Bone & Joint Canada
Wait Times Initiative, Phase III
APRIL 30, 2009

EDITORS:
Dr. James P. Waddell, MD, FRCSC, Coordinator, National Action Network for the Bone and Joint Decade, Dr. Cy Frank, Executive Director, Alberta Bone and Joint Health Institute
Acknowledgements

Development of this Toolkit has been made possible through:

Financial contributions from the following agencies:
- Health Canada
- Canadian Institutes of Health Research, Institute of Musculoskeletal Health and Arthritis (IMHA): Institute Community Support Grant and Award

In-Kind contributions from the following agencies:
- Canadian Orthopaedic Foundation
- Alberta Bone and Joint Health Institute (ABJHI)

Authors:

The authors of this report would like to thank the members of the Steering Committee, the Coordinators and the members of the various Working Groups who contributed to this report.

Introduction:

Ms. Hazel Wood, Executive Director, Bone and Joint Canada

Wait Times Section:

Ms. Sherry Weaver, PhD Candidate, Faculty of Mechanical & Industrial Engineering University of Toronto

Pre-Operative Section:

Ms. Rhona McGlasson, BSc.PT. MBA, Project Director, Bone and Joint Health Network

Surgical Section:

Ms. Cindy Roberts, BGS, Program Director, OASIS Program Vancouver Coastal Health

Post-Operative Section:

Ms. Michelle Morrison, RN BScN, Project Manager in Orthopaedics, Capital Health

Evaluation Section:

Ms. Kathy Gooch, BSc. MApp Epi, Advisor, Alberta Bone and Joint Health Institute

Technical Editing:

Ms. Laura Passalent, BScPT, MHSc
Table of Contents

1. Executive Summary ................................................................. 4
2. Introduction .............................................................................. 6
3. Governance and Guiding Principles ........................................... 10
4. Toolkit Development ............................................................... 13
5. How to use this Toolkit ............................................................ 15
6. Provincial Strategies ............................................................... 17
7. Implementation ......................................................................... 22
8. Wait Time Management ............................................................ 24
9. Pre-Operative Care .................................................................. 29
10. Surgical Care .......................................................................... 42
11. Post-Operative Care ............................................................... 53
12. Evaluation ............................................................................... 60
13. Project Evaluation .................................................................... 66
14. Project Outcomes and Lessons Learned ................................. 67
15. Summary and Future Recommendations ................................. 68

Appendices

Appendix A: Provincial Wait Time Strategies ................................ 71
Appendix B: Hip and Knee Replacement Variables ......................... 73
Appendix C: Hip and Knee Replacement Surgery Volumes ............... 74
Appendix D: Pre-Operative Tools .................................................. 75
Appendix E: Surgical Tools ........................................................... 76
Appendix F: Post-Operative Tools .................................................. 77
Appendix G: Cross Continuum Tools .............................................. 79
Appendix H: Acronyms ................................................................. 79

List of Figures Tables

Figure 1: National Core Model of Care for Hip and Knee Replacement Surgery ................. 8
Figure 2: Governance Structure for Phase III: Toolkit Development ........................................ 11
Figure 3: Hip and Knee Replacement Surgery Volumes, 2002* .............................................. 19
Figure 4: Provincial/National Orthopaedic Surgeon Rates, 2007* ........................................... 20
Figure 5: Average Length of Hospital .................................................................................. 21
Figure 6: The continuum of hip and knee replacement surgery: implementation .................. 22
Figure 7: The continuum of hip and knee replacement surgery: wait times ......................... 25
Figure 8: The continuum of hip and knee replacement surgery: pre-operative .................. 29
Figure 9: The continuum of hip and knee replacement surgery: surgery .............................. 44
Figure 10: The continuum of hip and knee replacement surgery: post-operative care .......... 53
Figure 11: The continuum of hip and knee replacement surgery: evaluation ......................... 62

Table 1: Teleconferences for Stakeholder* Input in the Development for the Toolkit ......... 13
Table 2: COA Wait-time Benchmark (2005) ....................................................................... 24
Table 3: Alberta Quality Domains for Health ..................................................................... 61
Executive Summary

The Bone and Joint Decade provided a mandate to develop and implement a wait list strategy to improve access to hip and knee replacement surgery. This mandate has been echoed by Bone and Joint Canada (BJC) in its promotion of a new continuum of care for patients undergoing hip or knee replacement surgery that will lead to sustainable improvements in access, quality and efficiency of care.

A number of successful programs for hip and knee replacement surgery have been developed and implemented across the country; however, it was evident that each province is at a different stage in its understanding of the issues associated with wait times for hip and knee replacement surgery and its ability to effectively implement a wait time management program. There was a recognised 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 surgery across Canada. BJC achieved this by 1) building consensus regarding key elements of a national Core Model of Care for 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 hip and knee replacement surgery. It is anticipated that this Toolkit will assist provinces in the development and implementation of the national Core Model of Care.

The development of the Toolkit was led by a steering committee and a group of four coordinators responsible for gathering and synthesizing materials from across the country into a high level model to guide clinical care for hip and knee replacement surgery. This was achieved through a series of national teleconferences that were convened from January 20th, 2009 to March 11th, 2009 to seek input from a number of stakeholder groups regarding the development of the Toolkit. Teleconferences were grouped according to categories of the national Core Model of Care (i.e. pre-operative, surgical, post-operative and evaluation). The first teleconference outlined the purpose and methods of the project and there was a request for submission of tools. The second teleconference outlined key areas of practice within each category of the national Core Model of Care. These were discussed and consensus was reached about these key areas. Participants were asked to submit tools relating to each of the key areas of practice. On the third teleconference, the key areas of practice and the associated tools were discussed and consensus was reached on the relevance of the tools and whether to include them in the final Toolkit Resource Folder.

Due to time constraints associated with this initiative, as well as a paucity of peer reviewed literature with respect to specific tools used in orthopaedic surgery, it was decided that this Toolkit document would be a synthesis of the clinical consensus that was obtained on the teleconferences related to this project. Time was insufficient to conduct a formal consensus review of the Toolkit; so it was decided that the document would not be put forth as a Gold Standard. The Toolkit is aligned with the accompanying Preliminary Literature Review in Support of Toolkit Development that provides a review of the human, English language journals published between the years 2004-2009.
The Toolkit is supported by a Resource Folder on the BJC website (www.boneandjointcanada.com). 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.

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

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

At the March 2009 meeting of the national Hip and Knee Knowledge Translation Network in Toronto, the Toolkit was presented and the key opinion leaders developed next steps and recommendations for use of the Toolkit including:

1. Disseminate and promote the Toolkit
2. Expand the National Network
3. Engage rural and remote primary care providers
4. Ensure sustainability of the Toolkit
5. Develop a Wait Times Toolkit
6. Further develop the National Hip & Knee Surgery Toolkit to ensure best practice
7. Establish a clear funding model for hip and knee replacement surgery

Over the next few months, Bone and Joint Canada will be working with stakeholders and partnering organizations to promote and facilitate the use of the Toolkit and will investigate opportunities to access the funding necessary to move ahead with the identified next steps.

This Toolkit was developed to share processes and resources that may be used by health care administrators and clinical staff wanting to improve patient access to hip and knee replacement surgery. It is meant to act as a guide and reference in the development of a comprehensive Core Model of Care for hip and knee replacement surgery. Further research is needed to develop a “gold standard of care”. 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. Due to the lack of supporting evidence, BJC does not endorse the individual items in the Resource Folder.

From referral to recovery, it is anticipated that this Toolkit will facilitate improved access, quality, efficiency and sustainability for patients engaged in the hip and knee replacement continuum of care.
Introduction

Background

The development of this Toolkit has been an initiative of Bone and Joint Canada, which originated from the Bone and Joint Decade.

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. In April 1998, an inaugural Consensus Meeting was held in Lund, Sweden that resulted in the formation of an International Steering Committee, a consensus document and a plan for continued work for the BJD. On January 13, 2000, the Bone and Joint Decade was formally launched at the headquarters of the World Health Organization in Geneva Switzerland. Today there is representation from 63 countries around the world.

The stated aim of the Bone and Joint Decade 2000 – 2010 is to improve the health-related quality of life for people with musculoskeletal disorders worldwide. This initiative provides a forum for professional organizations, patient advocacy groups, governments, industry, and researchers interested in musculoskeletal disorders to partner, network, and share information. Four key objectives have been identified for the Decade:

- Raise awareness of the growing burden of musculoskeletal disorders on society
- Empower patients to participate in their own care
- Promote cost-effective prevention and treatment
- Advance understanding of musculoskeletal disorders through research to improve prevention and treatment

Canadian endorsement of the Bone and Joint Decade was established in October 2002, when the Honourable Anne McLellan, Federal Minister of Health, proclaimed Canada’s official support for the Bone and Joint Decade. A number of pan-Canadian partnerships and subsequent meetings occurred over the next several years. They were directed at policy development related to standards for prevention and care for bone and joint disease, including arthritis.

Following the 2006 Bone and Joint Decade international meeting in Ottawa, BJD Canada identified five priorities for the latter half of the Decade and beyond:

- Develop and implement a wait time strategy to improve access to hip and knee replacement surgery
- Develop and implement an osteoporosis strategy to enhance the level and consistency of osteoporosis care in Canada
- Develop and implement a musculoskeletal education strategy to enhance the training of health professionals
- Train new clinical investigators with an interest in musculoskeletal research
- Optimize patient involvement in the Bone and Joint Decade
Concurrently, the Alliance for the Canadian Arthritis Program’s (ACAP) 2006 Report from the Summit on Standards for Prevention and Care of Arthritis outlined 12 proposed standards of arthritis care. One of these standards, 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 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”. 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.

