ARTHRITIS COMMUNITY RESEARCH & EVALUATION UNIT (ACREU)

University Health Network

ORTHOPAEDIC SURGERY IN ONTARIO IN THE ERA OF THE WAIT TIME STRATEGY

PART I: PATTERNS OF USE OF ORTHOPAEDIC SURGEON SERVICES IN ONTARIO 2005/06 INCLUDING SURGICAL TRENDS 1992/93 – 2005/06

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The content herein reflects the observations and opinions of the authors and in no way reflect the official positions of the Ontario Ministry of Health and Long Term Care (MOHLTC).

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Executive Summary

This is Part I of a wider report on Orthopedic Surgery in Ontario in the era of the Wait Time Strategy, which addresses the workload of orthopaedic surgeons to provide information for an informed debate on enhancing orthopedic care and access to surgery. This report entitled Patterns of Use of Orthopaedic Surgeon Services in Ontario 2005/06 including time trends in surgery from 1992 to 2005; provides information on the balance of surgical and ambulatory care and provides a preliminary assessment of the impact of the wait time strategy to date. This information can be used in the development of initiatives that help to maximise the use of surgical time to increase capacity in the system and to decrease waiting times, particularly for total joint replacement (TJR), and at the same ensure that other vital areas of care are recognized and not neglected.

Key Findings

- In 2005/06, over 600 thousand Ontarians had over 1,3 million encounters* with orthopaedic surgeons. Of those 86% were ambulatory encounters and the remaining 14% were in hospital encounters (Inpatient, Emergency department, Same day surgery). Overall, orthopaedic surgeons carried out over 140 thousand surgeries in Ontario, 58% these as inpatient surgeries.
- TJR accounted for 25% of all surgeries carried out by orthopaedic surgeons in Ontario, while arthroscopic repairs accounted for 16% and reductions with or without fixations accounted for 21% of all surgeries, respectively. Moreover, arthritis-related surgeries accounted for more than half of all surgeries performed by orthopaedic surgeons.
- Over one third of all arthritis-related surgeries were TJR and almost another third were arthroscopy. 15% of trauma-related surgeries were TJR (mostly, partial hip replacements) and 46% were reductions with fixations.
- The knee was the most common anatomic site to get an orthopaedic surgery, followed by the hip and shoulder and elbow.
- Arthroscopic surgery was more commonly performed in younger men and TJR in older women.
- Of the 1.1 million ambulatory encounters with orthopaedic surgeons, representing 500 thousand people, the majority were for a traumatic condition (48%) (e.g. sprains, strains, fractures, dislocations) followed by arthritis and related conditions (35%). Visits for osteoarthritis, the most frequent reason for TJR, accounted for 16% of all encounters. On average, Ontarians who visited an orthopaedic surgeon had two ambulatory encounters in 2005/2006.
- Approximately 25% of people with an ambulatory encounter with orthopaedic surgeon are estimated to have an orthopaedic surgery.
- The number of surgeries carried out increased steadily over the period 1992/93 to 2005/06 with much of this increase associated with increased numbers of TJR. There was a notable increase of over ten thousand TJRs carried by orthopaedic surgeons between 2002/03 and 2005/06, with much of this increase taking place between 2004/05 and 2005/06 when the number of TJRs increased by over five thousand. This coincided with the initiation of the Ontario Wait Strategy. At the same time the number of other surgeries remained relatively stable.

Future Directions

Part II will provide a detailed breakdown by LHIN, including information on cross-boundary flow for surgery.

*An *Encounter* is a visit to an orthopaedic surgeon where medical care was provided.

Introduction

This is Part I of a wider report on Orthopedic Surgery in Ontario in the era of the Wait Time Strategy which addresses the workload of orthopaedic surgeons to provide information for an informed debate on enhancing orthopedic care and access to surgery. This report entitled Patterns of Use of Orthopaedic Surgeon Services in Ontario 2005/06 including time trends in surgery from1992 to 2005 provides information on the balance of surgical and ambulatory care and provides a preliminary assessment of the impact of the wait time strategy to date. This information can be used in the development of initiatives that help to maximise the use of surgical time to increase capacity in the system and to decrease waiting times, particularly for total joint replacement (TJR), and at the same ensure that other vital areas of care are recognized and not neglected.

Access to TJR is of major concern in Ontario. This type of surgery plays a vital role in the successful management of end-stage arthritis. It is a widely accepted, efficacious form of treatment that has also been shown to be cost-effective and even cost saving. ICES Research Atlases have documented increasing rates of joint replacement (TJR) which have been accompanied by increasing wait times [1-4]. Demand for TJR already outstrips supply as illustrated by these increasing waiting times, and also by an Ontario study which found unmet need for TJR, even in an area with one of the highest per capita rates of this type of surgery [5;6].

The demand for TJR is unlikely to abate in the near future. The aging of the population is bringing with it an increasing prevalence of arthritis [7;8] with a concomitant increase in the need for TJR. Currently not all people with severe arthritis are willing to undergo this procedure [9;10], however, there is speculation that the aging baby boomers may be more willing than their predecessors to have surgery, putting further pressure on waiting times. In addition, increasing obesity rates in the population are also likely to contribute to an increase in the incidence of osteoarthritis, especially of the knee [11]. This is also likely to fuel the future need for TJR.

The government and community have responded to public concern about increasing waiting times for TJR. The Ontario Wait Time Strategy has spearheaded a number of initiatives directed at both increasing efficiency and increasing capacity particularly in the short term to catch up on the backlog of required surgery [12]. These initiatives include funding for additional hip and knee replacements, investments in home care, public access to wait time information, funding for special innovation and education projects to educate staff about efficient practices and support hospital innovations. Special projects include the *North West Local Health Integration Network, the Toronto Joint Network,* and *the Thunder Bay Regional Health Sciences Centre initiative* [13]. As indicated above, the need for TJR will continue to escalate. In the longer term we need to look more broadly at other factors, which affect capacity for these procedures.

Orthopaedic surgeons are central to the provision of TJR. An essential component of any long-term strategy therefore has to consider their availability. A 2000 study of orthopaedic manpower showed an overall decline in the numbers of surgeons practising in Ontario, and an increase in their average age [14;15]. There is considerable area variation in the amount of service provided. An earlier report by the Arthritis Community Research and Evaluation Unit (ACREU) also hinted at the possible importance of the amount of local orthopaedic provision in determining the rate of surgery to the population [16]. Clearly one important component to increasing orthopaedic provision is the recruitment and retention of orthopaedic surgeons. This is an important mission

of the Ontario Orthopaedic Association, and is outside the scope of this report. The surgical community has also pointed to the need to improve the efficient and effective use of highly skilled orthopaedic resources [13].

How orthopaedic surgeons spend their time is an important contributor to the amount of surgeon resources available for surgery. The ACREU survey of Ontario orthopaedic surgeons indicated that 35% of orthopaedic surgeon time is dedicated to surgery, with the balance being spent seeing patients in office settings [14;17]. This is the reverse of the US recommendation of 62% of orthopaedic surgeon's time to be dedicated to the operating room [18].

ACREU's previous reports have considered the role of orthopaedic surgery for people with arthritis [19;20]. These reports drew attention to the fact that arthroscopy comprises almost half of orthopaedic surgery for arthritis although its efficacy in the management of arthritis remains unclear. However, this previous work did not take into account the considerable workload of orthopaedic surgeons related to acute trauma (such as fractures, dislocations and tendon repair), repair of damage from injury and musculoskeletal deformities (such as corrective foot and ankle surgery), spinal conditions, and other orthopaedic surgery related to other conditions such as musculoskeletal cancers. Clearly it is important to set orthopaedic surgery for arthritis and related conditions into the wider context of all orthopaedic surgery. This report begins to address this wider context.

The examination of office time of surgeons should also not be neglected. As indicated above surgery is only one component of the work of orthopaedic surgeons. ACREU's previous work showed that in 2000/01 Ontario orthopaedic surgeons saw 15.2% of the 1.3 million patients visiting physicians for arthritis and related conditions [20]. In addition to osteoarthritis (the most common reason for joint replacement surgery) orthopaedic surgeons also saw patients with a variety of other arthritis related diagnoses including joint derangement, synovitis, and spinal disorders. Only one quarter of arthritis-related visits to orthopaedic surgeons was for osteoarthritis or rheumatoid arthritis, conditions for which TJR might be indicated, and only for patients aged 65 years and older (approximately one third of all visits) were the majority of visits for these conditions. In summary, our previous report showed that orthopaedic surgeons play a major role in the clinical management of musculoskeletal conditions, and the visits from patients likely to be candidates for TJR represented a relatively small proportion of this workload. However, this work did not include visits to orthopaedic surgeons for trauma. This preliminary report begins to describe the total workload of orthopaedic surgeons taking into account the full range of conditions seen.

Objectives

The overall purpose of this two-year project is to document the workload of orthopaedic surgeons in Ontario to serve as a basis for service planning and enhancement.

The results of this study will be presented in two reports. The specific objectives of this report, Part I, are:

a. To provide a breakdown of the surgeries performed by orthopaedic surgeons by diagnosis in order to set arthritis-related surgeries in the context of all procedures performed.
b. To determine the volume of ambulatory care provided by orthopaedic surgeons and the most common types of diagnosis seen in the clinic.
c. To examine time trends of common surgeries performed by orthopaedic surgeons.

The follow-up report to this, Part II, will focus on the following objectives:

a. To examine geographic variation in orthopaedic encounters and orthopaedic surgeries by Local Health Integration Network (LHIN), including area variation in total joint replacement and other types of surgery for arthritis and related conditions.
b. To examine patterns of cross-boundary flow between LHINs for people who underwent joint replacement surgery and other major types of orthopaedic surgeries.

