Length of Stay and Achievement of Functional Milestones in a Rural First Nations Population in Northwestern Ontario during Acute-Care Admission after Total Hip Replacement: A Retrospective Chart Review

Cameal Sinclair, MScPT;* Nicole Brunton, BSc;† Wilma M. Hopman, MA;‡§
Len Kelly, MD, MClinSci, FCFP, FRRM¶

ABSTRACT

Purpose: To understand the postoperative acute-care physiotherapy course for First Nations people returning after total hip replacement (THR) to remote communities with limited rehabilitation services and to evaluate length of stay and attainment of functional milestones after THR to determine to what extent an urban-based clinical pathway is transferrable to and effective for First Nations patients in a rural setting. **Methods:** Data were collected retrospectively by reviewing charts of patients who underwent THR in the Northwest Ontario catchment area from 2007 through 2012. **Results:** For the 36 patient charts reviewed, median length of stay (LOS) at the Sioux Lookout Meno Ya Win Health Centre (SLMHC) was 7.5 days (range 2–335); median LOS from time of surgery at the regional hospital (Thunder Bay Regional Health Centre) to discharge from SLMHC was 13.5 days; and median time for mobilizing and stairs was 9 days (range 1–93). **Conclusion:** Commonly accepted urban clinical pathways are not a good fit for smaller rural hospitals from which First Nations patients return to remote communities without rehabilitation services. LOS in a rural acute-care facility is similar to LOS in an urban rehabilitation facility.

Key Words: arthroplasty, hip replacement; osteoarthritis; postoperative care; rural health

RÉSUMÉ

Objet: Comprendre le parcours de soins de physiothérapie postopératoire de courte durée pour les membres des Premières Nations qui retournent dans des collectivités éloignées offrant des services de réadaptation limités après une arthroplastie totale de la hanche (ATH); évaluer la durée du séjour et l'atteinte des jalons fonctionnels à la suite d'une ATH afin de déterminer dans quelle mesure et avec quelle efficacité le cheminement clinique de patients des Premières Nations effectué en milieu urbain peut être transféré en milieu rural. **Méthodes:** Les données ont été recueillies de façon rétrospective en examinant les dossiers de patients qui ont subi une arthroplastie totale de la hanche dans la circonscription hospitalière du nord-ouest de l'Ontario entre 2007 et 2012. **Constatations:** Pour les 36 dossiers de patient examinés, la durée du séjour (DDS) médiane au centre de santé Meno Ya Win de Sioux Lookout était de 7,5 jours (étendue: de 2 à 335); la DDS médiane à compter du moment de l'intervention chirurgicale à l'hôpital régional (Centre régional des sciences de la santé de Thunder Bay) jusqu'au départ du centre de santé Meno Ya Win de Sioux Lookout était de 13,5 jours; et le temps médian de recouvrement de la capacité à marcher et à monter des escaliers était de 9 jours (étendue: de 1 à 93). **Conclusion:** Les cheminements cliniques en milieu urbain généralement reconnus ne conviennent pas aux petits hôpitaux ruraux à partir desquels les patients des Premières Nations retournent dans des collectivités éloignées qui n'offrent pas de services de réadaptation. La DDS dans un centre de soins actifs en milieu rural est semblable à la DDS dans un centre de réadaptation en milieu urbain.

Total hip replacement (THR), one of the most common orthopaedic procedures performed in the province of Ontario, Canada,¹ has been shown to be a valuable and cost-effective surgical procedure for people with severe hip osteoarthritis (OA) and other related hip musculoskeletal disorders.^{2–6} The rate of THR in Northwest

Ontario, which has a population of more than 45,000 First Nations patients in its catchment area, is 27% higher than the overall rate for Ontario.^{7,8} Our study evaluated in-hospital physiotherapy after THR in this catchment area.

From the: *Sinclair Physical Therapy Services and †Sioux Lookout Meno Ya Win Health Centre; ¶Division of Clinical Sciences, Northern Ontario School of Medicine, Sioux Lookout; ‡Clinical Research Centre, Kingston General Hospital, and §Department of Public Health Sciences, Queen's University, Kingston, Ont.