To address this burden, Bone and Joint Canada undertook the promotion of a new continuum of care for patients undergoing hip and knee replacement surgery to lead to sustainable improvements in access, quality and efficiency of care. 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. With funding from Health Canada, the Canadian Institutes of Health Research/Institute of Musculoskeletal Health and Arthritis, Alberta Bone and Joint Health Institute, and the Canadian Orthopaedic Foundation, this initiative has consisted of three phases:

**Phase I: Engagement of the National Hip and Knee Knowledge Translation Network**

Phase I was conducted between 2006 and 2007, to engage leading orthopaedic surgeons from across the country, national not-for-profit agencies, hospital administrators, health authorities and provincial government officials. The strategy was founded on the premise that Knowledge Translation Networks are needed in each province to help influence change and to develop sustainable solutions.

**Phase II: Consensus regarding National Core Model of Care**

Phase II was conducted between 2007 and 2008, to examine the features of various models of surgical care for hip and knee replacement surgery across Canada. In April 2008, a meeting was convened that included opinion leaders from across the country. At this meeting, experts in the field determined the key elements of a National Core Model of Care for hip and knee replacement surgery (see Figure 1) that focused on care from referral to recovery and addressed issues of access, quality, efficiency and sustainability.

---

1 Alliance 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.
3 BJC Report Phase I is available in the member’s section of www.boneandjointcanada.com
4 BJC Report Phase II is available in the member’s section of www.boneandjointcanada.com
The results of Phase II led to the recommendation that BJC should lead the compilation and integration of information related to the National Core Model of Care from across the country. Specifically, BJC would develop a Toolkit that could be used by each of the provinces when developing programs of care for hip and knee replacement surgery.

**Phase III: A Toolkit for Hip and Knee Replacement Surgery**

Examples of successful core models of care for hip and knee replacement surgery have been developed and implemented across the country. The initial programs were in Alberta, Ontario and British Columbia. At a meeting hosted by BJC in April 2008, these models were shared with other provinces. Following that meeting, implementation of the model was initiated in Nova Scotia. Initiatives have also been put in place in Newfoundland and Labrador, Manitoba and Saskatchewan. Through the results of the April 2008 meeting, and through interactions with the provinces, Bone and Joint Canada identified that each province is at a different stage in its understanding of the issues associated with wait times for hip and knee replacement surgery and its ability to effectively implement a wait time management program. There was a recognised need for better coordination across systems, more consistent patient care, improved patient satisfaction and cost benefits.

At the April 2008 meeting, feedback from the provinces suggested an opportunity to learn from those provinces that were further along with respect to implementation of the National Core Model of Care. While interest in participating in centralized rollout varied, what remained consistent was interest in the compilation of all the materials amassed to date. Hence, Bone and Joint Canada proposed that Phase III of this initiative would focus on compiling and integrating the various resources that had been developed across the country and that these resources would be included in a comprehensive Toolkit that would be shared nationally. It is anticipated that this Toolkit will assist provinces in the implementation of the National Core Model of Care.
Purpose and objectives

The purpose of this project was to develop a Toolkit that would provide a roadmap for implementation of the National Core Model of Care for the Hip & Knee Replacement Surgery.

The objectives were to:

- Compile available resource materials from the provinces that addressed the key components of the National Core Model of Care for hip and knee replacement surgery
- Consolidate the above resources into an integrated package (Toolkit) to address wait times for hip and knee replacement surgery
- Convene a meeting of the National Hip and Knee Knowledge Translation Network to develop next steps and recommendations for implementation of the Toolkit
- Disseminate the final Toolkit for public availability on the Bone and Joint Canada website (registration required)

Scope

This project was directed at improving care for people requiring primary hip or knee replacement surgery. The scope of this project was the further development of the National Hip & Knee Knowledge Translation Network through the sharing of resources and the promotion of best practice. Funding decisions (including costing and resource allocation) and model implementation were beyond the scope of this project. These items were deferred to the appropriate provincial governments and health authorities.

This Toolkit was designed to serve as a “living document” to establish a baseline for practice for hip and knee replacement surgery. This document is based on informal clinical consensus that was achieved through a series of teleconferences. The Toolkit is aligned with the accompanying Preliminary Literature Review in Support of Toolkit Development that provides a review of the human, English language journals published between the years 2004-2009. It is anticipated that the Toolkit will be updated and revised as practice develops over time.

In developing a Toolkit to address access to primary surgical care for hip and knee replacement surgery across Canada, it was acknowledged that care varied between communities and that resources fluctuated significantly across the country. Consequently, it was not likely that all aspects of the Toolkit would be implemented right away in all parts of the country; however, greater consistency of care across the country was identified as optimal and in the interests of Canadians.

It was also acknowledged that across the country, hospital administrators and clinicians would likely benefit from the sharing of materials and resources that have not been published or researched in the literature. To help guide and support administrative and clinical practice, it was decided that a Resource Folder would be created on the BJC website to enable sharing of these tools (e.g. sample forms, educational materials, care plans and performance indicators). The Toolkit provides a snapshot at this time of hip and knee replacement practices in Canada and the Resource Folder provides a repository of tools that have not yet undergone peer review. In March 2009, these materials were made electronically available to all those that had registered with Bone and Joint Canada (BJC) (www.boneandjointcanada.com).
Governance and Guiding Principles

The development of the Toolkit involved the establishment of a governance structure and guiding principles to direct the collection, inclusion and structure of the Toolkit.

Governance structure

The governance structure for the project was established in late 2008 by members of the National Hip & Knee Knowledge Translation Network. The structure included a Steering Committee, Coordinators and Working Groups (see Figure 2).

Steering Committee: The Steering Committee provided overall direction and support to the project. All members of the National Hip & Knee Knowledge Translation Network were invited to submit nominations for the Steering Committee. A teleconference was convened to select the members of the Steering Committee. In the end, the Steering Committee consisted of 45 members. It was acknowledged that this was a large group; however, given the challenges in scheduling teleconferences to meet the timetables of people from across the country, it was decided that this large group would enable cross country participation for the meetings.

Coordinators: Coordinators were selected by the Steering Committee. Selection was based on involvement to date in the implementation of the National Core Model of Care and representation of the provinces that had demonstrated some success in implementing the core model to date (British Columbia, Alberta, Ontario and Nova Scotia). Four Coordinators were engaged to facilitate the development of the Toolkit; to compile resources and to synthesize the key components of the National Core Model of Care for hip and knee replacement surgery. The information and resources were grouped under the categories of Pre-Operative, Surgical and Post-Operative care, with each section being headed up by one of the coordinators. Evaluation was recognized as a key component of each category and a coordinator was selected to incorporate evaluation in the development of the Toolkit. Each of the four Coordinators led a working group to develop their respective sections of the Toolkit and was responsible for gathering and synthesizing materials from across the country into a high level model to guide clinical care for hip and knee replacement surgery.

Working Groups: The Coordinators convened Working Group teleconferences for each of their corresponding sections of the Toolkit. Recruitment for the Working Group teleconferences was undertaken by all members of the Steering Committee and the Coordinators. They each contacted their associates in the area of Hip and Knee Replacement Surgery and requested that their associates extend the invitation to other appropriate colleagues and acquaintances. In this manner, representatives of surgical programs across Canada were engaged to participate in the development of the Toolkit. National and provincial professional associations for family medicine, orthopaedics, anesthesiology, physiotherapy, occupational therapy and nursing were also invited to participate.
Guiding principles

To guide the development of the Toolkit, the Coordinators and Steering Committee identified overall principles for the project based on the 10 rules for Health Care Reform\(^5\):

- 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

Specific to the Canadian context, the following principles were also identified by the steering committee and the coordinators:

- The model would be built around the patient experience, including the expectation that patients will actively engage in their care and self-management.
- It would focus on primary hip and knee replacement surgery. The sharing of clinical practices would be within the scope of this project; issues relating to funding and local implementation would be outside the scope of this project.
- It would incorporate 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). Relationships within the circle of care would be respected and supported.
- It would link to chronic disease strategies (e.g. Arthritis), which would address the broader issues of prevention and aspects of follow-up care. The full continuum of care relating to primary hip and knee replacement surgery would be considered.
- The model would be based on the premise that ongoing evaluation is necessary to guide system improvements and efficiencies. Included in the Toolkit would be recommended indicators to be used in the evaluation of the hip and knee replacement continuum.

In addition to the above guiding principles, it was agreed that the National Core Model of Care would be incorporated into the development of the Toolkit. In particular there would be a focus on access, quality, efficiency and sustainability from referral to recovery across the hip and knee replacement continuum.

Access: In the presence of an integrated model of care, access is best modulated through the use of a central registry, with centralized processing and decision-making regarding surgical decisions.

Quality: Improvements in quality are driven by focusing on knowledge translation that is linked to best practices and accountability. Care must be safe and effective and must be patient centred.

Efficiency: Care must eliminate waste and leverage the use of resources. There must be built-in mechanisms to study the inputs and the outputs to determine which lead to positive patient outcomes. Costs must be made explicit to drive change.

Sustainability: Involvement across the continuum of care is critical to success. There must be engagement of patients, governments, primary care practitioners, hospital administrators, hospital workers, community workers. Sustainable solutions require predictable, appropriate funding, managed expectations and ongoing evaluation and feedback.
**Toolkit Development**

In order to engage the largest number of people in a short period of time, teleconferencing and electronic communication through email and a web portal were used as the primary means of communication. A series of teleconferences were convened from January 20th, 2009 to March 11th, 2009 to seek input into the development of the components of the Toolkit. Participants were given the option of registering in advance on the website or by email or telephone. Following each teleconference, participants were asked to send an email confirming their participation on the call with their contact information including their place of work and position. Using these emails, we were able to conduct an analysis of representation on each of the calls (i.e. by geographic region and clinical discipline). Each of the teleconferences was recorded, and minutes were prepared (available at [www.boneandjointcanada.com](http://www.boneandjointcanada.com)). Table 1 outlines the teleconferences that were conducted in the development of the Toolkit.