Methodology

Data Sources

Administrative data from the Ontario Health Insurance Plan (OHIP) database, from the Discharge Abstract Database (DAD), from the National Ambulatory Care Reporting System (NACRS) database, and from the Same Day Surgery (SDS) database provided by the Canadian Institute of Health Information (CIHI) for the 2005 fiscal year (April 2005 to March 2006) were used to identify individuals accessing orthopaedic services in Ontario. Table 1 summarizes the databases that have been integrated for this study and the variables that were available for the analysis. The same databases were used to examine time trends for years 1992/93 to 2005/06.

Orthopaedic service utilization was measured by encounters with orthopaedic surgeons. Each encounter was represented as a discharge of a hospital inpatient, an ambulatory visit to an orthopaedic surgeon, a visit to an emergency department or a day surgery.

The volume of ambulatory encounters with orthopaedic surgeons was estimated using the OHIP database and the volume of encounters in the hospitals was estimated using DAD, NACRS and SDS databases.

Table 1. Description of databases used in this report

OHIP databases
▪ *Claims History Database (CHDB)*. For every claim, includes date of service, type of services or procedures received, associated diagnosis, patient and physician identification numbers, and physician specialty type. This was used to identify service encounters. ▪ *Corporate Provider Database***.** Contains data about health care providers and organizations in Ontario. ▪ *Registered Persons Database (RPDB).* Used to collect and maintain information about individuals who are registered for OHIP. Contains demographic information such as age, sex and residential postal code.
CIHI's Discharge Abstract Database (DAD)
Contains clinical, demographic and administrative data for hospital discharges. The information recorded includes: physician specialty, procedures received, diagnosis codes, residential postal code, age and gender.
CIHI's National Ambulatory Care Reporting System (NACRS)
Contains demographic characteristics, diagnostic codes and procedures received for patients visiting emergency departments from all hospitals in Ontario.
CIHI's Same Day Surgery (SDS)
Visits for same day surgeries have been split off from NACRS since 2003/2004 and they are stored independently in a separate database. The database contains demographic characteristics, diagnostic codes, and procedures received.

Identification of encounters with orthopaedic services

From each of the databases described above, the population accessing orthopaedic services was identified based on physician specialty. All individuals with an orthopaedic surgeon listed as a health care provider were considered as having an encounter with orthopaedic services in the time period selected.

For the analyses using the OHIP database, doctor specialty was defined according to the ICES Physician Database (IPDB) that incorporates information from the OHIP Corporate Provider Database (CPDB), the Ontario Physician Human Resource Data Centre (OPHRDC) database and the OHIP database of physician billings. The CPDB contains information about physician demographics, specialty training and certification, and practice location. This information is validated against the OPHRDC database, which verifies this information through periodic telephone interviews with all physicians practicing in Ontario. The IPDB was linked to the OHIP database to identify orthopaedic surgeons.

CIHI's databases (DAD, NACRS, and SDS) collect information on up to eight health care providers for each encounter. An encounter with an orthopaedic surgeon was defined as such if a health care record has an orthopaedic surgeon or paediatric orthopaedic specialist listed as a health care provider in any of the eight health care provider fields.

Definition of ambulatory and hospital encounters

Encounters with orthopaedic surgeons were further classified as being ambulatory encounters which were visits to orthopaedic surgeons in office or hospital outpatient department settings or hospital encounters which were further classified as inpatient hospitalizations, emergency department encounters, and same day surgeries. The OHIP services database was used to identify ambulatory encounters, based on physician claims that contained a fee code with a prefix of “A” or “K”. In addition encounters with an “A” fee code in combination with an orthopaedic procedure fee code were excluded, as these encounters would also be captured in the CIHI databases. All claims made by the same doctor on the same date for the same patient were considered one ambulatory encounter.

Hospital encounters were identified according to the ‘admission category’ field in DAD, NACRS and SDS databases. Day surgeries with missing information about orthopaedic interventions received were excluded from the analysis.

Diagnosis groups

Reasons for encounters with orthopaedic surgeons were grouped into four main diagnosis groups for the analysis presented in this report: arthritis and related conditions, traumatic conditions, MSK conditions and other conditions. The general strategy for assigning an encounter to a diagnosis group is given in Appendix I. In the OHIP database diagnostic codes were a selected list of ICD-9 based codes. In the CIHI databases ICD-9 codes were used up to 2001 and ICD-10 codes thereafter. Since each hospital encounter in the CIHI database might have several diagnoses recorded it was decided to assign one relevant diagnosis group to each encounter. Whenever possible it was decided to use the most responsible diagnosis (MRD). If the MRD was an arthritis and related condition, traumatic condition or MSK condition the encounter was assigned to the corresponding group. However, if the MRD fell under ‘other conditions’ category then any other diagnosis recorded was used to assign a diagnosis grouping. Since each record can have several diagnosis recorded the following prioritization order was used to assign a diagnosis to a group: traumatic conditions, arthritis and related conditions, MSK conditions, and other conditions. In the case of OHIP data, if a patient had recorded several diagnosis in the same date the above prioritization criteria was used to assign the encounter to a diagnosis group. A traumatic condition was given priority, as it is more likely that these diagnoses were the reason for the encounter and not a comorbid condition.

Groups of surgical procedures

In this report data on the type of surgical procedure were obtained from the CIHI databases. Up to 2001 these databases used the Canadian Classification of Procedures (CCP). In 2002 CIHI changed to using the Canadian Classification of Interventions (CCI). This is a systematic classification, which codes interventions by body part and standard types of intervention (e.g. excision, fixation, repair). CIHI provides coding notes to relate these to particular types of surgical procedures. A major challenge was to develop groupings based on this classification that were roughly equivalent to those developed using the CCP. Appendix II gives an outline of the content of the groups. In the CIHI databases each hospitalization might have recorded multiple CCI codes corresponding to the interventions received during the hospital encounter. Each CCI code has a date associated.

For this report it was decided that all CCI codes recorded on the same date and the same body region would be considered as one surgery. Surgeries were classified into one of the following groups:

- Total joint replacement
- Arthroscopic repair
- Open repair
- Reduction without fixation
- Reduction with fixation
- Other surgeries

Some hospital encounters might have several surgeries recorded, hence those cases were double counted in order to quantify the overall number of surgeries provided. Hospital encounters with no orthopaedic procedure recorded in the patient record are defined in this report as consultations by the orthopaedic surgeon.

Statistical analysis

Cross-sectional analysis

The volume of care provided by orthopaedic surgeons was analysed in terms of the number of persons receiving specific services and the quantity of services provided (since a patient may have several ambulatory encounters or receive several orthopaedic interventions). Four measures were used to quantify the volume of care provided by orthopaedic surgeons:

(1) The number of in hospital encounters with orthopaedic surgeons,
(2) The number of surgeries,
(3) The number of patients having ambulatory encounters with orthopaedic surgeons, and
(4) The total number of ambulatory encounters.

These measures were analysed according to service setting (ambulatory, inpatient, day surgeries and emergency department encounters), patient's demographic characteristics (sex and age), diagnosis group and surgical group.

Time trend analysis

Time trends were conducted for the number of total surgeries and specific surgeries from 1992/93 to 2005/06. The number of surgeries was also estimated by diagnosis groupings for each study year.

Findings

Overall utilization of orthopaedic services

In 2005, over 600 thousand people had 1.3 million encounters with orthopaedic surgeons in Ontario (Figure 1). Of those, 516 thousand people made over one million ambulatory visits accounting for 86% of all encounters with orthopaedic surgeons. Same day surgeries and encounters in emergency departments accounted for 34% and 18% of all hospital encounters that required orthopaedic services, respectively, with 48% of hospital encounters being inpatient hospitalizations.

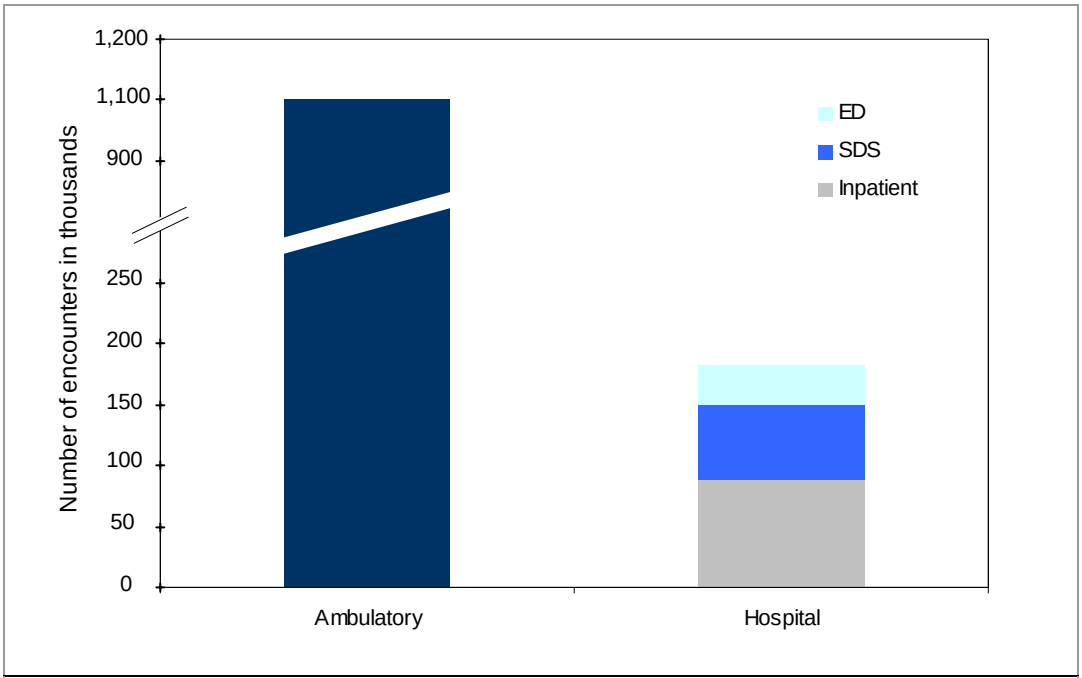


Figure 1. Distribution of encounters with orthopaedic surgeons by service setting, in Ontario, 2005/06

Data Sources: OHIP, DAD, NACRS, SDS

In both ambulatory and hospital settings the most common diagnoses seen were traumatic conditions and arthritis and related conditions. These diagnoses accounted for 81% of all ambulatory encounters and all hospital encounters, respectively (Table 2). Traumatic conditions were seen more often in ambulatory settings and arthritis and related conditions were most common in hospital setting. More than half of the day surgeries were for arthritis and related conditions and 82% of the encounters in emergency departments were for traumatic conditions.