Correspondence to: Cameal Sinclair, Sinclair Physical Therapy Services, 45 Blue Heron Dr., Sioux Lookout, ON P8T 0A4; cameal.sinclair@gmail.com.

Contributors: All authors designed the study; collected, analyzed, and interpreted the data; drafted or critically revised the article; and approved the final draft.

Competing Interests: None declared.

Physiotherapy Canada 2015; 67(3):268–272; doi:10.3138/ptc.2014-45

BACKGROUND

OA is responsible for more pain, long-term disability, and functional limitations than any other chronic disease and accounts for 75%–95% of THR.^{9–11} According to the Canadian Joint Replacement Registry, the incidence of THR increased by 59% from 1997 to 2007.¹²

Among First Nations adults in Canada, arthritis is the number-one self-reported medical condition, according to the national First Nations Regional Longitudinal Health Survey.¹³ In another regional health survey, 30% of respondents identified it as a major health concern.¹⁴ Arthritis produces greater rates of disability among First Nations people than among other Canadians; First Nations people with arthritis experience a greater burden of illness, which is linked to economic and social conditions.^{15,16} First Nations people with arthritis are more likely to have unfavourable health profiles, with a higher incidence of smoking, obesity, and other comorbidities than non-First Nations populations.¹⁵ Postoperative physiotherapy is particularly important for this population because after discharge they return to remote settings with few, if any, in-community rehabilitation services. Many communities in the region have no public transportation, paved sidewalks, or roads and are accessible only by plane.

Physiotherapy has been identified as a standard and vital intervention for optimizing function and independence while minimizing the risk of hip dislocation, wound infection, deep vein thrombosis, and pulmonary embolism after THR.¹ As well as lowering total cost of care and increasing the probability of discharge home, physiotherapy in acute care has been found to be directly related to functional improvements in patients with lower extremity issues, including total joint replacement (TJR).⁹ Early and more intensive rehabilitation has also been shown to result in earlier attainment of functional goals, decreased long-term disability, and decreased cost of care after surgery.^{6,17–19}

Functional milestones after THR include transfers, ambulation with or without an assistive device, and negotiating stairs;⁵ these activities are categorized as either assisted or unassisted.⁵ More specific functional milestones include supine-to-sit transfer, sit-to-stand transfer, ambulation of 30 m (100 ft), and ability to climb stairs.³

In 2011, a large urban study in Toronto undertook identification of factors that affect systemwide performance for primary elective unilateral hip and knee TJR.²⁰ Integral to its approach was the development of clinical pathways: structured care plans within an institution, based on best practice and team experience, which act as a means of standardizing treatment. Use of clinical pathways after THR reduces hospital length of stay (LOS), facilitates effective use of resources, and maintains quality of care without compromising patient safety.^{4,21–23} One result of this Toronto initiative was

an increased rate of discharge from acute care to home, as opposed to an inpatient rehabilitation facility, after surgery. A key expectation of the Toronto study was that THR patients would have adequate and timely access to appropriate rehabilitation services in the community.²⁰

Although these advances provide evidence of the importance of physiotherapy to early attainment of functional milestones and shorter in-hospital LOS, evidence as to whether these findings are relevant in medically and rehabilitation-underserved rural settings and among First Nations patients is still lacking.

The Sioux Lookout Meno Ya Win Health Centre (SLMHC) is a unique rural acute-care facility serving a largely First Nations population of 28,000, the majority of whom live in remote communities in which community-based rehabilitation and physiotherapy services are not typically available.²⁴ SLMHC serves as a base for primary care services that fly in to remote First Nations communities. The hospital also provides both initial referrals to the Thunder Bay Regional Health Centre (where orthopaedic services are available) and post-operative rehabilitation services before patients return home. LOS and attainment of functional milestones after THR in these unique circumstances have not previously been studied. To design clinical pathways appropriate to the rural setting and cultural needs of the population served by SLMHC, we need regional information and benchmarks; our study was therefore designed to evaluate LOS and attainment of functional milestones after THR at SLMHC, with the goal of providing valuable data for use in developing clinical pathways appropriate to rural care settings and care involving First Nations people.