Table 1: Teleconferences for Stakeholder* Input in the Development of the Toolkit

<table>
<thead>
<tr>
<th>CATEGORY OF CALL</th>
<th>NUMBER OF TELECONFERENCES</th>
<th>NUMBER OF PARTICIPANTS</th>
<th>PROVINCIAL AND TERRITORIAL REPRESENTATION*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steering Committee</td>
<td>5**</td>
<td>50</td>
<td>NL, NS, NB, ON, MB, SK, AB, BC</td>
</tr>
<tr>
<td>Coordinators</td>
<td>8**</td>
<td>46</td>
<td>NS, ON, AB, BC</td>
</tr>
<tr>
<td>Pre-Operative Care</td>
<td>3</td>
<td>156</td>
<td>NL, PEI, NS, NB, ON, MB, SK, AB, BC</td>
</tr>
<tr>
<td>Surgical Care</td>
<td>3</td>
<td>85</td>
<td>NL, PEI, NS, NB, ON, MB, AB, BC</td>
</tr>
<tr>
<td>Post-Operative Care</td>
<td>3</td>
<td>180</td>
<td>NL, PEI, NS, NB, QC, ON, MB, AB, BC, NWT</td>
</tr>
<tr>
<td>Evaluation</td>
<td>2</td>
<td>10</td>
<td>ON, MB, AB</td>
</tr>
<tr>
<td>Family Practice</td>
<td>3</td>
<td>7</td>
<td>NS, ON, SK</td>
</tr>
<tr>
<td>Surgeon</td>
<td>3</td>
<td>14</td>
<td>NL, NS, ON, MB, BC</td>
</tr>
</tbody>
</table>

*Stakeholder representation included: Anesthesiologists, BJC Representatives, Educators, Primary care practitioners, Government representatives, Health Care Consultants, Hospital Administrators, Nurses, Occupational Therapists, Operating Room Staff, Orthopaedic Surgeons, Patients, Pharmacists, Physiotherapists, Social Workers, University Affiliates, Wait time representatives † Provincial and Territorial Representation: AB=Alberta; BC=British Columbia; MB=Manitoba; NB=New Brunswick; NL=Newfoundland and Labrador; NWT=Northwest Territories; NS=Nova Scotia; ON=Ontario; PEI=Prince Edward Island; QC=Quebec; SK=Saskatchewan

** Prior to Health Canada funding, there were an additional 3 Steering Committee teleconferences and 3 Coordinators’ teleconferences. These were funded with BJD Canada resources.
Each coordinator held a series of three teleconferences pertaining to their respective category of the National Core Model of Care (i.e. pre-operative, surgical, and post-operative). The first teleconference outlined the purpose and methods of the project and there was a request for submission of tools. The second teleconference outlined key areas of practice within each category of the National Core Model of Care. These were discussed and consensus was reached about these key areas. Participants were asked to submit tools relating to each of the key areas of practice. On the third teleconference, the key areas of practice and the associated tools were discussed and consensus was reached on the relevance of the tools and inclusion in the final Toolkit. All Working Group teleconference materials were made available to all registrants on the website (www.boneandjointcanada.com).

The Coordinator responsible for evaluation participated on the teleconferences for each of the other Working Groups. On each call, issues of evaluation were raised for that section of the Toolkit and a request was made that evaluation tools and indicators be forwarded to the Evaluation Coordinator. These tools were compiled and synthesized, and a list of indicators for each section of the Toolkit was developed. Two meetings were held with evaluation experts from across the country to discuss the suggested indicators from each of the Working Groups and to guide the final selection of indicators for the Toolkit.

Following each of the Working Group teleconferences, each of the Coordinators prepared a draft identifying clinical practice for their section of the Toolkit. These were then discussed with each of the Working Groups and their feedback was taken to the Steering Committee. Several iterations of the components of the Toolkit were shared with the Working Groups and with the Steering Committee. Based on feedback, revisions were made to ensure that the final synthesis reflected practice and addressed varying needs across the country.

A team of two researchers evaluated the development of the Toolkit based on inclusivity, applicability and stakeholder readiness for change. A definition of inclusivity and applicability (including key elements) was determined through a literature review. The Report of the Evaluation Component of Phase III of the Bone and Joint Canada Hip & Knee Surgery Wait Times Strategy may be found on the BJC site (www.boneandjointcanada.com).

A number of Working Group participants and Steering Committee members stated that the wording in the document needed to be consistent with generally accepted principles of scientific literature. For the most part, this Toolkit is based on informal consensus by members of the Steering Committee and of the Working Groups. Where empirical evidence is available, it has been cited in the Toolkit. However, it is acknowledged that additional research is required to validate the recommendations herein.

**Tool selection**

A literature review was conducted to identify the evidence supporting information in this Toolkit. As anticipated, there was a paucity of high level evidence to support specific tools. Tools supported by peer reviewed literature have been cited in the aligned document titled Preliminary Literature Review in Support of Toolkit Development (O’Callaghan, McConnell & Soever) that provides a review of the human, English language journals published between the years 2004-
2009. All relevant tools have been included in the Resource Folder in the member’s section of the website (www.boneandjointcanada.com).

An evidence-based review of all tools found in the Resource Folder was beyond the scope of this project. It was agreed that all relevant tools as identified by the various stakeholders engaged in this project would be included, regardless of whether there was supportive evidence for the tool or not, as there are many clinically relevant tools currently being used across the country that demonstrate appropriate face validity and practical application. The tools, including, those that had not undergone peer reviewed scrutiny, were posted in a Resource Folder on the BJC website (www.boneandjointcanada.com). The tools have been organized in the Resource Folder under the categories of Pre-Operative, Surgical, Post-Operative and Evaluation.

It was recommended that the tools to be included in the Resource Folder meet the following basic criteria:

- Dated no earlier than April 1, 2005
- Available in electronic format
- Consistent with the National Core Model of Care
- Authorization for posting the tool was provided by the contributing site

Registrants to the website have full access to the Resource Folder. Documents may be downloaded and used, provided the source of the tool is appropriately acknowledged in writing.

How to use this toolkit

Two versions of the Toolkit are available. The “full” version is intended to provide detailed guidelines for program development; it is available on the website (www.boneandjointcanada.com) in both English and French. The “short” version is intended to provide a quick reference for the development of clinical programs. It is available in printed copy and on the website in both French and English. Both versions include the following sections; however, the “short” version is abridged.

Provincial Strategies: Hip and 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.

Implementation: This section is intended to guide the development of a plan of care that defines clinical practice, includes input from all stakeholders and manages patient transitions across the continuum.

Wait Times: This section is intended to provide guidance regarding the development of a system to manage the flow of referrals through the system, measure the waiting times and ensure the information is made available to the various stakeholders.
Pre-Operative Care: This section provides recommendations, resources and tools for the essential components of comprehensive pre-operative care for hip and knee replacement patients.

Surgical Care: This section focuses on processes and procedures that are in place to make the surgical journey of the 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 postoperative 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 hip and knee replacement surgery (pre-operative care, surgical care and post-operative care).

Project Evaluation: The development of the Toolkit was evaluated to determine if the process was inclusive, to what extent the end product met the needs and expectations of the participants on the Steering Committee and Working Groups, and stakeholder readiness to adopt processes and principles outlined in the Toolkit.

Project Outcomes & Lessons Learned: This project has demonstrated that there is widespread acceptance of the National Core Model of Care for Hip and Knee Replacement Surgery. However, there is considerable variability in the implementation of that model across Canada.

Each section begins with a schematic overview of the contents, while the remainder of the section provides comprehensive guidelines that are included in the core model of care for hip and knee replacement surgery.

Tools for each section of the Toolkit have been listed in the section, ‘Resource Folder’ on the BJC website (www.boneandjointcanada.com). The documents have been organized into three sections: Pre-Op, Surgery and Post-Op. The documents are then subdivided into province, organization and type. On the website there is also a spreadsheet that lists the documents by name and location and provides a brief description of each of the documents. To locate a specific document simply copy and paste the document name from the spreadsheet into the BJC’s built-in search function. Tools that were not consistent with the National Core Model of Care and those that were outdated or not available electronically were not included in the Resource Folder. Also included in the Toolkit is a section on evaluation that is comprised of indicators and evaluation frameworks relevant to each aspect of the National Core Model of Care.

This Toolkit was developed to share processes and resources that may be used by health care administrators and clinical staff wanting to improve patient access to hip and knee replacement surgery. It is meant to act as a guide and reference for the implementation of the National Core Model of Care for hip and knee replacement surgery. It lacks the necessary evidence to be considered a Gold Standard of Care. The Resource Folder is intended to provide templates to facilitate the development of clinical programs with the benefit of work already initiated across Canada. BJC does not endorse the specific items in the Resource Folder.
Provincial Strategies
Hip and Knee Replacement Surgery

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

Wait list and wait time registries

The 2004 First Minister’s Meeting on the Future of Health Care 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 hip and knee replacement surgery.

In compliance with the First Minister’s Meeting, each province has implemented a wait list coordination system to monitor wait times and wait lists for hip and knee replacement surgery. Some jurisdictions have established access management coordinators to assist with wait time registries. 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.

Wait time measurement

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 health care between 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. There are a few provinces that initiate the wait time on the date that the surgical request is received by the booking department at the hospital where the procedure will take place. Furthermore, there is variation between provinces in the unit of measurement reported: wait times may be reported as either days or weeks. Therefore, conversion to similar units would be necessary in order to accurately compare wait times between jurisdictions.
Summary measures

Provincial accountability through public reporting was agreed upon at the First Minister’s Meeting. Currently, all provinces are using established evidence-based benchmarks for wait time reporting. The benchmark for 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 will 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.