Table 2. Distribution of encounters with orthopaedic surgeons by diagnosis groups and service setting in Ontario, 2005/06

	Total number of encounters	Arthritis and related conditions		Traumatic conditions		MSK		Other	
		Encounters	%	Encounters	%	Encounters	%	Encounters	%
Ambulatory	**1,127,939**	**421,382**	**37.4**	**497,003**	**44.1**	**141,362**	**12.5**	**68,192**	**6.0**
Hospitalizations	**182,496**	**74,855**	**41.0**	**73,337**	**40.2**	**18,466**	**10.1**	**15,838**	**8.7**
Inpatient	88,186	36,591	41.5	38,714	43.9	8,239	9.3	4,642	5.3
SDS	61,831	36,806	59.5	8,044	13.0	8,759	14.2	8,222	13.3
ED	32,479	1,458	4.5	26,579	81.8	1,468	4.5	2,974	9.2
All encounters	**1,285,863**	**496,237**	**37.9**	**570,340**	**43.5**	**159,828**	**12.2**	**84,030**	**6.4**

Data Sources: OHIP, DAD, NACRS, SDS

Care provided by orthopaedic surgeons

Of the 182,496 patient encounters with orthopaedic surgeons in hospital settings, 75% received at least one surgery (ranging from 55% among patients with other conditions to 95% among patients with arthritis conditions) (Figure 2). Over 44 thousand encounters in hospital setting only required a consultation from an orthopaedic surgeon, representing 24% of all encounters in this setting. Encounters for traumatic conditions accounted for 68% of all consultations while encounters with arthritis and related diagnosis or MSK conditions accounted for another 8% each.

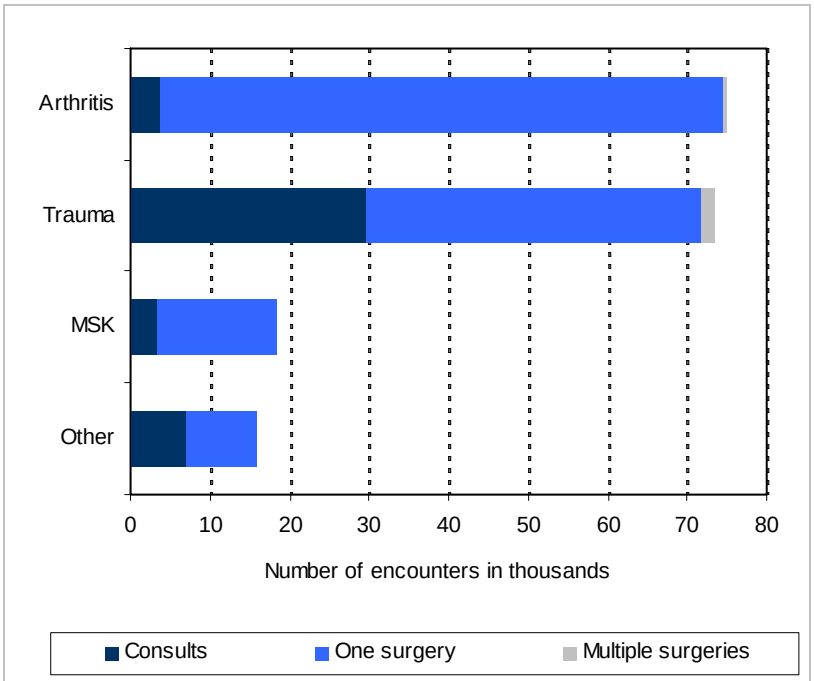


Figure 2. Distribution of hospital encounters by diagnosis group according to surgical grouping, in Ontario, 2005/06

Data Source: DAD, NACRS, SDS
Note: surgery refers to orthopaedic surgical procedures

Orthopaedic surgeons performed over 140 thousand surgeries in Ontario in 2005 (Figures 3 and 4). Only a quarter of those surgeries were TJR, another 14% were arthroscopic knee surgery, 16% were reductions with fixations, and repairs and reductions without fixations accounted for 11% and 5% of all surgeries, respectively. Spinal surgery accounted for a small (4%) proportion of all surgeries carried out by orthopaedic surgeons. Over 71 thousand surgeries were for arthritis and related

diagnosis, over 46 thousand were for trauma conditions and over 15 thousand were for MSK conditions.

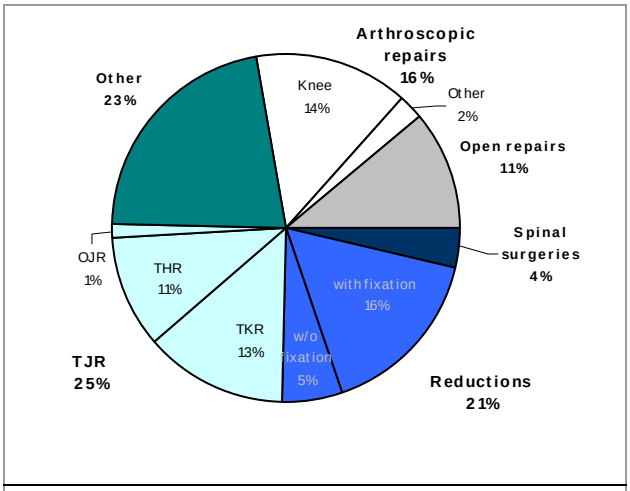


Figure 3. Number of surgeries in Ontario, 2005/06

Data Source: DAD, NACRS, SDS

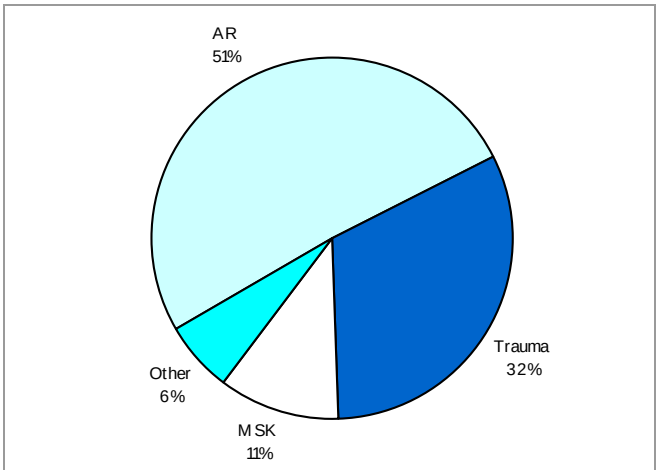


Figure 4. Number of surgeries for arthritis and related conditions, for trauma, for MSK and for other conditions in Ontario, 2005/06

Data Source: DAD, NACRS, SDS

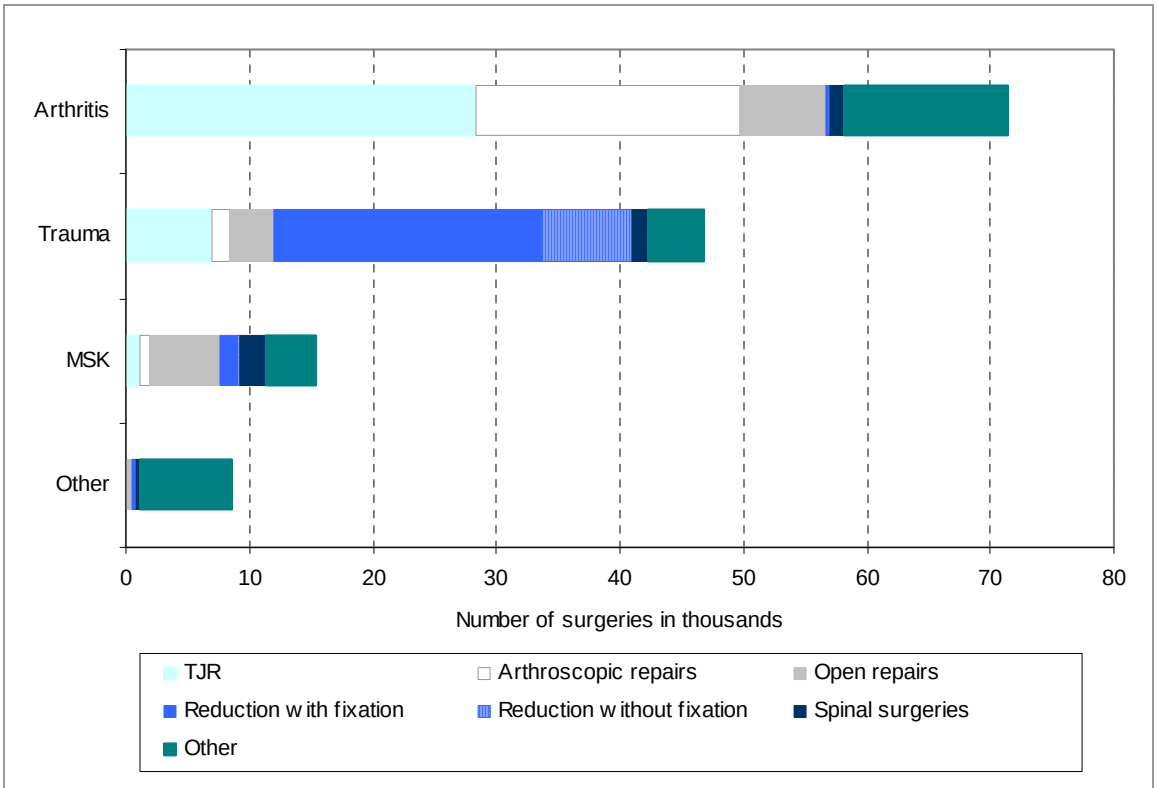


Figure 5. Volume of surgery according to surgical and diagnosis grouping in Ontario, 2005/06

Data Source: DAD, NACRS, SDS

The most common surgeries performed in patients with arthritis and related diagnosis were TJR accounting for 40% of all surgeries among patients in this group (Figure 5), arthroscopic surgeries, accounting for another 30%, and open repairs which accounted for 10% of all surgeries. Of the 46 thousand surgeries performed on patients with traumatic conditions almost half were reductions with fixations, 16% were reductions without fixations, 15% were TJR, and open repairs accounted for another 8% of all surgeries in this group. Among patients with MSK conditions open repairs accounted for 37% and spinal surgeries accounted for 14% of all surgeries in this group.

