ELSEVIER

Physiotherapy 100 (2014) 176–181

Physiotherapy

Predicting discharge outcomes after total knee replacement using the Risk Assessment and Predictor Tool

C. Tan [a,*], G. Loo [a,1], Y.H. Pua [b], H.C. Chong [b], W. Yeo [c], P.H. Ong [b], N.N. Lo [d], G. Allison [e]

[a] *Allied Health Division, Singapore General Hospital, Singapore*
[b] *Department of Physiotherapy, Singapore General Hospital, Singapore*
[c] *Orthopaedic Diagnostic Centre, Singapore General Hospital, Singapore*
[d] *Department of Orthopaedic Surgery, Singapore General Hospital, Singapore*
[e] *Faculty of Health Sciences, Curtin University of Technology, Bentley, WA, Australia*

Abstract

Objective To explore the use of the Risk Assessment and Predictor Tool (RAPT) as a pre-operative tool to predict postoperative discharge destination and length of stay for patients undergoing total knee replacement (TKR) in Singapore.

Participants and setting A cohort of 569 patients undergoing primary TKR at the Singapore General Hospital were recruited prospectively from November 2009 to June 2010.

Intervention All patients completed a modified RAPT questionnaire pre-operatively, and underwent standard clinical pathway guidelines for TKR throughout the study.

Main outcome measures Actual discharge destination (ADDest) and length of stay (LOS).

Design Total RAPT score and preferred discharge destination (PDD) were recorded pre-operatively, while ADDest and LOS were obtained immediately after discharge. Multivariable logistic regression and multivariable regression analysis were used to determine whether the RAPT items and score could predict the discharge outcomes.

Results Total RAPT score was a significant predictor of LOS for patients following TKR ($R = 0.24$, $P < 0.001$); the higher the RAPT score, the longer the LOS. Total RAPT score was also a significant predictor of actual discharge to home [odds ratio (OR) 2.32, 95% confidence interval (CI) 1.11 to 4.85]. PDD was a significant predictor for LOS ($R = 0.22$, $P < 0.001$) and ADDest ($R = 0.33$, $P < 0.001$). Patients who chose to be discharged home were more likely to be directly discharged home (OR 9.79, 95% CI 5.07 to 18.89, $P < 0.001$).

Conclusion Total RAPT score and PDD were significant predictors of ADDest and LOS for patients following TKR in Singapore. The ability to predict discharge outcomes following TKR could assist caregivers, healthcare professionals and administrators in optimising care and resource allocations for patients.

Keywords: Knee; Risk Assessment and Predictor Tool; Total knee replacement; Length of stay

Introduction

Total knee replacement (TKR) is a common surgical procedure for patients with painful arthritis of the knee. In Singapore, knee replacement surgery is the most common type of joint replacement surgery, and most patients are elderly [1]. In total, 1571 TKR procedures were performed in 2009 at Singapore General Hospital (SGH) [1], which is the largest public hospital in Singapore. This increasing trend is expected to continue due to the predicted growth of the geriatric population in Singapore and elsewhere [2,3].

After TKR surgery, patients commence their rehabilitation in the hospital surgical unit. Previous studies have attempted to identify patients who will require longer inpatient hospitalisation or length of stay (LOS) before discharge to a post-acute care setting [4–10].

The Risk Assessment and Predictor Tool (RAPT), a pre-operative predictor tool, was developed and validated in Melbourne by Oldmeadow *et al.* [11,12]. This tool uses six pre-operative parameters to identify the patient's potential need for intensive rehabilitation following TKR. The RAPT

* Corresponding author at: SingHealth Services, 168 Jalan Bukit Merah Connection 1, Tower 3, #06-08, Singapore 150168, Singapore.
Tel.: +65 6326 5281; fax: +65 6270 7047.
E-mail addresses: alliedhealth.research@sgh.com.sg, celia.tan.i.c@sgh.com.sg (C. Tan).

[1] Has moved to Republic Polytechnic, Singapore.