Other strategies

A number of strategies beyond wait time and wait list management systems have been implemented in order to improve access to hip and knee replacement surgery. Some of these include standardization of urgency scales to ensure all residents have equal access to care. Other strategies include investment of health human resources, incorporation of advanced technology and equipment, and increasing surgical resources to build service capacity for patients requiring hip or knee replacement surgery. A few provinces have also implemented public accountability campaigns for patients to have a role in decreasing wait times though cancellation of scheduled appointments, avoiding being on duplicate wait lists and through health promotion and disease prevention initiatives.

Surgical rates

Age standardized rates for hip replacement surgery vary across the country. The province of Quebec has the lowest rate of hip replacement surgery (42.3 per 100,000 population), followed by Newfoundland and Labrador with the second lowest rate at 50.3 per 100,000 population. In contrast, Saskatchewan has the highest rate at 80.8 hip replacement surgery per 100,000 population, followed by Alberta at 75.1 hip replacements per 10,000 population. The remaining provinces have similar rates to the overall national rate (61.5 hip replacements per 100,000 population). See Figure 3.

Overall the national rate of knee replacement surgery is higher than that for hip replacement (75.4 knee replacements per 100,000 population), with a similar distribution across the provinces. Again, Quebec has the lowest rate of knee replacement at 43.7 per 100,000 population, followed by Newfoundland and Labrador at 48.6 knee replacements per 100,000 population and British Columbia at 66.3 per 100,000 population. The remaining provinces have higher rates with the majority of provinces reporting rates from 85.5 per 100,000 population (PEI) to the highest rate of 97.9 per 100,000 population (Manitoba.). See Figure 3.
Figure 3: Hip and Knee Replacement Surgical Rates, 2002*

* Hospital Morbidity Database, CIHI, 2002
Orthopaedic surgeons per population

There is less variation noted when the number of orthopaedic surgeons per 100,000 population is examined. Generally all provinces have between 3 and 4 surgeons per 100,000 population. The exception to this is New Brunswick, with 5 surgeons per 100,000 population. The National Standard 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, New Brunswick is the only province meeting these recommendations. See Figure 4.

Figure 4: Provincial/National Orthopaedic Surgeon Rates, 2007*

* Supply, Distribution and Migration of Canadian Physicians, CIHI, 2007
Average length of stay

The national average length of stay for both hip and knee replacement surgery is 6 days. The province of Ontario demonstrates the shortest average length of stay (5 days) for both hip and knee replacement surgery. The province of Prince Edward Island has the longest average length of stay for hip and knee replacement surgery, at 14 and 11 days respectively. The remaining provinces report 6 to 9 days as their average length of stays for both hip and knee replacement surgery. See Figure 5.

Figure 5: Average Length of Hospital Stay (2005/06)*

* Hip and Knee Replacements in Canada, CIHI, 2007

Appendix A provides a detailed overview of the provincial wait time strategies, a comparison of wait time definition and public reporting mechanisms. Appendix B provides detailed information on surgical rates, orthopaedic surgeons per population and average length of stay. Appendix C presents the provincial volumes of patients who have undergone hip or knee replacement surgery, and, the volumes of patients waiting for hip or knee replacement surgery. As evident from this table, reporting mechanisms vary widely across Canada, making true comparison between provinces difficult.
Implementation

The implementation of the National Core Model of Care for hip and knee replacement 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 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 (see Figure 4):
- Define current and future needs for hip and knee replacement surgery at a Regional level
- 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
- Information is tracked electronically where possible
- Modify practices using a standardized change management protocol

Overview

Figure 6: The continuum of hip and knee replacement surgery: implementation
Define the need for hip and knee replacement surgery

- It is important to define volume needs for 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.

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 organizational governance structure needs to include representation from all health care 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 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.

Information is tracked electronically where possible

- Electronic patient tracking will provide information to measure system performance and may include:
  - Electronic referrals
  - Referral management system
  - Wait time 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 health care management change can be found through the Institute of Healthcare Improvement (IHI) web site at: www.ihi.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.

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.

Table 2: COA Wait-time Benchmark (2005)

<table>
<thead>
<tr>
<th>EMERGENCY CASES</th>
<th>URGENT CASES</th>
<th>SCHEDULED CASES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immediate to 24 hrs</td>
<td>Within 30 days (priority 1)</td>
<td>Consultation: within 3 months</td>
</tr>
<tr>
<td>Within 90 days (priority 2)</td>
<td>Treatment: within 6 months of consultation</td>
<td></td>
</tr>
</tbody>
</table>

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, measure the waiting times and ensure the information is made available to the stakeholders. Recommended practices in wait time management include (see Figure 5):

- 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
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.
  - Wait lists need to be actively managed and validated on an ongoing basis to ensure patients who no longer require the service are removed from the list in a timely fashion, and to ensure wait time data remains accurate.
  - 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 adjust forecasting techniques to incorporate demand patterns not yet seen.

- **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 intake process. Central 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 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. Evidence demonstrates improved surgeon productivity and high patient satisfaction with the addition of these resources.

- **Reporting**
  - Until central intake is fully implemented, the system needs to identify current waiting times of all surgeons. Patients should be provided with the option to be referred to another surgeon (or intake) with a shorter waiting time when there are differences across the system.
  - 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 waiting 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.
  - An environmental scan of systems currently being used is underway and research will be presented within the next year.
  - Electronic waitlists/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**
  - True central intake includes referral screening and standardized assessment and patient education.
  - Until this can be coordinated, a shared waitlist to balance patient waiting 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.

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, Canadian Institute for Health Information (CIHI) estimates 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.

- 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 waiting time. Systems must be consistent regarding which types of delays are included when reporting waiting time. (e.g. System delay vs. Patient-requested delay)

- Policies pertaining to clearance from the waitlists must be in place. For example, after 2 refusals the patient is removed from the list.

Tools for the measurement of waits

- The system needs to measure waits and ensure these are measured against the COA targets of 90 days for Wait 1 and 182 days for Wait 2 for 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 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 chose 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 health care continuum for patients, the public, and policy makers to see and judge. Throughout this document, we see that 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 for us to provide evidence-based research regarding the high-quality of the services we deliver, we must recognize that a large aspect of patient perception of quality is wait time to receive care. We have begun to see how data collection and measurement of wait times are important tools to help us discover better pathways and policies that have benefited our patients. Continued diligence will help us be more proactive in the future, plan long-term supply and demand with more accuracy and prevent wait times from reaching critical levels.


Pre-Operative Care

The hip and knee replacement program needs to ensure access to the health care 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.

These components include (See Figure 6):
- Referral management practices
- Assessment and triage
- Communication with Primary care practitioners
- Preparation for surgery and post-operative care
- Patient optimization
- Education

Overview

Figure 8: 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, ensure they are seeking consultation with an appropriate practitioner and 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

### 1.1.1. Access to the system

- The Primary Care Provider (i.e. family physician, 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 a specific surgeon or hospital, or to the next available surgeon.

- Other forms of access such as self-referral should be considered for patients who do not have a Primary Care Provider.

### 1.1.2. 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
  - Physician 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.

### 1.1.3. 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.

1.1.4. 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

1.1.5. 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 recommendation must be shared to prevent duplication and 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.

1.1.6. 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
- Lower Extremity Functional Scale (LEFS)

**Functional Tests**

- Timed Up and Go (TUG)
- 40 metre walk test
- Stairs test

1.1.7. **Investigations**

- All investigation 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.**

1.1.8. **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

1.1.9. **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.

1.1.10. 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

1.1.11. 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

1.1.12. Continuum of care planning

• The assessment needs to 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 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 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

1.1.13. 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

1.1.14. 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

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)

### 1.1.16. 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

### 1.1.17. 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)
1.1.18. 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

1.1.19. 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
1.1.20. 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 surgery date. Medical issues may include:
  • Cardiac or respiratory conditions
  • Anaemia
  • Psychological status (e.g. depression)
  • Relevant co-morbidities

1.1.21. 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

1.1.22. 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.

1.1.23. 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.

1.1.24. 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. Weight watchers, The Arthritis Society, 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.

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
1.1.25. 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.

1.1.26. Education Format

- Educational materials that are available in written format help to ensure 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.
1.1.27. Education content

- Patient education should address all information needs.
- Education should address the entire continuum of care and ensure consistent messaging from all health care 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 health care 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 anticoagulation
    - 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

1.1.28. 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.

1.1.29. 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.

Surgical Care

The journey of the surgical patient should be seamless. To support this flow across the joint replacement care continuum, the team of health care 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 health care 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 Health Care 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 Health Care Now Website (Surgical Site Infection), [http://www.saferhealthcarenow.ca/EN/Pages/default.aspx](http://www.saferhealthcarenow.ca/EN/Pages/default.aspx)
- Institute for Healthcare Improvement Website (Pausing for Safety), [http://www.ihi.org/IHI/](http://www.ihi.org/IHI/)

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 waitlist 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 waitlist 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 hip and knee replacement patients, along with resources and tools for implementation. These components will include (see Figure 7):

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

Overview

Figure 9: The continuum of hip and knee replacement surgery: surgery

Medical preparation for surgery

Medical preparation of the patient for surgery is an important part of the patient 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

1.1.30. Coordination with Assessment and Triaging

To facilitate seamless patient flow, medical preparation of 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.
1.1.31. 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.

1.1.32. 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.

1.1.33. 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

1.1.34. 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 maximize 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 waitlist management, OR scheduling, SPD procedure card generation and surgical schedule distribution.

1.1.35. 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.