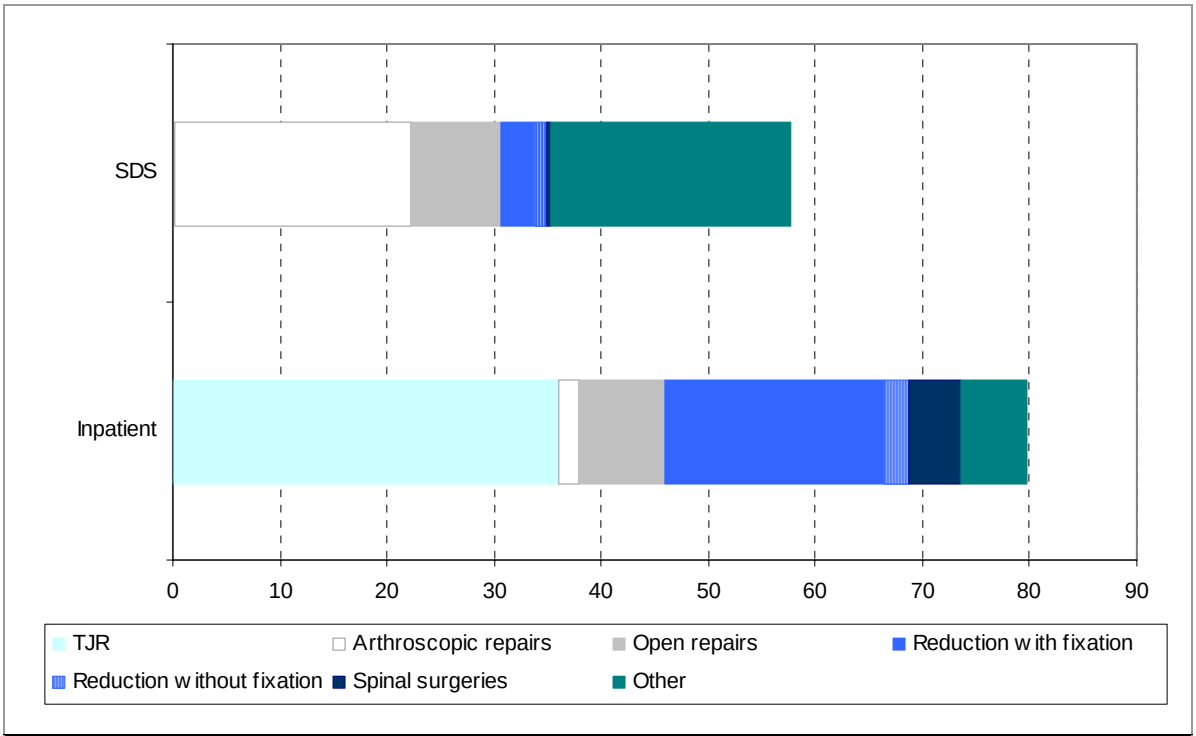


Figure 6. Number of surgical procedures by type and service setting in Ontario, 2005/06

Data Source: DAD, NACRS, SDS

The number of surgeries performed by orthopaedic surgeons according to service setting is presented in Figure 6. The majority of the surgeries were performed as inpatient encounters or as day surgeries. The most common procedures performed as day surgeries were arthroscopic surgeries, accounting for 38% of all surgeries in this setting. Other surgeries accounted for 39% (almost half were closed excisions) of all day surgeries. Over 79 thousand surgeries were performed by orthopaedic surgeons during inpatient hospitalizations. TJR accounted for 45% and reductions with fixations accounted for 25% of all surgeries in this setting.

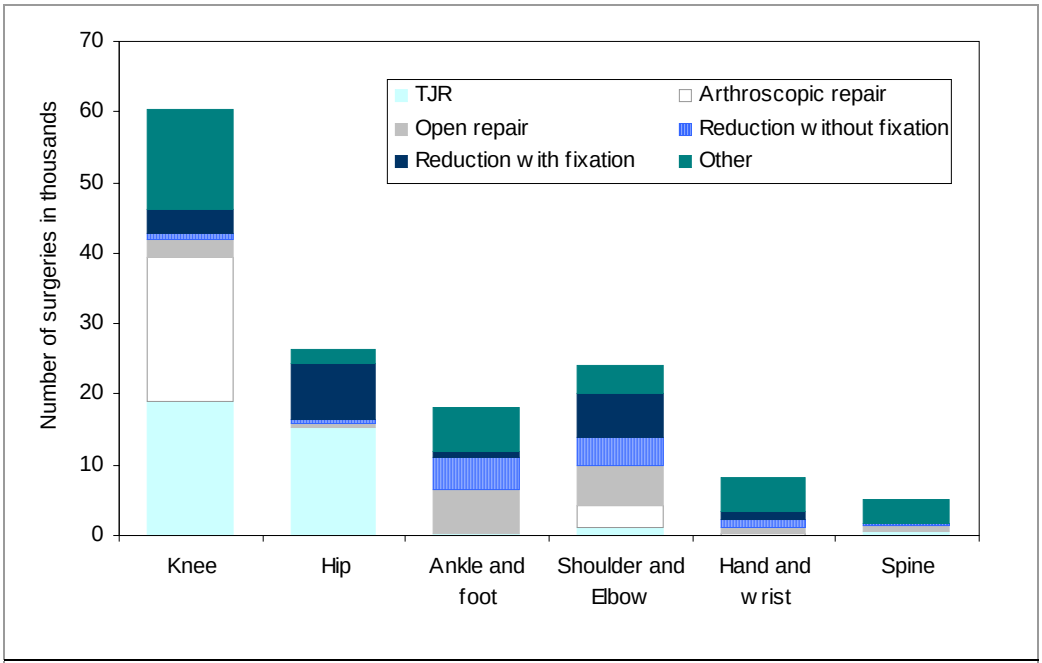


Figure 7. Number of surgeries by type and anatomic location in Ontario, 2005/06

Data Source: DAD, NACRS, SDS

The distribution of surgeries according to anatomic location is displayed in Figure 7. Surgeries on the knee were most common, accounting for over 40% of all surgeries, followed by the hip (18%), the shoulder and elbow (17%) and foot and ankle (12%). The number of knee replacements was 24% higher than the number of hip replacements. In addition, the number of knee arthroscopic surgeries was 8% higher than the number of total knee replacements. Arthroscopic surgeries were most commonly performed on the knee (87%) and the shoulder and elbow (13%). Reductions with fixations were most commonly carried out on the hip (41%), and shoulder and elbow (31%). Reductions without fixations were performed more often on the ankle and foot (38%), shoulder and elbow (33%) and hand and wrist (11%).

The number of surgeries performed by orthopaedic surgeons varied according to patient's age and sex (Figure 8). The total number of surgeries increased with age among women; however, among men, the number of surgeries increased with age up to the age of 54 and then showed a considerable decline. Among people 44 years or younger the number of surgeries was higher in men than women and among people 55 years or older the opposite was observed.

The pattern of surgery with age varied according to underlying condition. The volume of surgeries for arthritis and related conditions increased with age for men and women until age 64 years and then declined for those 65 years or older (Figure 9). The number of surgeries was higher in men less than age 55 years and in women 55 years or older. The volume of surgeries related to traumatic conditions was higher in younger men (less than age 55) and in older women (64 years or older). The number of surgeries for this diagnosis group was particularly high in older women (75 years or older) where the number of surgeries was almost triple the number in men the same age, and in younger men (24 years or younger) where the number of surgeries was almost double the number of surgeries in women the same age group.