METHODS

Through a 5-year retrospective review of our medical records (2007–2012) and Canadian Institute for Health Information postal code-specific data, we identified 36 patients admitted for rehabilitation after THR or partial hip replacement (PHR), most of whom underwent surgery at Thunder Bay Regional Hospital, approximately 300 km away, and were transferred to the SLMHC for postoperative rehabilitation.

We collected data on 25 variables pertaining to patient demographics, functional milestones, LOS, comorbidities, and surgical interventions. To ensure cultural appropriateness, we consulted with the Special Advisor for First Nations Healthcare at SLMHC; ethics approval was granted by the SLMHC Research Review and Ethics Committee, which includes First Nations representation. Data were entered into an Excel spreadsheet and imported into IBM SPSS Statistics Version 21.0 for Windows (IBM Corp., Armonk, NY) for analysis. Data were analyzed descriptively, including means, standard deviations, quartiles, and medians for continuous data and frequencies and percentages for categorical data.

Table 1 Characteristics of Patients with Total Hip Replacement (*n* = 36)

Characteristics	No. (%) of participants
Sex	
Female	26 (72.2)
Male	10 (27.8)
First Nations status	
Yes	34 (94.4)
No	2 (5.6)
Comorbidities	
OA	25 (69.4)
RA	5 (13.9)
Smoking	11 (30.6)
Diabetes	17 (47.2)
Pre-surgery living situation	
Home alone	6 (16.7)
Home with others	25 (69.4)
Data not available	5 (13.9)
Home location	
On reserve	29 (80.6)
Local township	7 (19.4)
Stairs in home	
Yes	25 (69.4)
No	4 (11.1)
Data not available	7 (19.5)
Operated side	
Left	15 (41.7)
Right	21 (58.3)
Postoperative WB status	
Full WB	21 (58.3)
Partial WB	3 (8.3)
Toe touch WB	6 (16.7)
Non-WB	3 (8.3)
Data not available	3 (8.4)

OA = osteoarthritis; RA = rheumatoid arthritis; WB = weight-bearing.

RESULTS

We collected data from a total of 36 patient charts; 34 patients (94.4%) had First Nations status. Mean age was 62.0 (SD 16.0) years, and all 36 had OA preoperatively. Demographic and surgical intervention characteristics of the study sample are shown in Table 1.

Length of Stay

LOS at SLMHC was preceded by a short postoperative stay in the regional surgical hospital for immediate care and some initial rehabilitation; LOS at the regional hospital also depended on availability of air ambulance transfer services. From the date of surgery at the regional hospital, median overall LOS was 13.5 days (range 6–338), including a median 6-day postoperative period before transfer to SLMHC. The LOS of interest in our study began at inpatient admission to SLMHC and ended at discharge from inpatient physiotherapy services. Median LOS was 7.5 days (range 2–335); 25% of patients were discharged by day 5, and 75% were discharged by day 17.8.

Table 2 Level of Achievement of Functional Milestones (*n* = 36)

Functional milestone	No. (%) of participants
Supine to sit	
Achieved, assisted	3 (8.3)
Achieved, unassisted	28 (77.8)
N/A	5 (13.9)
Sit to stand	
Achieved, assisted	4 (11.1)
Achieved, supervision	0 (0)
Achieved, unassisted	27 (75.0)
N/A	5 (13.9)
Ambulate ≥30 m	
Not ambulatory	0 (0)
<30 m, >3 m	13 (36.1)
Achieved, assisted	1 (2.8)
Achieved, unassisted	20 (55.6)
N/A	2 (5.6)
Negotiate stairs	
Achieved	18 (50)

N/A = not available.

Table 3 Days Taken for Patients to Achieve Functional Milestones after Surgery

Functional milestone	No. of days		
	25th percentile	Median	75th percentile
Supine to sit	6.0	8.0	11.0
Sit to stand	6.0	8.0	11.0
Ambulate ≥30 m	7.0	9.0	16.0
Stairs	6.0	9.0	13.0
LOS, SLMHC only	5.0	7.5	17.75
LOS, surgery to discharge	10.0	13.5	23.5

Note: The LOS in this study was defined as the time of inpatient admission to the SLMHC to the time of discharge from inpatient physiotherapy services. LOS = length of stay; SLMHC = Sioux Lookout Meno Ya Win Health Centre.