**1.1.36. 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.

**1.1.37. 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 were possible to facilitate efficiency and patient flow.
- All patients need to have the correct site identified and initialed 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.

**1.1.38. Transfer to OR**

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

**1.1.39. Induction Rooms**

- Where patient volume and resources such as space, equipment and anaesthesiologists allow, induction or block rooms may be utilized.
• 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.

1.1.40. 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.

1.1.41. 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.
1.1.42. 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.

1.1.43. 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.

1.1.44. 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.

1.1.45. Transfer to PACU

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

1.1.46. Two OR Model

Facilities may adopt a two OR model to increase the number of 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 OT 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.

1.1.47. 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-anaestetic 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.

1.1.48. 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.

1.1.49. 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.
1.1.50. 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

1.1.51.

1.1.52. 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.

1.1.53. 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.
1.1.54. 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.

1.1.55. 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.

1.1.56. 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.
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 (see Figure 8):

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

Overview

Figure 10: The continuum of hip and knee replacement surgery: post-operative 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 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 anticoagulation therapy
- Established pain management regimes
- Standardization of clinical practice
- Interdisciplinary teams to facilitate discharge planning
- Targeted length of stay

1.1.57. 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.

1.1.58. Implementation of national standards of anticoagulation 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 anticoagulation medications.
- Further research on the efficacy and effectiveness of new oral anticoagulation protocols needs to be considered in the management of this complication.

1.1.59. Established pain management regimes

- Pain management is imperative in the care of the joint replacement population. There is suggestive evidence that supports the use of multimodal pain management to maximize patient outcomes. 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.

1.1.60. 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 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 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.
- 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.
- Optimal ROM (>90°) for total knee replacement patients can be acquired through active exercise therapies.
- 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.
1.1.61. 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.

1.1.62. 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 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.

1.1.63. 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.

1.1.64. 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.

1.1.65. Outpatient Physiotherapy

There is limited outpatient physiotherapy available through the publicly funded system; however, many patients continue therapy through a private care provider.

• 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.

1.1.66. 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.
1.1.67. Access to Ongoing Education

- Up to and beyond one year following surgery, both 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.

1.1.68. Availability and access of services based on geographical location

- Access to programs and resources can vary by geographic location (urban, rural or remote). Health care 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)

1.1.69. 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 health care team members, as necessary.

1.1.70. 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.

1.1.71. 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.

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.

Without the concurrent implementation of a comprehensive and feasible evaluation framework for monitoring KPIs, it is difficult to assess the success or gaps after the implementation of a hip and knee replacement model of care (from referral to post-operative recovery). Therefore, the goal of the evaluation component of the Bone and Joint Canada initiative was to identify and
recommend an evaluation framework of KPIs that would assess and guide improvements after the implementation of the National Core Model of Care Toolkit for Hip and Knee Replacement Surgery. The foundation for the development of the evaluation framework ensured the recommendation of KPIs that are quantifiable and critical to the goal of addressing access to surgical care for hip and knee replacement surgery.

Identification of key performance indicators

Working group participants from each of the three clinical working groups (pre-operative, surgical and post-operative) were asked to provide information regarding the indicators and measurements they had previously and/or were currently undertaking for hip and knee replacement performance evaluation. Requests for indicator benchmarks were obtained when known or applicable. The indicators were synthesized into a complete list and were categorized in accordance with the Dimensions of Quality within the Alberta Quality Matrix of Health [http://www.hqca.ca](http://www.hqca.ca) (Table 3). Such an approach to the evaluation of a hip or knee replacement model of care was applied in the Alberta Hip and Knee Replacement Pilot Project to ensure that improvements in one dimension of quality (e.g. improved efficiency), were not at the compromise of other dimensions. In subsequent meetings, the working group participants noted other pertinent indicators. Once the completed list was obtained and agreed to, the indicators were prioritized by the working groups, relative to their importance. At the completion of this exercise, the synthesized lists were reviewed by the Evaluation Working Group. This group consisted of experienced evaluation experts, who identified what indicators should be included and should comprise the overall evaluation framework for the Toolkit. The Evaluation Working Group also provided additional recommendations regarding measurement methods and reporting the scope for each indicator. The final list of KPIs recommended for the evaluation framework include those that are necessary, as well as those, while important, are not as critical to the evaluation framework, due to issues of capacity and limitations in some areas (see Figure 9). For providers to obtain a comprehensive evaluation of the performance of their model for hip and knee replacement care, it is recommended that the KPIs listed in the evaluation framework be assessed accordingly.

Table 3: Alberta Quality Domains for Health

<table>
<thead>
<tr>
<th>QUALITY DOMAIN</th>
<th>DEFINITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acceptability</td>
<td>Health services are respectful and responsive to user needs, preferences and expectations</td>
</tr>
<tr>
<td>Accessibility</td>
<td>Health services are obtained in the most suitable setting in a reasonable time and distance</td>
</tr>
<tr>
<td>Appropriateness</td>
<td>Health services are relevant to user needs and are based on accepted or evidence-based practice</td>
</tr>
<tr>
<td>Effectiveness</td>
<td>Health services are provided based on scientific knowledge to achieve desired outcomes</td>
</tr>
<tr>
<td>Efficiency</td>
<td>Resources are optimally used in achieving desired outcomes</td>
</tr>
<tr>
<td>Safety</td>
<td>Mitigate risks to avoid unintended or harmful results</td>
</tr>
</tbody>
</table>
The KPIs recommended as a result of this project are inter-related and it is anticipated that improvements in all of the KPIs could result in a national reduction in waiting times for 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 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

Figure 11: The continuum of 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**

1.1.72. **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.
1.1.73. Surgical Yield
Surgical yield is defined as the percentage of orthopaedic 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.

1.1.74. 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 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.

1.1.75. 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.

1.1.76. Compliance with pre-operative 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 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 key performance indicators

A total of 8 KPIs were recommended for the surgical component of the Toolkit, of which 5 are considered necessary (indicated in bold). These include:

- Wait Time 2
- Acute Care Length of Stay (LOS)
- 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

1.1.77. 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.

1.1.78. 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, it is suggested that the KPI be stratified by patients discharged home versus those discharged to another destination.

1.1.79. 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. If collected, recommendations for the scope of reporting are the same for the acute care LOS KPI.

1.1.80. 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.

1.1.81. Acute Care Adverse Events (AEs)

Acute Care AEs are any unexpected or undesirable events occurring during the acute care stay for 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.

1.1.82. 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.

1.1.83. 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.

1.1.84. 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-operative key performance indicators
A total of 4 KPIs were recommended for the Post-operative component of the Toolkit, of which 2 are considered necessary (indicated in bold). These include:

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

1.1.85. 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.

1.1.86. 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 hip and knee replacement care. Post-operative AEs are a measure of Safety.

1.1.87. 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.

1.1.88. 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.

Project Evaluation

The development of the Toolkit was evaluated to determine if the process was inclusive, to what extent the end product met the needs and expectations of the participants on the Steering Committee and Working Groups, and readiness to adopt processes and principles outlined in the Toolkit.

The results can be found in the Report on the Evaluation Component of the Phase III of the Bone and Joint Canada Hip & Knee Surgery Wait Times Strategy that was prepared by Leslie Soever and Lynda O’Callaghan. The report can be downloaded from the website (www.boneandjointcanada.com).
Project Outcomes and Lessons Learned

This project has demonstrated that there is widespread acceptance of the National Core Model of Care for Hip and Knee Replacement Surgery. However, there is considerable variability in the implementation of that model across Canada.

Outcomes:

- Using an informal networking model, our team was able to actively engage stakeholders from across Canada.
- Using an informal consensus approach, those stakeholders provided input to the development of the Toolkit and contributed to the amalgamation of tools into an online Resource Folder. They identified Key Performance Indicators for the ongoing evaluation of the National Core Model of Care for Hip & Knee Replacement Surgery.

Lessons learned:

- Engagement of stakeholders in the process of change was as important as the synthesis of the final document and the compilation of resources.
- The Toolkit has value as a snapshot of care at this point in time. As such, it outlines where there is a lack of evidence to support the Model.
- The groundwork has been laid for this Toolkit to serve as a “living document”. A plan is needed to ensure that the Toolkit is updated on a regular basis. In this way, it has the potential to enhance consistency of care, to guide research and to ultimately develop into an evidence-based Gold Standard of Care.
- When involving clinicians in the field as key drivers of such a project, longer timelines are needed. The extremely short timelines meant that the leaders of the project had to defer other work demands, which imposed additional stress.

Indicators of success:

The ultimate success of this project will be based on:

- How broadly the Toolkit is disseminated across the country. This will be based on registrations to the website (www.boneandjointcanada.com) and activity on the site (e.g. downloading of reports and tools).
- The degree to which surgical centres across the country implement the National Core Model of Care. The Steering Committee indicated that there is risk of failure if centres implement only parts of the model. Therefore, success will be related to the number of centres implementing the model and the degree of completeness of those implementations.
- The use of wait time measurement methodologies to track performance and to plan capacity. This will be based on the adoption of Key Performance Indicators and the implementation of systems to match supply and demand to prevent wait times from reaching critical levels.
Summary and Future Recommendations

Summary

The Bone and Joint Decade provided a mandate to develop and implement a wait list strategy to improve access to hip and knee replacement surgery. This mandate has been echoed by Bone and Joint Canada in its promotion of a new continuum of care for patients undergoing hip or knee replacement surgery that will lead to sustainable improvements in access, quality and efficiency of care.

Across Canada there exists variation in wait time management strategies, surgical rates, availability of orthopaedic surgeons, and care processes for hip and knee replacement surgery. A number of successful programs of care for hip and knee replacement surgery have been developed and implemented across the country; however, it is evident that each province is at a different stage in its understanding of the issues associated with wait times for hip and knee replacement surgery and its ability to effectively implement a wait time program. Therefore, this project attempted to address this need and provide a roadmap for the implementation of the National Core Model of Care for Hip and Knee Replacement Surgery.