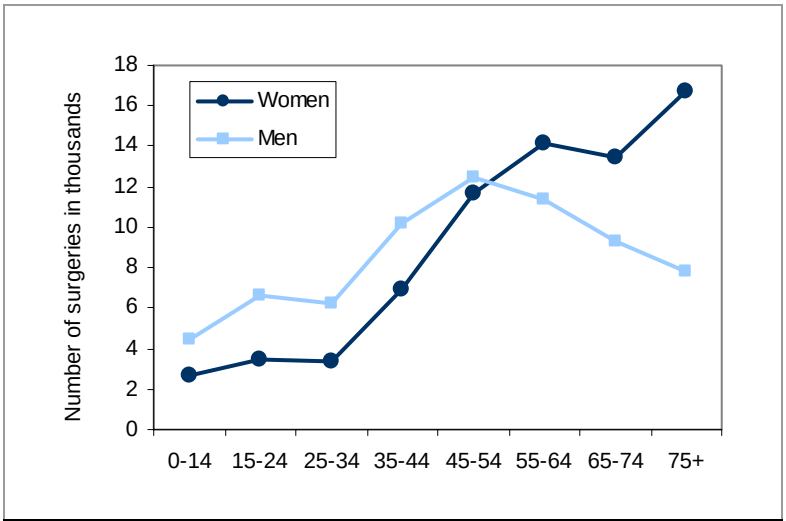


Figure 8. Total number of surgeries (in thousands) by age and sex in Ontario, 2005/06

Data Source: DAD, NACRS, SDS

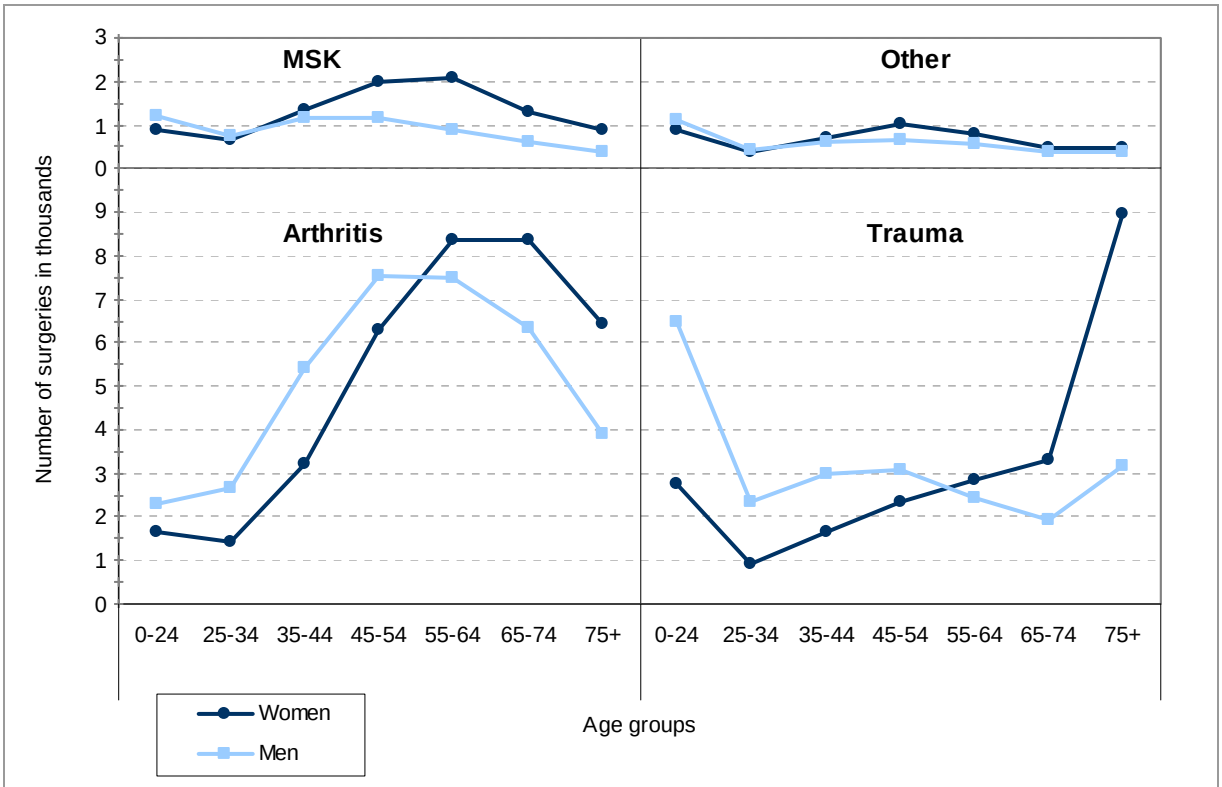


Figure 9. Total number of surgeries (in thousands) according to diagnosis grouping by age and sex in Ontario, 2005/06

Data Source: DAD, NACRS, SDS

Table 3. Number of surgeries by age and gender according to diagnosis and surgical groupings in Ontario 2005/06

Surgical groups	Total	Ratio Women/Men	Age groups			
			0-24	25-54	55-74	75+
Arthritis and related conditions						
TJR	28,275	1.5	21	569	9,356	18,329
Arthroscopic repairs	21,451	0.7	2,090	6,513	10,093	2,755
Other repairs	6,891	0.7	559	1,460	3,546	1,326
Reductions with fixations	227	1.0	38	57	70	62
Reductions without fixations	119	0.9	23	28	25	43
Other	14,386	1.0	1,250	4,053	6,515	2,568
Traumatic conditions						
TJR	6,952	1.9	21	172	1,112	5,647
Arthroscopic repairs	1,430	0.5	371	575	419	65
Other repairs	3,656	0.4	528	1,306	1,276	546
Reductions with fixations	21,711	1.2	4,142	3,970	5,093	8,506
Reductions without fixations	7,267	0.9	3,386	909	1,328	1,644
Other	5,786	0.7	981	1,441	1,905	1,459
MSK conditions						
TJR	1,074	1.6	17	189	402	466
Arthroscopic repairs	790	0.5	272	308	179	31
Other repairs	5,714	3.0	651	1,348	2,676	1,039
Reductions with fixations	1,544	0.7	411	343	423	367
Reductions without fixations	81	1.0	33	5	21	22
Other	6,223	1.2	734	1,781	2,435	1,273

The volume of surgery conducted according to diagnosis groupings and surgical groupings is presented in Table 3. TJRs were performed more commonly in people with arthritis and related conditions, women, and people 55 years or older. Knee arthroscopy was performed mainly in younger and middle aged men (between the ages of 24 to 54) with arthritis. There was also a significantly smaller group of arthroscopies performed in men under age 45 with a trauma diagnosis, probably related to sport injuries. A large volume of reductions with fixations was seen among women 75 years or older and younger men, both with traumatic conditions. Reductions without fixations were more common among younger men (24 years or younger) with a trauma diagnosis. Repairs excluding those on the knee were more common among women with MSK conditions or with arthritis and related conditions.

Volume of care provided in ambulatory settings

Of the 1.1 million ambulatory encounters with orthopaedic surgeons almost half were for traumatic conditions and another 35% were for arthritis and related conditions (osteoarthritis, rheumatoid arthritis and other arthritis), visits for spine disorders accounted for 4% of all visits (Figure 10). The most common reasons for having ambulatory encounters with orthopaedic surgeons were fractures and dislocations (27%), strains and sprains (18%), osteoarthritis (16%), other arthritis (19%), and other MSK conditions (8%).

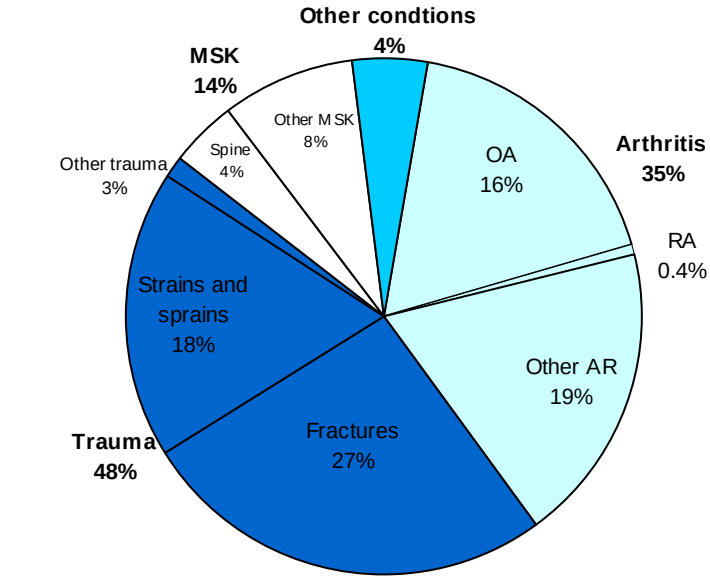


Figure 10. Distribution of ambulatory encounters by diagnosis group in Ontario, 2005/06

Data Sources: OHIP, RPDB

The 1.1 million encounters represent visits by 500 thousand people, a mean of 2.2 visits per person. Women with arthritis and related diagnosis and MSK conditions had on average 20% and 40% more encounters than men with the same condition, respectively (Table 4). However, for traumatic conditions both men and women reported a similar number of encounters. On average, people reported two ambulatory encounters with orthopaedic surgeons for the conditions studied. However, fractures required more ambulatory encounters than any other diagnosis studied, with an average of 2.5 encounters per person.

A summary of the distribution of encounters with orthopaedic surgeons by patients with traumatic conditions according to body region is presented in Figure 11. The most common sites of fractures and dislocations were hand and wrist (35%) and the lower extremity (23%), which includes ankle and foot. Hip fractures accounted for 9% of all fractures and dislocations. These sites accounted for 67% of all encounters for fractures and dislocations. The most common sites for sprains and strains were the lower extremity (41%), which included the knee, the ankle and foot (18%) and the upper extremity (24%).