Functional milestones

Of the functional milestones measured (see Table 2), negotiating stairs was the least frequently achieved, at 40%. Five patients had a ramp to access their home and did not use stairs as their functional baseline; one patient was deemed unsafe to climb stairs and was transferred to an extended care facility. For both ambulation for more than 30 m (100 ft) and safely climbing stairs, the median time to achieve milestones from date of surgery was 9 days (see Table 3).

DISCUSSION

LOS and clinical pathway

The purpose of our study was to evaluate the LOS and achievement of functional milestones to determine the transferability and effectiveness of urban-based clinical

pathways for First Nations patients who access services in a rural acute-care setting. We found that median LOS from time of surgery to discharge home was 13.5 days and that median time from admission to SLMHC to discharge was 7.5 days—both longer than the median LOS for rehabilitation hospitals in urban settings. In the Toronto Central Local Health Integration Network, the median rehabilitation hospital LOS is 7 days, and 73% of patients are discharged within 13 days;²⁵ the Provincial Orthopaedic Expert Panel's recommended best-practice care for primary unilateral TJR would include an average acute-care LOS of 4.4 days.²⁵ Although SLMHC is designated as an acute-care facility, its LOS numbers are more comparable to (and longer than) those of an urban rehabilitation facility.

A prerequisite for achieving urban-generated best-practice goals is ready access to outpatient or community-based rehabilitation services.²⁰ Meeting this need is a challenge for most remote communities in Northwest Ontario, which do not have access, or have only limited access, to rehabilitation services. The majority of patients in our study sample lived in such remote communities, and their geographic location thus directly affected their health status and access to services—an identified problem for remote First Nations communities.²⁶

For rehabilitation facilities, current clinical care pathways suggest a 7-day LOS.²⁵ However, this LOS is directly influenced by patient goals, patient needs, and the availability of adequate supports in the patient's home environment.²⁷ Although receiving rehabilitation through community rehabilitation services is ideal for the typical patient in an urban setting, it is likely not ideal for the typical patient in an underserved rural setting. When most of a facility's patients are from a remote location, a 4.4- or 7-day clinical care pathway is inadequate. Patients at SLMHC during the period studied received, on average, less than 1 hour of physiotherapy services per day, 5 days per week; as in many rural hospitals, rehabilitation services were not available on weekends.

Patients in this study achieved most or all of their functional milestones within 10 days after surgery, which suggests that patients' rehabilitation LOS depends on additional factors beyond the achievement of functional milestones, including limited availability of rehabilitation services in the community, transportation arrangements, management of comorbidities, access to equipment, and other socio-economic factors that affect discharge needs. More research is required to determine what these factors are and what role they play in patients' LOS.

All patient charts in our sample had an indication of OA; the average age was 62.0 years, whereas the Canadian average for people undergoing THR is 66 years.²⁸ Whether First Nations people experience OA at an earlier age or experience greater related disability remains to

be studied; a larger study will be required to assess this because our sample included only 2 non-Aboriginal patients.

Other implications

Partly because of its location and the population it serves, SLMHC, an acute-care facility, provides inpatient rehabilitation care in a time frame comparable to that of designated rehabilitation centres in urban settings. The situation is unique in that THR patients have their surgery in another facility and are then transferred to SLMHC for continued care and discharge. Because transportation in our region is by aeroplane—and aeroplanes are also used for emergency patient transfers—elective transfers are subject to triaging and consequent delays; the development of a clinical pathway for this population must take this unique transportation situation into account. In addition, clinical pathways in more rural facilities must identify what best practice means for patients, giving due consideration to other factors such as socio-economic status, geographic location, and availability of community-based rehabilitation.

The possibilities of telerehabilitation require additional evaluation to determine whether it can become a viable treatment option to decrease LOS among First Nations patients in rural settings after THR or PHR.

LIMITATIONS

Our pilot study has several limitations. First, the sample size was relatively small. Second, our analysis did not include data on occupational therapy because access to this service was inconsistent during the period under study. Finally, this pilot study was not designed to determine pre-surgical functional status of patients or its association with outcomes.

