.

11.1.16. Adverse Events (AEs) < 30 days post-surgery

Post-operative AEs are any unexpected or undesirable events occurring during the first 30 days after hip or knee replacement surgery, excluding AEs occurring during the acute care length of stay. This KPI was determined necessary and is recommended to be captured electronically and reported for all patients. Recommendations for the scope of KPI reporting are at the local and provincial levels on an annual basis. AEs should include all deaths and readmissions related to the primary hip and knee replacement care. Post-operative AEs are a measure of Safety. This KPI is available in Canadian Institute of Health Information as readmission rates within 30 days of discharge.

11.1.17. Revision rates

Complication from the hip or knee replacement surgery can result in a second surgery needing to be performed within the first year following the initial surgery which will result in a poorer outcome. This KPI is therefore a measurement of safety and is available through the Canadian Institute of Health Information.

11.1.18. Compliance with Post Surgical Component of the Toolkit

Accurate reporting of compliance with the post-operative component of the Toolkit will require a significant amount of information and effort to measure. Although this KPI addresses the feasibility and Efficiency, it was not recommended as being necessary for the evaluation framework. If this KPI is assessed, recommendations included intermittent measurement, as needed, with reporting required at the local level only. Reporting for all patients is likely unachievable for most organizations, therefore a review of adherence to procedures on a random cross sectional sample only is recommended.

11.1.19. Patient Satisfaction

Patient satisfaction is defined as the patient's assessment of their overall experience of their hip or knee replacement, including their post-operative care. This KPI was not determined necessary; however, it is a useful measure that would provide information regarding patient Acceptability. As this indicator may be too complex to report for all patients, it is recommended that this KPI be measured on an as needed basis via a patient questionnaire administered to a random cross sectional sample of patients. The reporting scope for pre-surgery patient satisfaction was recommended for the local level. Examples of patient questionnaires utilized by organizations throughout Canada for measuring patient satisfaction are included in the Reference Folder.

12. Implementation

Although the implementation of the National Core Model of Care for primary hip and knee replacement is beyond the scope of the Toolkit some basic parameters are provided to assist organizations to improve access and quality care. Implementation requires a coordinated plan that meets the needs of patients within the local community. Regional plans therefore should be developed to identify the current and future demand for service, as well as, the capacity to meet the demand. To ensure a successful program, a planned approach is required, with all stakeholders providing input through the development, implementation and performance monitoring stages of the program.

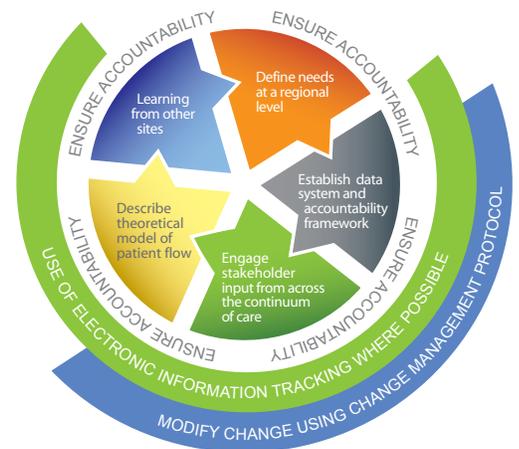
To ensure best practice for primary hip and knee replacement patients, a plan of care needs to be created that defines care as it relates to the local region and manages patient transitions across the continuum.

Recommended practices for implementation include:

- Define current and future needs for primary hip and knee replacement surgery at a Regional level
- Identify sites with functioning program and learn about the program
- Describe patient flow as a theoretical model prior to initiation of the program
- Ensure decision making includes all stakeholders across the continuum of care
- Ensure there is an accountability framework across the continuum of care
- Track information electronically where possible
- Modify practices using a standardized change management protocol

OVERVIEW

The continuum of primary hip and knee replacement surgery: implementation



DEFINE THE NEED FOR HIP AND KNEE REPLACEMENT SURGERY

- It is important to define volume needs for primary hip and knee replacement surgery using the data which is available on local services and demographics.
- Use of the above data will assist in the planning for future volumes on a regional level in order to optimize system capacity and resource utilization.

IDENTIFY SITES WITH FUNCTIONING PROGRAM AND FACILITATES LEARNING ABOUT THE PROGRAM

- Connect with high performing centres regionally, provincially or nationally
- Learn about their programs including successes and challenges
- Link staff to increase knowledge uptake as required

DESCRIBE PATIENT FLOW THEORETICALLY PRIOR TO INITIATION

- A process map will assist in the description of patient flow across the continuum.
- Front line staff should have the opportunity to create and modify the process map to ensure all operational issues are addressed.
- The process map should be endorsed by the management teams of the stakeholder organizations.