Table 4. Ambulatory encounters with orthopaedic surgeons in Ontario, 2005/06

Condition	Number of visits	Number of people	Mean number of visits per person	Ratio (women/ men)
All conditions	**1,127,939**	**515,420**	**2.2**	**1.1**
Arthritis and Related Conditions	**421,382**	**200,046**	**2.1**	**1.2**
Osteoarthritis	200,198	91,505	2.2	1.5
Rheumatoid Arthritis	5,256	2,269	2.3	2.5
Joint Derangement	108,301	54,002	2.0	0.8
Synovitis	58,944	29,761	2.0	1.2
Ankylosing Spondylitis	541	368	1.5	1.2
Traumatic Arthritis	3,609	1,502	2.4	1.0
Other arthritis	44,533	20,639	2.2	1.2
MSK Conditions	**141,362**	**72,360**	**2.0**	**1.4**
Other spine	48,336	27,339	1.8	1.3
Bone Disorders	27,519	13,627	2.0	2.4
Not Yet Diagnosed	65,507	31,394	2.1	1.2
Traumatic Conditions	**517,514**	**222,442**	**2.3**	**1.0**
Fractures and dislocations	293,984	116,614	2.5	1.0
Strains, sprains	203,019	96,846	2.1	1.0
Other trauma	20,511	8,982	2.3	1.0
Other conditions	**47,681**	**20,572**	**2.3**	**0.9**

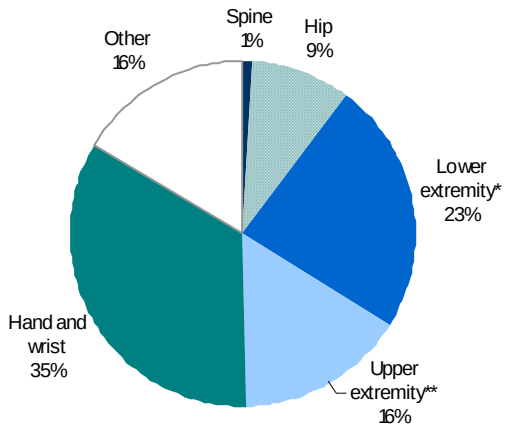
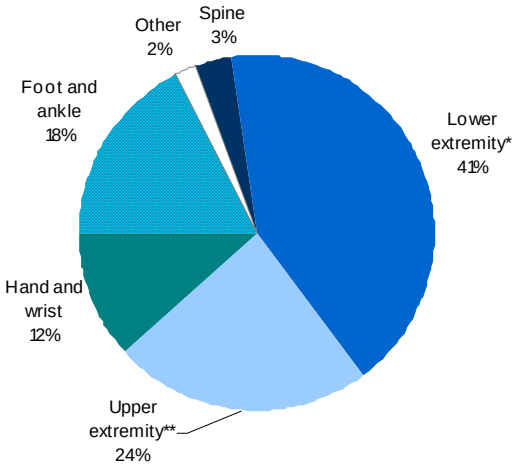
Fractures and dislocations	Strains and sprains
	
* Lower extremity includes fibula, tibia and ankle ** Upper extremity includes clavicle and humerus	* Lower extremity includes knee and leg ** Upper extremity includes shoulder an upper arm

Figure 11. Number of encounters with orthopaedic surgeons for fractures and dislocations and sprains and strains according to anatomic location in Ontario, 2005/06

Data Source: OHIP, RPDB

Time trends in surgical procedures 1992/93-2005/06

The number of surgeries carried out by orthopaedic surgeons in Ontario between 1992/93 and 2001/02 increased from 115,992 to 135,195 in 2001/02 (Figure 12). As can be seen from the figure there was a discontinuity in numbers between 2001/02 and 2002/03 and instability in numbers thereafter, which is likely related to the change in the classification used to capture surgeries: the CCP was used between years 1992/93-2001/02 and the CCI for years 2002/03-2005/06. In this report, we describe the time trends in these two time periods separately.

Table 5 summarises the time trend in numbers of major types of orthopaedic surgeries. Of all surgeries performed by orthopaedic surgeons between 1992/93 and 2001/02, the number of TJRs increased substantially by 62% from 13 thousand to 21 thousand; and accounted for between 11% and 16% of all surgeries in the period. In the most recent years (2002/03 to 2005/06) the number has continued to increase and the proportion of all surgeries accounted for by TJR has increased from 19% in 2002/03 to 25% in 2005/06, representing an increase of 40% in the total number of TJRs. In 2005/06 orthopaedic surgeons carried out 36 thousand surgeries, which were ten thousand more than the number in 2002/03. Over six thousand of these surgeries were for patients with osteoarthritis. Much of this increase took place between 2004/05 and 2005/06 when the number of TJRs increased by over five thousand. This coincided with the initiation of the Ontario Wait Time Strategy. At the same time the number of other surgeries remained relatively stable.

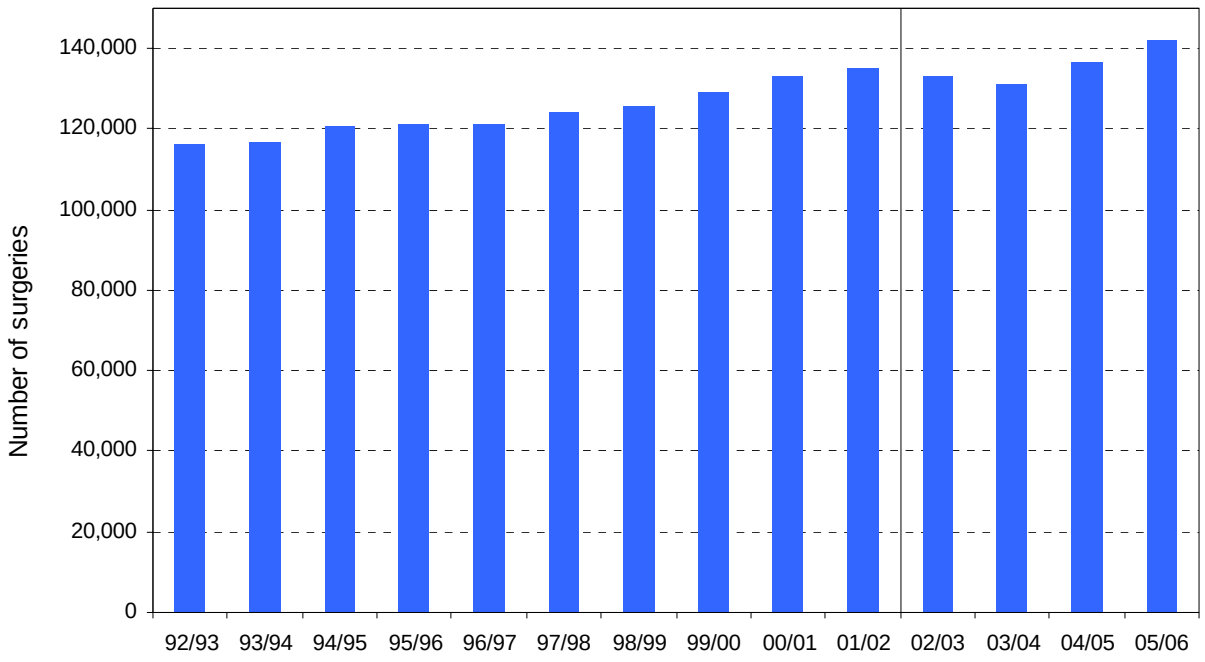


Figure 12. Total number of orthopaedic surgeries in Ontario, 1992/93 to 2005/06

Data Source: DAD, NACRS, SDS
Note: The line represents when the change in classification of health interventions occurred

Table 5. Number of TJR, arthroscopy, reductions with or without fixations, repairs and other surgeries performed by orthopaedic surgeons in Ontario from 1992/93 to 2005/06

Year	Total number of surgeries	TJR		Arthroscopy		Reductions with or without fixations		Repairs		Spinal surgeries		Other	
		Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
1992/93	115,992	12,948	11.2	21,564	18.6	21,592	18.6	9,632	8.3	5,305	4.6	44,951	38.8
1993/94	116,698	13,733	11.8	19,490	16.7	19,507	16.7	10,126	8.7	4,580	3.9	49,262	42.2
1994/95	120,642	14,700	12.2	18,395	15.2	18,443	15.3	10,571	8.8	4,526	3.8	54,007	44.8
1995/96	121,198	15,437	12.7	18,587	15.3	18,618	15.4	11,024	9.1	4,235	3.5	53,297	44.0
1996/97	121,377	16,227	13.4	16,324	13.4	16,347	13.5	11,949	9.8	4,182	3.4	56,348	46.4
1997/98	124,059	17,263	13.9	17,689	14.3	17,720	14.3	12,498	10.1	3,872	3.1	55,017	44.3
1998/99	125,625	18,221	14.5	17,137	13.6	17,165	13.7	12,818	10.2	4,090	3.3	56,194	44.7
1999/00	128,935	19,379	15.0	17,536	13.6	17,552	13.6	13,685	10.6	4,423	3.4	56,360	43.7
2000/01	132,955	19,390	14.6	17,570	13.2	17,588	13.2	14,154	10.6	4,451	3.3	59,802	45.0
2001/02	135,195	20,973	15.5	18,534	13.7	18,548	13.7	14,704	10.9	4,323	3.2	58,113	43.0
2002/03	133,268	25,723	19.3	18,207	13.7	18,221	13.7	15,377	11.5	5,449	4.1	50,291	37.7
2003/04	131,236	27,570	21.0	19,847	15.1	19,857	15.1	14,875	11.3	4,921	3.7	44,166	33.7
2004/05	136,783	30,687	22.4	21,348	15.6	21,356	15.6	15,507	11.3	5,313	3.9	42,572	31.1
2005/06	142,228	35,903	25.2	23,663	16.6	23,678	16.6	15,859	11.2	5,044	3.5	38,081	26.8

Note: The discontinuous line represents when the change in classification of health interventions occurred