CONCLUSION

The application of clinical pathways developed for urban populations may not be appropriate for more rural populations, including First Nations populations. Other factors beyond achievement of functional milestones must be considered in creating a physiotherapy-specific clinical pathway. Taking into account socio-economic factors and available community resources, a clinical pathway should be developed in the context of the population and location it is intended to serve. In particular, First Nations patients returning to remote communities with limited rehabilitation and public transportation services will need relevant benchmarks established before they return home. Ontario's Senior Strategy in 2013 identified the need for Aboriginal senior adults to access culturally appropriate care and for community consultation in developing such services; rehabilitation services for the management of chronic diseases may be a good place to start.²⁹

KEY MESSAGES

What is already known on this topic

In urban centres, clinical pathways for postoperative care of patients after THR include LOS recommendations of 4.4 days in an acute-care facility and 7 days in a rehabilitation facility.

What this study adds

Rural acute-care facilities that serve patients returning to remote communities without access to rehabilitation services need to configure their clinical pathways to reflect their needs and realities.

REFERENCES

- Health Quality Ontario. Physiotherapy rehabilitation after total knee or hip replacement: an evidence-based analysis. *Ont Health Technol Assess Ser.* 2005;5(8):1–91. Medline:23074477
- Chang RW, Pellisier JM, Hazen GB. A cost-effectiveness analysis of total hip arthroplasty for osteoarthritis of the hip. *JAMA.* 1996;275(11):858–65. <http://dx.doi.org/10.1001/jama.1996.03530350040032> Medline:8596224
- Zavadak KH, Gibson KR, Whitley DM, et al. Variability in the attainment of functional milestones during the acute care admission after total joint replacement. *J Rheumatol.* 1995;22(3):482–7. Medline:7783066
- Juliano K, Edwards D, Spinello D, et al. Initiating physical therapy on the day of surgery decreases length of stay without compromising functional outcomes following total hip arthroplasty. *HSS J.* 2011;7(1):16–20. <http://dx.doi.org/10.1007/s11420-010-9167-y> Medline:22294953
- Kroll M, Ganz S, Backus S, et al. A tool for measuring functional outcomes after total hip arthroplasty. *Arthritis Care Res.* 1994;7(2):78–84. <http://dx.doi.org/10.1002/art.1790070206> Medline:7857997
- Ganz SB. A historic look at functional outcome following total hip and knee arthroplasty. *Top Geriatr Rehabil.* 2004;20(4):236–52. <http://dx.doi.org/10.1097/00013614-200410000-00004>.
- Lewis D, Connley D, Knott C, et al. Social forecasting of demand for rehabilitation for Ontario's elderly [Internet]. Hamilton (ON): Regional Geriatric Program Central; 2006 [cited 2015 Jan 15]. Available from: <http://www.rgpc.ca/files/Demand%20for%20Rehabilitation%20for%20Elderly%20CHARTS%20AND%20TABLES.pdf>
- North West LHIN. Population health profile [Internet]. Thunder Bay (ON): Local Health Integration Network; 2011 [cited 2015 Jan 15]. Available from: http://www.northwestlhin.on.ca/AboutOurLHIN/~media/sites/nw/uploadedfiles/Home_Page/Report_and_Publications/Population%20Health%20Profile%20Oct%202011%20FINAL.pdf
- Soever L, MacKay C. Best practices across the continuum of care for total joint replacement. Toronto: Greater Toronto Area Rehabilitation Network; 2005.
- Health Canada. Arthritis in Canada, an ongoing challenge. Ottawa: Health Canada; 2003. Cat. no. H39-4/14-2003E.
- Canadian Institute for Health Information. Hip and knee replacements in Canada—Canadian Joint Replacement Registry (CJRR) 2014 annual report. Ottawa: The Institute; 2014.