This was achieved through the compilation of available resource materials from the provinces that address the key components of the National Core Model of Care for hip and knee replacement surgery. This material was consolidated into an integrated Toolkit to address wait times for hip and knee replacement surgery. This Toolkit provides comprehensive guidelines and resources for hip and knee replacement surgery that is a planned approach, which meets the needs of patients within the local community and incorporates stakeholder input through the development, implementation and performance monitoring stages of the program.

Specifically the Toolkit provides a method to manage the flow of referrals through the system, measure wait times and to ensure meaningful information is made available to stakeholders. There is emphasis that such a system should be streamlined so that surgical patients can be identified effectively through an interdisciplinary assessment, while ensuring equitable access through activities that assess and identify surgical candidates, and ensure patients are educated and prepared to undergo hip or knee replacement surgery. Furthermore, coordinated processes and procedures need to be established to create a seamless environment for the patient, making the surgical journey effective, efficient and safe. In addition, post-operative care, including rehabilitation, needs to involve community resources and interdisciplinary teams that effectively communicate and utilise standardized information through electronic and centralised processes. Lastly, Key Performance Indicators are outlined to compare performance, set targets, promote improvements and monitor performance. This will enhance the ability to effectively target areas for change and guide improvements after the implementation of the National Core Model of Care Toolkit for Hip and Knee Replacement Surgery.
Future recommendations

At the March 2009 meeting of the National Hip and Knee Knowledge Translation Network in Toronto, the Toolkit was presented and the key opinion leaders developed next steps and recommendations for use of the Toolkit including:

1. **Disseminate and promote the Toolkit:**

   To facilitate use of the Toolkit and to improve clinical practice, dissemination and marketing of the Toolkit and resources is required across the country through all the individuals who supported its development. Uptake will be enhanced through identification of local champions to promote its use to government, health care administrators, surgeons, clinical teams, primary care providers, and the public at large.

2. **Expand the National Network:**

   Continue to develop a National Network to promote sharing of clinical practices and build on the learnings at a local, regional and provincial level

3. **Engage rural and remote primary care providers:**

   Continue to engage primary health care providers and allied health practitioners, with greater representation from rural and remote communities to promote and stimulate cross country networking and to ensure comprehensiveness applicability and utility of the Toolkit.

4. **Develop tools for primary care practitioners:**

   Develop tools to assist primary care physicians in the management of surgical patients both pre operatively and following their surgery to maximize the patient’s functional recovery.

5. **Ensure sustainability of the Toolkit:**

   The Toolkit is meant to be a “living” document that will require ongoing maintenance to provide the most up-to-date resources related to hip and knee replacement surgery. In order to ensure the sustainability of this endeavour, appropriate funding, stewardship and promotion of the Toolkit will be required.

6. **Develop a Wait Times Toolkit:**

   A separate Toolkit is currently being developed which provides many of the tools required to develop and utilize a wait time management system that includes capacity planning and modeling.
7. Further develop the National Hip & Knee Surgery Toolkit to ensure best practice:

A comprehensive international review of articles with direct relevance to the Toolkit would help to address the paucity of evidence.

A formal evaluation of the systems and the results following implementation would be of benefit to measure the impact of the Toolkit’s use in the field. Phase III of this project established face validity (i.e. key opinion leaders determined that the Toolkit will likely be effective).

8. Facilitate and refine data collection:

A number of indicators have been identified for evaluation of clinical practice related to the National Core Model of Care. These indicators can be further refined through clearer definitions to allow for local, regional and provincial data comparison.

9. Establish a clear funding model for hip and knee replacement surgery:

Funding should be based on a sound business model that clearly identifies the necessary human and financial resources and follows the patient across the care continuum. This will ensure access to efficient quality care for hip and knee replacement surgery.

Over the next few months, Bone and Joint Canada will be working with stakeholders and partnering organizations to promote and facilitate the use of the Toolkit and will investigate opportunities to access the funding necessary to move ahead with the identified next steps.

On behalf of the Steering Committee and the Working Groups, the authors would like to thank the sponsors of this project: Health Canada, the Institute of Musculoskeletal Health and Arthritis, the Alberta Bone and Joint Health Institute and the Canadian Orthopaedic Foundation.
## Appendix A: Provincial Wait Time Strategies

<table>
<thead>
<tr>
<th>Provinces†</th>
<th>NL</th>
<th>PEI</th>
<th>NS</th>
<th>NB</th>
<th>QC</th>
<th>ON</th>
<th>MB</th>
<th>SK</th>
<th>AB</th>
<th>BC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wait list / wait time management system</strong></td>
<td>Managed within each regional health authority. Provincially established wait time metrics are collected and reported to the Office of the Provincial Wait Time Coordinator, Department of Health and Community Services on a quarterly basis</td>
<td>Managed by individual surgeon and department managers at each institution. Building on current electronic systems to manage patient information for hospital services. Strategic goals include: accountability; access management; system design; communication, and evaluation. Target of 90% within national benchmark of 26 weeks by 2010/11</td>
<td>Data on wait times collected from each district. Central registry planned for future. Invest in the right equipment, the right services and the right people. Patient accountability to help improve wait times (canceling scheduled appointments; avoiding being on duplicate wait lists; health promotion, disease prevention).</td>
<td>Provincial surgical access registry for all patients waiting for surgery since January 2008. Access managers in each of the 8 Zones across the province.</td>
<td>6 month guarantee for hip and knee replacement surgery, with alternative offer if the 6 months cannot be respected. Central access management system to standardize the measurement of wait times and monitor individual patients on the waiting list.</td>
<td>Overall aims of the wait time strategy are to increase the number of procedures; invest in new, more efficient technology; standardize best practices; collect and report accurate and up-to-date data on wait times. The wait time strategy outlines accountability, access management, capacity, evaluation, communication.</td>
<td>Manitoba wait time information system. Investment in technology, additional surgeries, diagnostic testing, health professionals, prevention and health promotion, improved wait list management. Patient accountability: waiting as part of your care; making the most of health care resources (missed appointments, demand for tests and technology, health promotion and disease prevention).</td>
<td>Patient Assessment Process to standardize assessment of urgency of surgery. Surgical Patient Registry to improve management of surgical access, system capacity, resource requirements. Targeted funding for additional hip and knee replacements. Health human resource initiatives to increase the number of nursing positions and nursing education seats.</td>
<td>Alberta Waitlist Registry. All cases to be completed within 20 weeks.</td>
<td>Surgical Patient Registry.</td>
</tr>
<tr>
<td><strong>Wait time definition</strong></td>
<td>Wait time starts at decision to treat and ends when patient receives service. Measured in calendar days.</td>
<td>Wait time starts at booking of surgery and ends when patient receives service. Measured in days.</td>
<td>Wait time starts at decision to treat and ends when patient receives service. Measured in calendar days.</td>
<td>Wait time starts when the request for surgery is received at the booking office and ends when patient receives service.</td>
<td>Wait time starts at decision to treat and ends when patient receives service. Measured in calendar days.</td>
<td>Wait time starts at decision to treat and ends when patient receives service.</td>
<td>Wait time starts at booking of surgery and ends when patient receives service.</td>
<td>Wait time starts at decision to treat and ends when patient receives service.</td>
<td>Wait time starts when the booking is received at the hospital and ends when the surgery is performed.</td>
<td></td>
</tr>
<tr>
<td>Public reporting mechanism</td>
<td>Reported quarterly on the Gov't web site on a quarterly basis by regional health authority. Wait time metrics collected:</td>
<td>Volume of cases completed</td>
<td>Quarterly reports on the percentage of patients who received surgery within 60, 180, 270, 360, and 540 days. Reports available by province.</td>
<td>Reported quarterly to the public. Hip and knee benchmarks are reported provincially by median, 90th percentile, and percent completed within benchmark.</td>
<td>Data on median and average wait times, 90th percentile, percent completed within target, change in current versus baseline data (from 2005). Reports available by province, health region and facility.</td>
<td>Monthly reporting on median wait times. Number of total joint surgeries performed, percent of cases performed within benchmark, median wait time, 90th percentile, number of cases waiting, % cases waiting beyond benchmark. Reports available by province, health region, facility and by physician.</td>
<td>Number of cases performed, percent of cases performed within benchmark. Reports available by province, health region, facility and by physician.</td>
<td>Median wait times. Number waiting beyond benchmark. Reports available by province, by institution and by physician.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------------</td>
<td>---------------------------------------------------------------</td>
<td>--------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>*Percent within 182 day benchmark, Volume of new referrals. Number waiting as of end of quarter. Median wait time for completed cases.</td>
<td>Mean, median, minimum, maximum and 90th percentile of wait times. Reports available by province and health region.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Data sources include provincial wait times websites, provincial representatives of the Bone and Joint Canada Hip and Knee Surgery Wait Times Initiative and CIHI.
†AB=Albert; BC=British Columbia; MB=Manitoba; NB=New Brunswick; NL=Newfoundland and Labrador; NS=Nova Scotia; ON=Ontario; PEI=Prince Edward Island; QC=Quebec; SK=Saskatchewan
## Appendix B: Hip and Knee Replacement Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Provinces†/Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Hip replacement* (per 100 000 population)*</td>
<td>NL    PEI   NS    NB    QC    ON    MB    SK    AB    BC    Canada</td>
</tr>
<tr>
<td></td>
<td>50.3  71.8  69.8  63.1  42.3  67.2  67.4  80.8  75.1  64.8  61.5</td>
</tr>
<tr>
<td>* Knee replacement* (per 100 000 population)*</td>
<td>48.6  85.5  97.5  90.5  43.7  90.2  97.9  89.5  93.9  66.3  75.4</td>
</tr>
<tr>
<td>Number of orthopaedic surgeons per 100 000 population‡</td>
<td>4     3     3     5     4     3     3     3     4     4     4</td>
</tr>
<tr>
<td>Average Length of Hospital Stay for Hip Replacement (2005/2006) - Males⁸</td>
<td>8     14‡   9     9     9     6     9     8     7     6     7</td>
</tr>
<tr>
<td>Average Length of Hospital Stay for Hip Replacement (2005/2006) - Females⁸</td>
<td>11    19‡  9     11    11    7     14    8     8     8     8</td>
</tr>
<tr>
<td>Average Length of Hospital Stay for Knee Replacement (2005/2006) - Males⁸</td>
<td>8     11‡  7     7     9     5     8     7     6     6     6</td>
</tr>
<tr>
<td>Average Length of Hospital Stay for Knee Replacement (2005/2006) - Females⁸</td>
<td>8     14‡  7     8     9     5     9     8     6     6     6</td>
</tr>
</tbody>
</table>