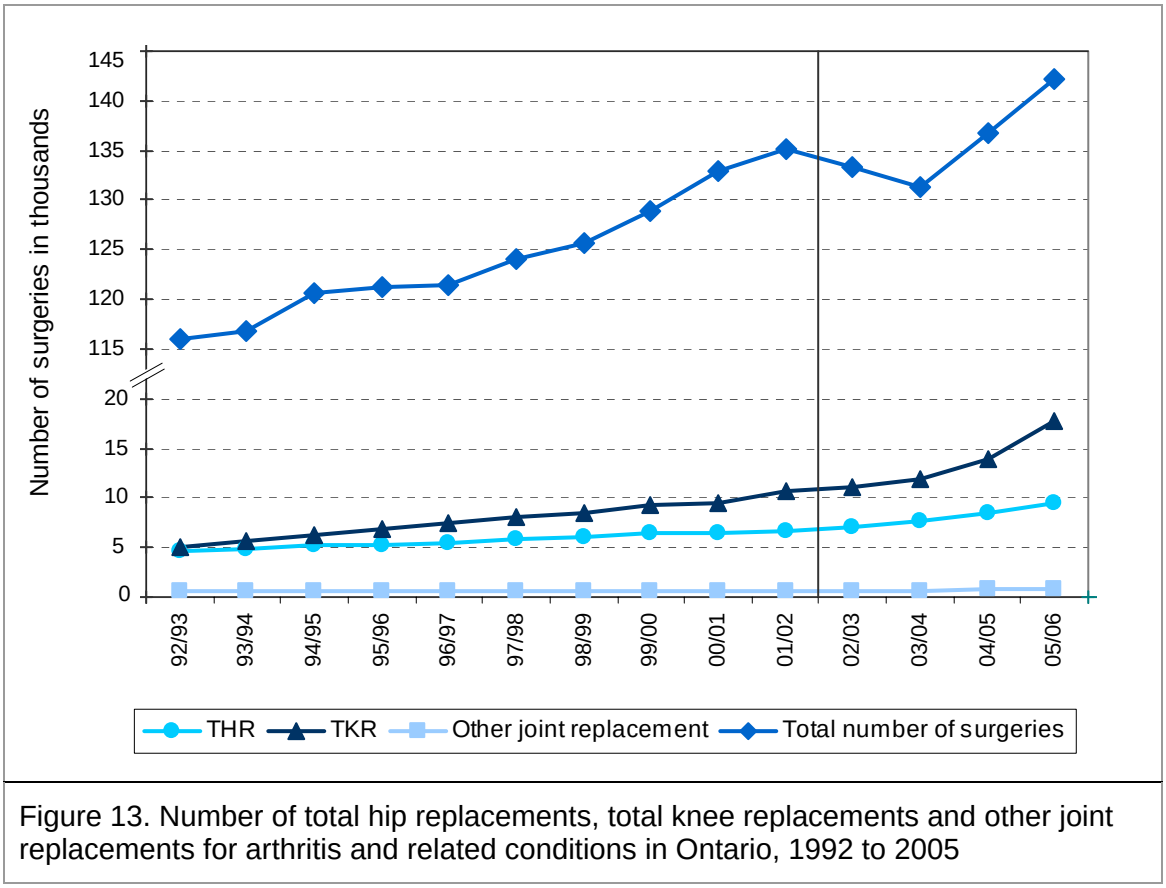


Figure 13. Number of total hip replacements, total knee replacements and other joint replacements for arthritis and related conditions in Ontario, 1992 to 2005

Data Source: DAD, NACRS, SDS

Limitations

This report relates to fiscal year 2005/06. In this year CIHI data were collected using ICD-10 for diagnostic codes and the CCI for procedures. Fiscal year 2005/06 was the fourth year of implementation of these new classification systems. In developing grouping of variables for data analysis certain assumptions had to be made. We also recognize a need for sensitivity analyses, in particular related to our decisions about where to group diagnostic terms relating to spinal conditions.

While the Canadian Classification of Interventions is indeed systematic in its structure, it is often difficult to decode types of intervention such as repair, removal, etc. into the terms used by orthopaedic surgeons. There are coding rules which continued to be elaborated by CIHI, and we were fortunate to be able to consult with the coders at the Toronto Western Hospital about the practical aspects of how the terms entered by the orthopaedic team in the patients' charts were translated into CCI codes for reporting to CIHI. The change to the CCI for coding types of surgery has major implications. To study time trends, it is necessary to examine codes using both the CCP and CCI. Methodologies to identify TJR are well established and trends in this type of surgery have been reported elsewhere [3]. For other surgeries, it is more challenging to

study time trends. For example, in the CPP, there is a specific code for arthroscopic surgery, while in the CCI, we selected 'repairs' that were conducted arthroscopically. While this includes common arthroscopic procedures such as menisectomy with or without debridement (captured under 'arthroscopy' in the CCP), it also includes a range of other procedures performed arthroscopically. There is potential that this overestimates what health professionals consider typical arthroscopy.

Discussion

This report provides a snapshot of the work carried out by orthopaedic surgeons in 2005/06 and sets this in the context of time trends in surgery from 1992/93 to 2005/06. Overall trends in the number of surgeries point to an accelerated increase in 2002/03 and 2005/06, during which period the Wait Time Strategy was initiated, most of which was associated with an increase in the number of TJRs. It is also clear from this report that TJR is only one component of the overall contribution of orthopaedic surgeons to the care of people with musculoskeletal conditions. Overall, the results reported here demonstrate that the number of encounters with patients in ambulatory settings far exceeds the number of procedures carried out. Approximately 25% of people seeing an orthopaedic surgeon are likely to have an orthopaedic procedure. This is in line with findings from the UK, which has shown that, in some surgeon's practices, less than 30% of patients referred to orthopaedic surgeons are candidates for surgery on their initial consultation [21]. These findings also point to the high volume of encounters for traumatic conditions both in ambulatory care and hospital settings, where traumatic conditions account for the majority of encounters. The traumatic conditions seen ranged from simple strains and strains, which were unlikely to need surgical intervention, to fractures and more serious conditions. While most of the encounters in hospital related either to same day or inpatient surgery, a substantial minority was in the emergency room.

In this work we have juxtaposed ambulatory encounters and hospital encounters that received at least one surgery or consultation into a count of total number of encounters. While it is clear that encounters associated with a surgery are the minority, a major limitation in our work is that we were not able to take into account the surgeon's time. Encounters involving a surgery are to be more time consuming than an ambulatory visit. It should also be recognized that a proportion of ambulatory encounters are likely to be pre- or post-surgical assessments. Nevertheless, that only a minority of encounters are associated with a surgery is in line with the survey of Ontario Orthopaedic Surgeons which showed that only a third of time was spent in the operating room[14;15].

This report we looked at the work of orthopaedic surgeons by juxtaposing different sources of data, in particular data from the OHIP and on surgical procedures from the Canadian Institute of Health Information. We showed that encounters with orthopaedic surgeons for arthritis and related conditions account for less than half of all encounters with orthopaedic surgeons. In addition, the number of encounters from patients with arthritis and related conditions far exceeds the number of surgeries carried out. However, it is not known what proportion of patients seen by surgeons eventually has surgery. Analysis of linked data for a number of years would be necessary to establish this. However, anecdotal accounts from surgeons suggest that a sizeable proportion of patients referred for hip or knee arthritis are not yet ready for surgery, and neither are patients fully aware of other treatment options for the management of their arthritis, including the role of exercise, physical therapy and use of appropriate medications.

Other studies have pointed to deficiencies in the primary care management including both under and over use of non-steroidal anti-inflammatory medications and lack of referral for physical therapy [22].

We have suggested previously that a strategy for increasing availability of orthopaedic surgeons for TJR surgery would be to ensure that patients who were referred are those who are most likely to need surgery [16]. Strategies to do this would include enhancing the capacity of primary care physicians to diagnose and treat musculoskeletal conditions appropriately, and also looking at a wider role for other health professionals. While most of ACREU's work on alternative models of care is mainly focused on arthritis, some of the initiatives we describe have been developed to deal with orthopaedic conditions more generally [23].

There is clearly a need for the better education of both family physicians and the general public about relevant aspects of what can be done to reduce the painful and disabling impact of arthritis and related conditions. Our analysis of OHIP billing data points to the important role that orthopaedic surgeons play in the management of musculoskeletal disorders in general. A potential strategy for increasing the availability of orthopaedic surgeons for surgery is to ensure that patients who are referred are those who are likely to need surgery. Enhancement of the capacity of primary care physicians to diagnose and treat musculoskeletal conditions is clearly important, including musculoskeletal trauma and back and other soft-tissue disorders. It is also timely given primary care reform in Ontario with the formation of primary care teams to look at other options including a wider role for other health professionals.

It may be possible to increase capacity for total joint replacement by decreasing the amount of clinic time of orthopaedic surgeons by delegating some of the routine follow-up and triage of patients to another arthritis health professional. Surgical wait times have three components: the time between a family doctor's referral to a surgeon and the date of the first consult with surgeon; the time from date of the patient's first surgical consult to the date the surgeon and patient decide to proceed with a total joint replacement; and the time between the decision date for surgery and the actual date of surgery. Studies in the UK show that pre-screening of potential surgical patients by specially trained physical therapists has increased the proportion of patients who are seen by surgeons and need surgery from 30% to 70% [21]. It is clear however from the spectrum of patients seen in ambulatory care by orthopaedic surgeons that patients are referred for advice on managing a wide range of musculoskeletal problems. It is important that the use of other health professionals does not have the unintended consequence of reducing access to needed care. These considerations underline the importance of ensuring that appropriately trained health professionals can manage the full spectrum of the non-surgical management of musculoskeletal and joint conditions, and identify those patients likely to benefit from surgical intervention.

In this regard, studies have shown that specially trained physiotherapists can assess and manage some patients with musculoskeletal conditions while working with orthopaedic surgeons [24-26]. The potential role of other health professionals in the routine management and monitoring of arthritis is a future option for the management of the increasing burden of arthritis and other chronic diseases. When addressing orthopaedic capacity, it is important to consider the total management of joint conditions across the continuum of care. Alternative models of care are discussed further in ACREU working report 2006-02 [23].

In summary, the preliminary findings for 2005/06 presented here point to the wide scope of the work of orthopaedic surgeons in dealing with arthritis, trauma and other musculoskeletal conditions in both ambulatory and hospital settings. It begins to set work in the operating room, and in particular TJR, in the context of all procedures and the major contribution made by orthopaedic surgeons to the ambulatory care of patients. The increase in surgeries in recent years is mainly accounted for by the increase in TJR. We anticipate that our findings will provide a factual basis for discussions of ways to increase efficiencies in use of orthopaedic resources and will link with ongoing initiatives to develop comprehensive chronic disease management strategies, which are relevant to people with arthritis and other musculoskeletal conditions.