- Canadian Institute for Health Information. Hip and knee replacements in Canada: 2008–2009 Annual Report. Ottawa: The Institute; 2009.
- First Nations Centre. First Nations regional longitudinal health survey (RHS) 2002/3: Results for adults, youth and children living in First Nations communities. Ottawa: First Nations Centre; 2005.
- Sioux Lookout First Nations Health Authority. Anishinabe health plan—Sioux Lookout First Nations health plan [Internet]. Sioux Lookout (ON): The Authority; 2006 [cited 2015 Jan 15]. Available from: <http://www.sfnha.com/files/4114/0007/2122/AHP-FINAL-REPORT.pdf>
- Ng C, Chatwood S, Young TK. Arthritis in the Canadian Aboriginal population: North-south differences in prevalence and correlates. *Chronic Dis Can.* 2010;31(1):22–6. Medline:21176412
- Clement ND, Muzammil A, Macdonald D, et al. Socioeconomic status affects the early outcome of total hip replacement. *J Bone Joint Surg Br.* 2011;93(4):464–9. <http://dx.doi.org/10.1302/0301-620X.93B4.25717> Medline:21464483
- Munin MC, Rudy TE, Glynn NW, et al. Early inpatient rehabilitation after elective hip and knee arthroplasty. *JAMA.* 1998;279(11):847–52. <http://dx.doi.org/10.1001/jama.279.11.847> Medline:9515999
- Larsen K, Hansen TB, Thomsen PB, et al. Cost-effectiveness of accelerated perioperative care and rehabilitation after total hip and knee arthroplasty. *J Bone Joint Surg Am.* 2009;91(4):761–72. <http://dx.doi.org/10.2106/JBJS.G.01472> Medline:19339559
- Ganz SB, Wilson PD Jr, Cioppa-Mosca J, et al. The day of discharge after total hip arthroplasty and the achievement of rehabilitation functional milestones: 11-year trends. *J Arthroplasty.* 2003;18(4):453–7. [http://dx.doi.org/10.1016/S0883-5403\(03\)00070-6](http://dx.doi.org/10.1016/S0883-5403(03)00070-6) Medline:12820088
- GTA Rehab Network. MSK Flow task group initiative primary, elective, unilateral total joint replacement. Toronto: The Network; 2011.
- Gregor C, Pope S, Werry D, et al. Reduced length of stay and improved appropriateness of care with a clinical path for total knee or hip arthroplasty. *Jt Comm J Qual Improv.* 1996;22(9):617–28. Medline:8904690
- Barbieri A, Vanhaecht K, Van Herck P, et al. Effects of clinical pathways in the joint replacement: a meta-analysis. *BMC Med.* 2009;7(32):32. Medline:19570193
- Dowsey MM, Kilgour ML, Santamaria NM, et al. Clinical pathways in hip and knee arthroplasty: a prospective randomised controlled study. *Med J Aust.* 1999;170(2):59–62. Medline:10026684
- Walker R, Cromarty H, Kelly L, et al. Achieving cultural safety in Aboriginal health services: implementation of a cross-cultural safety model in a hospital setting. *Diversity in Health and Care.* 2009;6(1):11–22.
- Implementing stroke and orthopaedic best practices in the Toronto Central LHIN: analysis of system wide impacts [Internet]. Toronto: Toronto Central LHIN; 2012 [cited 2015 Jan 15]. Available from: <http://www.gtarehabnetwork.ca/uploads/File/PublicationsLHINreports/TCLHIN—Implementing-Stroke-and-Ortho-Best-Practices—HAY-Report—Mar-2012.pdf>
- Newbold KB. Problems in search of solutions: health and Canadian aboriginals. *J Community Health.* 1998;23(1):59–73. <http://dx.doi.org/10.1023/A:1018774921637> Medline:9526726
- Greater Toronto Area Rehab Network. MSK total joint replacement rehab definitions framework. Toronto: Greater Toronto Area Rehab Network; 2010 [cited 2015 Jan 15]. Available from: <http://www.gtarehabnetwork.ca/uploads/File/tools/rehab-definitions-conceptual-framework-msk-totaljoint.pdf>.
- Passias P, Bono J. Total hip arthroplasty in the older population. *Geriatrics and Aging.* 2006;9(8):535–43.
- Sinha SK. Living longer, living well. Ottawa: Ministry of Health and Long-Term Care; 2013 [cited 2015 Jan 15]. Available from: http://www.health.gov.on.ca/en/common/ministry/publications/reports/seniors_strategy/docs/seniors_strategy.pdf