DECISION MAKING INCLUDES INPUT FROM ALL STAKEHOLDERS

- A governance structure is required at both a regional and organization level.
- The governance structure needs to include representation from all healthcare provider groups, including surgeons, primary care practitioners, anesthesiologists and allied health.
- The regional governance structure should include representation from all stakeholders including government and participating organizations across the continuum of care.
- The committees and working groups within the governance structure need to have responsibility and authority to implement the program.
- The governance structure needs to have working groups assigned to the implementation and the performance monitoring of the program.
- Patient representation should be considered where relevant.

ENSURE THERE IS DATA REPORTING AND AN ACCOUNTABILITY FRAMEWORK

- A mandate for the program needs to be established through an accountability framework.
- The accountability framework should include public performance measurement and reporting systems which are linked to funding.

Electronic patient tracking will provide information to measure system performance and may include:

- Electronic referrals
- Referral management system
- Wait times measurement
- Surgical booking system
- Electronic records for post-operative care
- Outcomes

MODIFY PRACTICES USING A STANDARDIZED CHANGE MANAGEMENT PROTOCOL

Change management protocols are beyond the mandate of this project. Reference for healthcare management change can be found through the Institute of Healthcare Improvement (IHI) web site at: www.ihl.org

SUMMARY

Care for patients requiring hip or knee replacement surgery can be enhanced by taking a systematic approach that builds consistency across the country. This requires planning, stakeholder engagement and communication, coordination and ongoing evaluation. For system design to be based on outcomes, data collection must be targeted and must guide decision-making.

13. System Capacity And Operations Research Modelling

Planning for the management of primary hip and knee replacement needs to take into consideration many factors including the demand for service, the Health Human Resource capacity to provide service as well as the functional resources of which the main limiting factors are access to the Operating room as well as bed capacity. In order to maximize local capacity it is important to understand how these factors are interrelated. This can be achieved through modelling. The models below provide information on the measurement of these factors. These models were created through the University of Toronto¹⁸.

CARE PATHWAYS

The development of efficient care pathways that benefit both patient care and the overall efficiency of the system has been an ongoing effort. Several different models are used across Canada, but each one addresses the central theme of improving access to care with limited resources. Each pathway follows a similar patient flow, but each differs in the resources used at each step and how care is delivered. Based upon available resources and the current process in place, some care pathways may be easier to implement than others. The goal of the care pathway models is to give a general overview of the resources required and the benefits of implementation compared to the status quo or other care pathways.

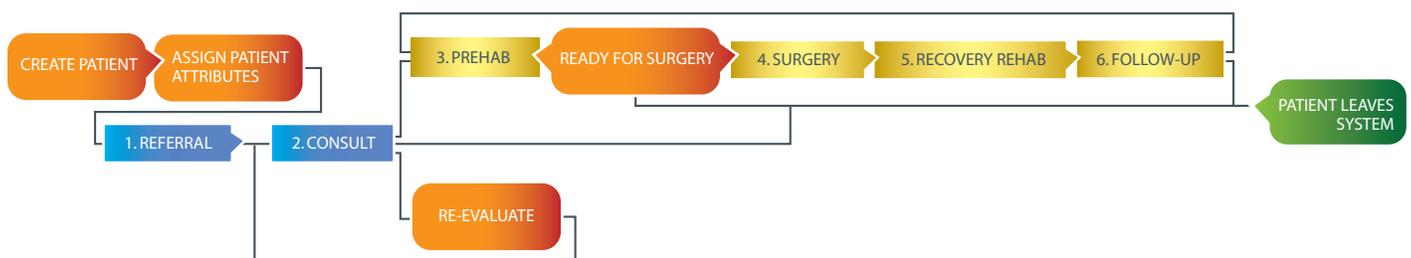
13.1.2. Data Requirements

In general, the data requirements are extensive, depending on the level of detail required for the analysis. Below is just a small sample of the data required.

- **Patient Data:** Arrival rate of referrals and the distribution of urgency, distribution of types of surgeries (primary, revision, total, partial, hip or knee, difficulty), % patients requiring medical/functional optimization
- **Resource Data:** Number of surgeons and their average rate of converting referrals to surgery, surgical (OR) allocation, # surgeries performed/OR day, length of referral and follow-up appointments
- **Clinic Data:** clinic hours, schedule of clinic days, how are referrals distributed, management of wait lists
- **Care Pathway Data:** other services offered at the clinic and the timing/availability of those resources (e.g. Advanced practice physiotherapist, prehabilitation, patient education), who is involved and patient contact time

13.1.1. What does the model do?

- Simulates the flow of patients through the process of referral, consult, prehabilitation, surgery, post-surgical care and follow-up.
- Measures various statistics as the patient flows through the system such as queue times, queue lengths, resource utilization and can be expanded to include costs.