Future Directions

In our next report, Part II, we will address geographic variation in orthopaedic encounters and orthopaedic surgeries by LHIN; and examine area variation in TJR and other types of surgery for arthritis and related conditions, including patterns of cross-boundary flow of people who underwent joint replacement surgery in an area outside their area of residence. In this report, we were unable to address the current availability of orthopaedic surgeons in Ontario. In Part II, we will also be able to set volume of services by orthopaedic surgeons in the context of orthopaedic surgeon provision throughout the province.

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Glossary of Terms

1. *Encounter*: an encounter is a visit to an orthopaedic surgeon where medical care was provided.

2. *Hospital encounter:* a hospital encounter is a visit to an Emergency Department, an admission as inpatient (one hospital stay was considered one encounter) or a same day surgery with an orthopaedic surgeon.

3. *Ambulatory encounter:* an ambulatory encounter is a visit to an orthopaedic surgeon in his/her office.

4. *Consultation:* a consultation is defined as an in hospital encounter with orthopaedic surgeons where either non-surgical procedures were recorded or other non-orthopaedic surgery.

5. *Orthopaedic surgery:* all surgical procedure codes recorded on the same patient, same date and the same body region.

6. *Body region*: using CIHI databases body region was defined as follows,

    a. Ankle and foot: includes ankle joint, foot ligaments, tarsal bones, intertarsal joints, foot, tarsometatarsal joints, metatarsal bones, metatarsophalangeal joints, phalanx of foot, interphalangeal joints of toe, tendons of ankle an foot

    b. Hand and wrist: wrist joint, radioulnar and carpal joints, metacarpal bones, metacarpophalangeal joints, phalanx of hand, interphalangeal joint of hand, joints of finger and hand, tendons of finger and thumb, soft tissue wrist and hand

    c. Shoulder and elbow: shoulder joint, acromiclavicular and sternoclavicular joints, rotator cuff, arm muscles around shoulder, humerus, elbow joint, muscles of forearm, radius and ulna, clavicle, scapula

    d. Hip: hip joint, femur, muscles of hip and thigh

    e. Knee: knee joint, meniscus, cruciate ligaments, collateral ligaments, patella, tibia and fibula, muscles of lower leg, soft tissue of leg

    f. Spine: spinal vertebrae, intervertebral disc, sacrum and coccyx, atlas and axis, soft tissue of back, back,

Appendix I.

Developing groupings of diagnosis codes

For this report we used data from different sources that used two different classification schemes of diagnosis. OHIP used a classification system based on ICD-9 and CIHI's databases used diagnostic codes based on ICD10. The process to create the groupings of diagnoses was similar for both sources of data where we tried to create equivalent and comparable groups.

General strategy for identifying relevant diagnosis codes

After the cohort of encounters with orthopaedic surgeons was created, a frequency distribution of all diagnoses was produced. First, diagnoses associated with musculoskeletal conditions were grouped using categories from previous work [1;27]; the remaining diagnoses were initially grouped in broader categories in such a way that diseases with clinical and epidemiological profiles were aggregated. This was an iterative process that required several consultations with team members who have orthopaedic expertise, until the following groups were formed:

- **Arthritis and related conditions:** includes osteoarthritis, rheumatoid arthritis, synovitis, ankylosing spondolytis, fibrositis, connective tissue disorders, joint derangements and other arthritis. Disseminated lupus erythematosus, scleroderma, dermatomyositis and polyarteritis were joined to form a single group of connective tissue diseases. The other arthritis and related conditions group comprised a number of relatively infrequent conditions, the majority of which relate to deformity or malfunction of joints: recurrent dislocation, ankylosis, pyogenic arthritis, and traumatic arthritis.

- **Musculoskeletal conditions (MSK)**: includes some disorders of the spine (e.g. lumbar strains, sciatica, scoliosis), conditions of the bone (e.g. osteomelytis, osteoporosis, osteochondritis), conditions of the foot (e.g. corns and calluses, hallux vagus, hammer toe, ingrown nails and onychogryposis), and other MSK conditions.

- **Traumatic conditions**: includes fractures and dislocations; strains and sprains; and other trauma (e.g. concussions, lacerations, other injuries). Fractures and dislocations of the spine are included in this category.

- **Other conditions:** includes a wide range of diseases such as benign and malignant neoplasms, conditions of the childhood and adolescence, psoriasis, bedsores, and cellulites, cerebrovascular diseases, acute poliomyelitis, obesity, and birth trauma.

Assigning a diagnosis group

The classification system of diagnoses used in OHIP consists of 3-digit truncated codes adapted from ICD9. In the OHIP database each record corresponds to a physician claim for each encounter. Each claim can only have one diagnosis code and one procedure fee code. However, for a patient's encounter it is possible to claim several codes and therefore have several diagnoses for that particular encounter. In this analysis if a patient had more than one diagnosis code in a one encounter we decided to consider all available diagnosis codes.

Each hospital encounter could have more than one diagnosis recorded (up to 25 in the DAD and up to 10 in the NACRS and the SDS). Diagnoses are further classified according to the type; for example the first diagnosis corresponds to the most responsible diagnosis (MRD), which is defined as the most significant contributor to the length of stay. Additional diagnoses are recorded that correspond to comorbidities or secondary diagnosis (a condition that had a significant contribution to the length of stay). Using only the most responsible diagnosis might not reflect all the diagnoses relevant to the orthopaedic encounter. It was decided that to use all diagnoses recorded, in addition to the most responsible diagnosis.

In both analyses, with OHIP and CIHI databases we used a hierarchical mutually exclusive classification rule to assign a diagnosis group to each MRD whenever was possible, if the MRD was an arthritis, traumatic or MSK diagnosis then this group was used. Otherwise we classified the encounters using all available secondary diagnosis. When an encounter had several diagnoses falling in different groups the following prioritization rule was applied:

1. If an encounter had a diagnosis in the 'traumatic conditions' group in combination with any other diagnosis, it was classified as being a 'traumatic conditions' encounter.
2. If an encounter had a diagnosis in the 'arthritis conditions' group in combination with any other diagnosis except a 'traumatic conditions' diagnosis, it was classified as being a 'arthritis conditions' encounter.
3. If an encounter had a diagnosis in the 'MSK conditions' group in combination with any other diagnosis except a 'traumatic conditions' or 'arthritis conditions' diagnosis, it was classified as being an encounter in the 'MSK conditions' group.

The decision to prioritize 'traumatic conditions' over 'arthritis and related conditions' and 'MSK conditions' was based on the assumption that if an individual had a traumatic diagnosis as well as other diagnosis in one encounter, the reason for that particular encounter was more likely to be the acute condition and in this case the remaining diagnoses were considered comorbidities.

Table 6. Description of the diagnosis groups used in this report

Dx groups	Diagnostic Categories
Arthritis and related	1. Inflammatory arthritis (e.g RA)
	2. Osteoarthritis
	3. Connective tissue
	4. Soft tissue (Peripheral enthesopathies, synovitis, fibrositis)
	5. Spondylosis
	6. Other arthritis
MSK	7. Other spine disorders
	8. Bone (Including conditions of the foot)
	9. Soft tissue disorders
	10. Other joint disorders
	11. Other MSK (other acquired deformities)
Trauma	12. Accidents and falls
	13. Dislocations
	14. Strains and sprains
	15. Fractures
	16. Other trauma
	17. Other injuries

Appendix II.

Developing groupings of orthopaedic procedures

Procedures performed by orthopaedic surgeons were identified using data from DAD, NACRS and SDS. In CIHI's databases each in hospital encounter recorded up to 20 procedure codes in DAD and up to 10 procedure codes in NACRS and SDS. In 2002, the procedures are being classified using the Canadian Classification of Health Interventions (CCI). This new classification system is more specific and it is organized first by body region and then by main types of interventions. In the CCI, health interventions are defined as a service performed for a client with the purpose of improving health, altering or diagnosing the course of disease or promoting wellness [28]. The term intervention is used instead of procedure to reflect the expanded scope beyond the traditional medical/surgical settings. The intervention codes are organized in eight sections.

One limitation of these data is the impossibility to link the interventions to the specific type of physician that performed them. As a starting point, a list of interventions was devised in consultation with a practicing orthopaedic surgeon. Interventions were classified into therapeutic interventions (codes recorded in section 1) and other non-surgical interventions (codes recorded in the remaining sections). Therapeutic interventions on the MSK system were included with the exception of those on the sternum, ribs, chest and abdomen.

Therapeutic interventions were further classified as surgical or non-surgical. Non-surgical procedures included, pharmacotherapy, exercise, hypothermy, hyperthermy, therapy, management of external appliance and drainage. Hospital encounters with orthopaedic surgeons where only non-surgical procedures were recorded were classified as consultations. Surgical procedures were classified according to table 7.

Table 7. Description of surgical groupings used in this report

Surgical groupings	Description in CCI classification	Description in CCP classification
TJR	Implantation of internal devices	Total joint replacement
Arthroscopic repairs	Repairs done arthroscopically. This includes joint repair with meniscectomy, meniscoplasty with or without concomitant debridement of meniscus.	Arthroscopy
Open repairs	Repairs using open approach. This includes joint repair with meniscectomy, meniscoplasty with or without concomitant debridement of meniscous.	Repair of joints, total osteotomy
Reduction with fixation	Reductions of joint with fixation device inserted into joint without fusion of joint. Codes can be found under “fixation” rubric in the CCI classification system.	Open or closed reductions of fracture with internal fixations
Reduction without fixation	Reductions of joint only. Codes can be found under “reduction” rubric in the CCI classification system.	Open or closed reductions of fracture without internal fixation
Other surgeries	Include amputation, fusion, excision, reattachment, removal of foreign body, etc.	Include amputation, fusion, excision, reattachment, removal of foreign body, etc.