* Age standardized rates
† AB=Albert; BC=British Columbia; MB=Manitoba; NB=New Brunswick; NL=Newfoundland and Labrador; NS=Nova Scotia; ON=Ontario; PEI=Prince Edward Island; QC=Quebec; SK=Saskatchewan
‡ PEI’s measurement of average length of hospital stay includes inpatient rehabilitation length of stay.

---

*6 Hospital Morbidity Database, CIHI, 2002
7 Supply, Distribution and Migration of Canadian Physicians, CIHI, 2007
8 Hip and Knee Replacements in Canada, CIHI, 2007*
### Appendix C: Hip & Knee Replacement Surgery Volumes

<table>
<thead>
<tr>
<th>Province</th>
<th>Reporting Time Frame</th>
<th>Number completed</th>
<th>Number† waiting / % complete</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total Hip Replacement</td>
<td>Total Knee Replacement</td>
</tr>
<tr>
<td>Newfoundland and Labrador</td>
<td>January - March 2008</td>
<td>80</td>
<td>164</td>
</tr>
<tr>
<td>Prince Edward Island</td>
<td>October 2007- March 2008</td>
<td>59</td>
<td>106</td>
</tr>
<tr>
<td>Nova Scotia</td>
<td>2007-08 (fiscal year)</td>
<td>828</td>
<td>1158</td>
</tr>
<tr>
<td>New Brunswick</td>
<td>January - December 2008</td>
<td>543</td>
<td>1020</td>
</tr>
<tr>
<td>Québec</td>
<td>2005-2006</td>
<td>4454</td>
<td>5862</td>
</tr>
<tr>
<td>Ontario</td>
<td>September - December 2008</td>
<td>Data not available</td>
<td>Data not available</td>
</tr>
<tr>
<td>Manitoba</td>
<td>2007/08 (fiscal year)</td>
<td>1105</td>
<td>1932</td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>April - September 2008</td>
<td>498</td>
<td>818</td>
</tr>
<tr>
<td></td>
<td></td>
<td>56% completed within 26 weeks</td>
<td>Median wait time=155 days</td>
</tr>
<tr>
<td>Alberta</td>
<td>90 days preceding September 30, 2008</td>
<td>608</td>
<td>877</td>
</tr>
<tr>
<td></td>
<td></td>
<td>56% completed within 26 weeks</td>
<td>Median wait time=15.6 weeks</td>
</tr>
<tr>
<td>British Columbia</td>
<td>3 months ending December 31, 2008</td>
<td>1093</td>
<td>1695</td>
</tr>
</tbody>
</table>

*Information for this table was provided by working group members representing the various provinces, or was gathered from provincial websites.
†Not all provinces provide the number waiting for surgery. Where the number of surgery is not available, other metrics of wait lists and wait times are provided.
## Appendix D: Pre-Operative Tools

<table>
<thead>
<tr>
<th>Document Name</th>
<th>Document Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anemia_cards_march07_outlines.jpg</td>
<td>Education</td>
</tr>
<tr>
<td>Atologous donation fact sheet.pdf</td>
<td>Education</td>
</tr>
<tr>
<td>NL - Eastern Health - Preparation for Total Knee Replacement Surgery.PDF</td>
<td>Patient Education</td>
</tr>
<tr>
<td>NL - Eastern Health Ortho Ax Record.PDF</td>
<td>Patient Education</td>
</tr>
<tr>
<td>Patient Guide for Total Knee Replacement Sept 08.pdf</td>
<td>Patient Education</td>
</tr>
<tr>
<td>OASIS assessment form - client.pdf</td>
<td>Assessment Sheet</td>
</tr>
<tr>
<td>OASIS assessment form - clinician.pdf</td>
<td>Assessment Sheet</td>
</tr>
<tr>
<td>OASIS Bathroom Safety-Grab Bars.pdf</td>
<td>Patient Education</td>
</tr>
<tr>
<td>OASIS Before During After Surgery Pt Handbook.pdf</td>
<td>Patient Education</td>
</tr>
<tr>
<td>OASIS Cane Brochure.pdf</td>
<td>Patient Education</td>
</tr>
<tr>
<td>OASIS checklist_surgery.pdf</td>
<td>Patient Education</td>
</tr>
<tr>
<td>OASIS DVD Managing Your OA.pdf</td>
<td>Patient Education</td>
</tr>
<tr>
<td>OASIS Hip Precautions.pdf</td>
<td>Patient Education</td>
</tr>
<tr>
<td>OASIS Hip Surgery.pdf</td>
<td>Patient Education</td>
</tr>
<tr>
<td>OASIS info_sheet_prehab_educ.pdf</td>
<td>Patient Education</td>
</tr>
<tr>
<td>OASIS info_sheet_preop_educ.pdf</td>
<td>Patient Education</td>
</tr>
<tr>
<td>OASIS Knee_Surgery.pdf</td>
<td>Patient Education</td>
</tr>
<tr>
<td>OASIS Managing Pain Flare Up.pdf</td>
<td>Patient Education</td>
</tr>
<tr>
<td>OASIS physician referral form.pdf</td>
<td>Referral Form</td>
</tr>
<tr>
<td>OASIS Pre Hab Education Info.pdf</td>
<td>Patient Education</td>
</tr>
<tr>
<td>OASIS Pre Op Education Info.pdf</td>
<td>Patient Education</td>
</tr>
<tr>
<td>OASIS_pre_hab_presentation.pdf</td>
<td>Patient Education</td>
</tr>
<tr>
<td>OASIS_pre_op_presentation.pdf</td>
<td>Patient Education</td>
</tr>
<tr>
<td>OASIS return_to_work.pdf</td>
<td>Patient Education</td>
</tr>
<tr>
<td>OASIS surgery equipment list.pdf</td>
<td>List and Description of Surgery Equipment</td>
</tr>
<tr>
<td>OASIS Surgery Info.pdf</td>
<td>Patient Education</td>
</tr>
<tr>
<td>OASIS Telephone Assessment Form.pdf</td>
<td>Assessment Sheet</td>
</tr>
<tr>
<td>Holland-Centre-Patient-Guide.pdf</td>
<td>Patient Education</td>
</tr>
<tr>
<td>Surgical Patient Information - Aug 1-07.pdf</td>
<td>Patient Information Sheet</td>
</tr>
<tr>
<td>VIHA Education Class PT Script.doc</td>
<td>Patient Education</td>
</tr>
<tr>
<td>VIHA Education Class RN Instruction Sheet.doc</td>
<td>Patient Education</td>
</tr>
<tr>
<td>VIHA Responsibilities before Total Hip July 7 2008.doc</td>
<td>Patient Education</td>
</tr>
<tr>
<td>VIHA Responsibilities before Total Knee July 8, 2008.doc</td>
<td>Patient Education</td>
</tr>
<tr>
<td>VIHA Template_Pre-op Home Ax.doc</td>
<td>Patient Education</td>
</tr>
<tr>
<td>VIHA Therapy Assessment Form.doc</td>
<td>Assessment Sheet</td>
</tr>
</tbody>
</table>
## Appendix E: Surgical Tools