¹⁸Centre for Research in Healthcare Engineering (www.crhe.ca)

13.1.3. Possible Scenarios with Current Model

These are some of the scenarios that can be tested with the current models and data. This is not a comprehensive list; rather it indicates the range of scenarios that can be tested with the model.

- If more resources are allocated to various stages of the patient care continuum, how does it affect capacity?
- If the patient referral rate increases/decreases, what happens to patient wait times?
- If the patient mix changes, what happens to wait times and resource utilization?
- If an advanced practice physiotherapist is used to screen referrals, can surgical output be increased?
- What is the ability of the clinic to meet wait time targets?

HEALTH HUMAN RESOURCE MODELLING – ORTHOPAEDIC SURGEONS

Ensuring there are sufficient health human resources to provide the required healthcare services is a critical component of providing high quality, accessible care in a sustainable system. To facilitate this, health human resource (HHR) planning tools are needed. HHR workforce system models provide insight into the future supply of human resources and future demand for the services they provide based on population projections and other factors. Models can be used to examine various “what if” scenarios to provide insight into the long-term effects of policy and other system changes. An HHR model of the orthopaedic surgeon workforce in Canada has been developed for this purpose.

13.1.4. What does the model do?

- Simulates the progression of students through the orthopaedic surgery residency and fellowship stages and their entry into the surgeon workforce
- Models the population of practicing surgeons as they age over time and determines the surgical and clinical capacity they provide to the system
- Determines the orthopaedic surgical and clinical demand based on population projection and gender/age specific per-capita demand rates, current wait lists, and the demand for surgery by non-Canadians
- Compares the supply and demand for each type of surgeon activity (surgical and clinical) to determine the surplus/shortage of surgeons in the system.

13.1.5. Data Requirements

- **Student Component:** Number of students in the system by residency year, enrolment rate, training stage durations and proportion of students pursuing fellowships
- **Surgeon Component:** Number of surgeons in the system age and attrition rate by age
- **Workload Component:** Current and desired per-surgeon annual surgical and clinical workload by surgeon age, proportion of time allocated to surgical versus clinical activity, surgical capacity of the system (funded cases)

- **Demand:** Age/gender specific per-capita demand for visits and surgery, number of patients currently waiting for surgery and visits, wait list departure rate, non-Canadian demand for surgery

13.1.6. Possible Scenarios with Current Model

These are some of the scenarios that can be tested with the current model and data. This is not a comprehensive list; rather it indicates the range of scenarios that can be tested with the model.

- What would happen if resident enrolment was capped at a certain number of students per year?
- What is the impact of surgical case limits on the system?
- What if demand is higher/lower than current estimates for surgery? Visits?
- What happens if higher population projections are used? Lower?
- What if surgeon’s annual case or visit load are higher/lower than currently estimated?
- What if wait list demand is distributed over different time periods (1 year? 5 years? 10 years?)

GENERALIZED PREOPERATIVE MODEL

While each hospital faces its own set of challenges, the basic model of surgical care is the same at all; bring patients into the hospital, perform surgeries on these patients, ensure that they are cared for post-procedure and send them home. Simulating this has historically been a lengthy, complex process involving custom building a model to capture the nuances of each situation but given the underlying similarity the model can be generalized and still capture enough detail to provide meaningful insights. The goal of this model is to allow for analysis of various “what if” scenarios to provide decision support around changes to operations and scheduling.

13.1.7. What does the model do?

- Simulates the flow of patients into operating room, through recovery and into hospital wards for recovery
- Generalized to allow for application in any hospital situation from small rural to very large academic centres
- Accounts for variability introduced by surgical slate changes and differing surgeon practices
- Allows for off-servicing of patients into non-surgical wards, cancellation of surgeries due to shortcomings in ward space and operating time
- Measures statistics regarding hospital operation such as operating room utilization, ward census by day of week and surgeon/service throughput rates

13.1.8. Data Requirements

In general, the data requirements are extensive but should be available to hospital administrators. At a high-level, the data required is:

- **Patient Data:** service and surgeon performing surgery, surgery date and length of stay in operating room, booked surgical duration, turnover time between surgeries, post-surgery pathway through hospital with lengths of stay in each location
- **Resource Data:** number of operating theatres, surgical slate by service for each theatre, number of surgeons available in each service, size of wait list for each surgeon, number of beds available in each ward by shift. Resource data can be expanded to include other resources in the system (e.g. rehabilitation, nursing, anaesthesiology).
- **Operational Data:** off-servicing allowances and nursing ratios, scheduling rules, management of wait lists.