<table>
<thead>
<tr>
<th>Document Name</th>
<th>Document Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autologous donation PBMP process.pdf</td>
<td></td>
</tr>
<tr>
<td>ID patients PACSDAlgorithm2nov06.pdf</td>
<td></td>
</tr>
<tr>
<td>IV IRON Pamphlet QUEII FINAL.Feb07.pdf</td>
<td></td>
</tr>
<tr>
<td>Less than 48 hours notice.doc</td>
<td>Surgery Form</td>
</tr>
<tr>
<td>newLoanedEquipmentss01015.doc</td>
<td>Manual</td>
</tr>
<tr>
<td>PARR Discharge Criteria yellowknife.doc</td>
<td>Process Document</td>
</tr>
<tr>
<td>Perioperative blood management program.pdf</td>
<td></td>
</tr>
<tr>
<td>Sunnybrook MSK_CarePathK.pdf</td>
<td>Care Path</td>
</tr>
<tr>
<td>Surgical processAlgorithmnov06.pdf</td>
<td></td>
</tr>
<tr>
<td>TAP 8-Joint OR Day Process and Tools.pdf</td>
<td>Form</td>
</tr>
<tr>
<td>TAP Booking Policy and Tools.pdf</td>
<td>Form</td>
</tr>
<tr>
<td>TAP Process Map and Dictionary.pdf</td>
<td>Process Map</td>
</tr>
<tr>
<td>TAP Toolkit Main Document.pdf</td>
<td>Process Document</td>
</tr>
<tr>
<td>VCH Flash Sterilization Policy.pdf</td>
<td>Policy</td>
</tr>
<tr>
<td>VCH Loaner Sets Policy.pdf</td>
<td>Policy</td>
</tr>
<tr>
<td>VCH pref card sample.pdf</td>
<td>List</td>
</tr>
<tr>
<td>VCH Surgical Site Marking - Time Out Policy.pdf</td>
<td>Policy form</td>
</tr>
<tr>
<td>VCH TRH Final OR Surgery Schedule Review Form.pdf</td>
<td>Form</td>
</tr>
<tr>
<td>VCH TRH OR Booking Form.pdf</td>
<td>Form</td>
</tr>
<tr>
<td>VCH TRH OR Record.pdf</td>
<td>Form</td>
</tr>
<tr>
<td>VCH TRH Patient Admission Questionnaire.pdf</td>
<td>Form</td>
</tr>
<tr>
<td>VCH TRH Perianaesthesia Record.pdf</td>
<td>Form</td>
</tr>
<tr>
<td>VCH TRH Pre-Operative Orders.pdf</td>
<td>Form</td>
</tr>
<tr>
<td>VCH TRH Sample OR Block Allocation.pdf</td>
<td>Form</td>
</tr>
<tr>
<td>VCH TRH Tentative OR Surgery Schedule Review Form.pdf</td>
<td>Form</td>
</tr>
<tr>
<td>VCH TRH Two OR Algorythm.pdf</td>
<td>Algorythm</td>
</tr>
<tr>
<td>VCH VA Patient Preop Questionnaire.pdf</td>
<td>Patient Questionnaire</td>
</tr>
<tr>
<td>VIHA allocation methodology.example for BJC.PPT</td>
<td>Examples</td>
</tr>
</tbody>
</table>
## Appendix F: Post-Operative Tools

<table>
<thead>
<tr>
<th>Document Name</th>
<th>Document Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inpatient Record.pdf</td>
<td>Form Inpatient Rehab</td>
</tr>
<tr>
<td>Inpatient Discharge Information.pdf</td>
<td>Form Discharge</td>
</tr>
<tr>
<td>Sub acute Record.pdf</td>
<td>Form Inpatient Rehab</td>
</tr>
<tr>
<td>Two Week Post Operative Visit.pdf</td>
<td>Form Follow Up</td>
</tr>
<tr>
<td>Post-op Physical Therapy Referral_Report.pdf</td>
<td>Form Follow Up</td>
</tr>
<tr>
<td>Six Week Post Operative Visit.pdf</td>
<td>Form Follow Up</td>
</tr>
<tr>
<td>Twelve Week Post Op Visit.pdf</td>
<td>Form Follow Up</td>
</tr>
<tr>
<td>Hip Evaluation Post.pdf</td>
<td>Form Follow Up</td>
</tr>
<tr>
<td>Knee Evaluation Post.pdf</td>
<td>Form Follow Up</td>
</tr>
<tr>
<td>Referring Physician Post-Op Report.pdf</td>
<td>Form Follow Up</td>
</tr>
<tr>
<td>1 Year Post-Operative Patient Questionnaire.pdf</td>
<td>Form, post op report</td>
</tr>
<tr>
<td>One Year Post-Op Visit.pdf</td>
<td>Form Follow Up</td>
</tr>
<tr>
<td>Prosthesis Monitoring.pdf</td>
<td>Form Follow Up</td>
</tr>
<tr>
<td>Post -op Order Set for hip replacement_rev0608_.pdf</td>
<td>Orders</td>
</tr>
<tr>
<td>Post op Knee Order Set for Knee Replacement_rev0608.pdf</td>
<td>Orders</td>
</tr>
<tr>
<td>ABJHI H&amp;K Care Path- Recovery.pdf</td>
<td>Care Path</td>
</tr>
<tr>
<td>Copy of Post op Arthroplasty Total Hip and Knee.XLS- Stevenson.XLS</td>
<td>Orders</td>
</tr>
<tr>
<td>Fast Track THR NOV 6.pdf</td>
<td>Orders</td>
</tr>
<tr>
<td>Flow Record CD1896MR_09_08.pdf</td>
<td></td>
</tr>
<tr>
<td>Milestones Handout Hip.doc</td>
<td>Care Path</td>
</tr>
<tr>
<td>Milestones Knee handout.doc</td>
<td>Care Path</td>
</tr>
<tr>
<td>NL - Eastern Health - Pain Intensity.PDF</td>
<td></td>
</tr>
<tr>
<td>NL - Eastern Health - Physiotherapy Progress or Discharge Note.PDF</td>
<td></td>
</tr>
<tr>
<td>NL - Eastern Health LEFS.PDF</td>
<td></td>
</tr>
<tr>
<td>NL - Eastern Health Patient Guidelines from Surgeons.PDF</td>
<td></td>
</tr>
<tr>
<td>NL - Eastern Health TKR Responsibilities.PDF</td>
<td></td>
</tr>
<tr>
<td>NL - Gander Discharge Instructions THR.PDF</td>
<td></td>
</tr>
<tr>
<td>NL - Gander Discharge Instructions TKR.PDF</td>
<td></td>
</tr>
<tr>
<td>NL - Gander Warfarin Discharge Letter.PDF</td>
<td></td>
</tr>
<tr>
<td>Northern Health Clinical Pathway.PDF</td>
<td>Care Path</td>
</tr>
<tr>
<td>ON - North York General Hospital - Total Hip Knee Replace.pdf</td>
<td>Form - Follow Up</td>
</tr>
<tr>
<td>Orders_EMERG_RM - Periprosthetic Joint Infection revised 5-05.doc</td>
<td>Orders</td>
</tr>
<tr>
<td>Post op PCA Orders.pdf</td>
<td>orders</td>
</tr>
<tr>
<td>PPO0071MR.pdf</td>
<td></td>
</tr>
<tr>
<td>PPO0186MR_08_07 October 8 2008 PreOp Orders Fast Track Arthroplasty.pdf</td>
<td></td>
</tr>
<tr>
<td>PPO0186MR_08_12 Dec 19 2008 PreOp Arthroplasty Orders (With Multimodal Pain Medication)[1].pdf</td>
<td></td>
</tr>
</tbody>
</table>
### Appendix G: Cross Continuum Tools

<table>
<thead>
<tr>
<th>Document Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic and Best Community arthroplasty Care Feb 2008 draft 3.doc</td>
</tr>
<tr>
<td>PACT Current State 19 Feb 08.pptm</td>
</tr>
<tr>
<td>Patient Passport CD1894MR_09_08.pdf</td>
</tr>
<tr>
<td>TAP Clinic Pathway-HIP.pdf</td>
</tr>
<tr>
<td>TAP Clinic Pathway-KNEE.pdf</td>
</tr>
<tr>
<td>Total hip Arthroplasty CP4A Dec 2006.pdf</td>
</tr>
<tr>
<td>Total Knee Arthroplasty CP5A Dec 2006.pdf</td>
</tr>
<tr>
<td>TRH Care Pathway Hip.pdf</td>
</tr>
<tr>
<td>TRH Care Pathway Knee.pdf</td>
</tr>
</tbody>
</table>
**Appendix H: Acronyms:**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACAP</td>
<td>Alliance for the Canadian Arthritis Program</td>
</tr>
<tr>
<td>AE</td>
<td>Adverse Event</td>
</tr>
<tr>
<td>BJC</td>
<td>Bone and Joint Canada</td>
</tr>
<tr>
<td>BJD</td>
<td>Bone and Joint Decade</td>
</tr>
<tr>
<td>CAOT</td>
<td>Canadian Association of Occupational Therapists</td>
</tr>
<tr>
<td>CAPA</td>
<td>Canadian Arthritis Patient Alliance</td>
</tr>
<tr>
<td>CAS</td>
<td>Canadian Anesthesiologists Society</td>
</tr>
<tr>
<td>CMA</td>
<td>Canadian Medical Association</td>
</tr>
<tr>
<td>COA</td>
<td>Canadian Orthopaedic Association</td>
</tr>
<tr>
<td>COF</td>
<td>Canadian Orthopaedic Foundation</td>
</tr>
<tr>
<td>CONA</td>
<td>Canadian Orthopaedic Nurses Association</td>
</tr>
<tr>
<td>CPA</td>
<td>Canadian Physiotherapy Association</td>
</tr>
<tr>
<td>CRA</td>
<td>Canadian Rheumatology Association</td>
</tr>
<tr>
<td>ICIT</td>
<td>Inclusivity of Committee Involvement Tool</td>
</tr>
<tr>
<td>KPI</td>
<td>Key Performance Indicator</td>
</tr>
<tr>
<td>LOS</td>
<td>Length of Stay</td>
</tr>
<tr>
<td>OR</td>
<td>Operating Room</td>
</tr>
<tr>
<td>PACU</td>
<td>Post Anaesthetic Care Unit</td>
</tr>
<tr>
<td>Post-Op</td>
<td>Post-operative</td>
</tr>
<tr>
<td>Pre-Op</td>
<td>Pre-operative</td>
</tr>
<tr>
<td>SC</td>
<td>Steering Committee</td>
</tr>
<tr>
<td>SPD</td>
<td>Sterile Processing Department</td>
</tr>
<tr>
<td>TAS</td>
<td>The Arthritis Society</td>
</tr>
<tr>
<td>THR</td>
<td>Total Hip Replacement</td>
</tr>
<tr>
<td>TKR</td>
<td>Total Knee Replacement</td>
</tr>
<tr>
<td>TOT</td>
<td>Turn Over Time</td>
</tr>
<tr>
<td>VTE</td>
<td>Venous Thrombo-Embolus</td>
</tr>
<tr>
<td>WG</td>
<td>Working Group</td>
</tr>
</tbody>
</table>