13.1.9. Possible Scenarios with Current Model

These are some of the scenarios that can be tested with the current model and data. This is not a comprehensive list; rather it indicates the range of scenarios that can be tested with the model.

- What would happen to utilization/census levels/throughput if the surgical slate was changed to a different configuration?
- What would happen to utilization/census levels/throughput if an additional operation room was added? And how should the service be scheduled into this new room?
- What would happen to utilization/census levels/throughput if certain surgeries were scheduled earlier/later in the week/day?

13.1.10. Model Results

This model is positioned more at an operational level to aid in decision support. It has been validated in five hospitals of varying sizes, with several more planned for the coming year. In each location it has been tested in, it has proven capable of representing the actual operations accurately enough to be able to aid decision-makers in planning changes to hospital operations and process flow.

MONTE CARLO MODELLING – BED CAPACITY PLANNING

Allocating scarce resources to multiple stakeholders is a difficult process as is attempting to understand the factors impacting the number of patients requiring beds in a hospital during a typical week. To allow for an understanding of how to allocate OR time and beds to services, planning tools are needed. A bed capacity planning model provides insight into the overall system impact of changes made in one area. A model can be used to examine various “what-if” scenarios to evaluate the effect of these changes. This model has been developed for this purpose.

13.1.11. What does the model do?

- Simulates number of required beds by day of week and shift of a day for each service.
- Utilizes actual historical patients to account for correlated times between surgery, length of stay in ICU, length of stay in ward, etc.
- Incorporates the impact of emergency and medical patient arrivals on bed capacity.
- Allows for analysis of impacts of growth of patient base, changes in surgical slate, changes in length of ward stay, changes in length of ALC stay, etc.
- Positioned at a tactical level to act as decision support in planning bed allocations, ring fencing and other strategies for bed management.

13.1.12. Data Requirements

In general, the data requirements are quite extensive but should be available to hospital administrators. At a high-level, the data required is:

- By patient, surgery information: date, duration, surgeon
- By patient, post-surgical path through hospital with length of stay at each stage
- By surgeon, historical surgeries performed with associated lengths of stay
- Arrival rate of new patients to the system

13.1.13. Possible Scenarios with Current Model

These are some of the scenarios that can be tested with the current model and data. This is not a comprehensive list; rather it indicates the range of scenarios that can be tested with the model.

- What is the impact on bed resources if the number of surgeries is expected to rise 10% next year? 15%? 20%?
- What is the impact on bed resources if a number of surgical beds are ring-fenced to prevent off-servicing?
- What is the impact on bed resources if the surgical slate is changed? What is the minimal change to have the maximal impact?
- What is the impact on bed resources if the length of stay for all typical patients was reduced to the CIHI 25th% benchmark length of stay?
- What is the impact on bed resources if the number of ALC days was cut by 25%? 50%?

SUMMARY

Modelling provides information on the theoretical flow of patients through the healthcare continuum and can address the individual factors that can be a barrier to improved care and improved access for patients.

14. Summary

With financial support from Health Canada, the Institute of Musculoskeletal Health and Arthritis and in-kind support from the Canadian Orthopaedic Foundation, Canadian Orthopaedic Association, Alberta Bone and Joint Health Institute, and The Arthritis Society and tremendous participation and effort by a variety of stakeholders in each of the provinces and two territories, Bone and Joint Canada has developed a Toolkit to guide implementation of the National Core Model of Care across the country. Hospitals across the country generously made available tools that they had developed, which have been posted on the BJC website (www.boneandjointcanada.com) and can be downloaded by clinicians across the country.

This Toolkit provides comprehensive guidelines and resources for the management of primary hip and knee replacement care that is a planned approach to meet the needs of patients within the local community. Specifically the Toolkit provides recommendations on how to provide evidence based practice within the management of referrals through the system, the pre-operative phase of care including patient identification and management, the surgical process as well as the post-operative phase of care including rehabilitation.

The Toolkit focuses on the development of coordinated processes and procedures to create a seamless environment for the patient, making the journey effective, efficient and safe.

Key Performance Indicators are outlined to compare performance, set targets, promote improvements and monitor performance. This will enhance the ability of regions and organizations to effectively target areas for change and will guide improvements to continually improve care after the initial implementation of the Toolkit for primary hip and knee replacement surgery.

Lastly, the document provides an overview as to how system capacity and resource modelling can be used to provide data to guide decisions related to the allocation of resources.

Further research is needed to develop a “Gold Standard of Care”. In the interim, the authors offer this Toolkit as a starting point in terms of Best Practice.