0031-9406/$ – see front matter © 2013 Chartered Society of Physiotherapy. Published by Elsevier Ltd. All rights reserved.
http://dx.doi.org/10.1016/j.physio.2013.02.003

was shown to predict patient discharge to a rehabilitation facility following TKR with 89% accuracy for those with a high-risk score. Total RAPT score correctly predicted the discharge destination with 75% accuracy [11].

In Singapore, however, no predictive tools for TKR are used in any of the hospitals. Therefore, if the RAPT was found to be valid for TKR protocols in hospitals in Singapore, it would be a useful tool for better resource allocation and information for surgeons, clinicians, physiotherapists, caregivers and administrators.

As such, the aim of the present study was to explore the use of the RAPT as a pre-operative predictor tool for patients undergoing TKR in Singapore. Specifically, the outcomes of interest in this study were LOS and actual discharge destination (ADDest).

Materials and methods

Patient recruitment

Patients admitted for elective primary TKR at the Orthopaedic Diagnostic Centre, Orthopaedic Department, SGH were recruited prospectively from November 2009 to June 2010. Patients undergoing an elective primary TKR were included, regardless of whether the arthroplasty was a unilateral, bilateral or compartmental joint replacement. Patients were excluded from the study if they were admitted for TKR due to trauma, congenital deformity or cancer.

Instrument

Each patient completed the seven questions on the RAPT questionnaire (Table A, see supplementary online material). The total RAPT score was derived from the first six items in the RAPT questionnaire, which included age, gender, ambulatory status, use of walking aids, community support (home help), and patient's choice to live with a caregiver following surgery. The seventh question (Preferred Discharge Destination, PDD) asked whether the patient would prefer to be discharged home (non-institutional destination) or to a community hospital (institutional non-acute care destination). This question is not included in the total RAPT score.

Questions 3 and 4 in the RAPT questionnaire were modified to be more applicable to the local context in Singapore (Table B, see supplementary online material) using the walking range and walking aids options from the Knee Society Clinical Rating Score [13]. For Questions 5, 6 and 7, specific texts were defined to enable patients to answer the questions contextually. A high total RAPT score (maximum 12) indicates a low risk for intensive rehabilitation or extended care and vice versa.

Assessment procedure

All patients referred for elective TKR were assessed routinely by the physiotherapist at the Orthopaedic Diagnostic Centre. Before and after surgery, patients undergoing TKR were managed using the standard hospital clinical pathway for TKR. Pre-operative assessments for hospital admission usually consist of routine blood tests, X rays, electrocardiograms, and other functional range of motion and strength tests. The RAPT questions were included in the pre-operative assessment of the patient during the study period. Non-English-speaking patients were assisted with translation to complete the RAPT questions. These pre-operative assessments were conducted within 6 weeks prior to the TKR procedure.

On the same day after a TKR procedure, patients are taught routine cardiopulmonary exercises and lower limb mobilisation and strengthening exercises in bed. Patients are required to start partial weight bearing with a walking aid on post-operation if their vital signs are stable. All patients are discharged with a walking aid to assist with ambulation for the first month or as long as necessary, with instructions to continue exercises for lower limb strengthening. Postoperative information such as LOS and discharge outcomes was recorded immediately by the inpatient physiotherapist when the patient was discharged from the ward. Informed consent was obtained from all study participants, and this study was approved by SingHealth Centralised Institutional Review Board.

Statistical analyses

Total RAPT scores were grouped into three levels for risk of complications and need for intensive rehabilitation: <6, high risk; between 6 and 9, medium risk; and >9, low risk [11]. Linear regression analysis was performed to determine if there was any correlation between RAPT score and ADDest and LOS. Associations between individual RAPT items and ADDest were analysed using Chi-squared test and multivariate logistic regression. Associations between LOS and RAPT were analysed using *t*-tests and analysis of variance. All statistical calculations were performed using Statistical Package for the Social Sciences Version 17.0 (SPSS Inc., IBM Corp., New York, USA).

Results

Patient characteristics and RAPT scores

In total, data for 569 patients were analysed (569/597, 95%). Twenty-eight patients were excluded due to missing RAPT information. Patient demographic data are summarised in Table 1. The distribution of patients differed significantly between the three risk groups, with the highest percentage of patients in the medium-risk group (60%, $P < 0.05$). The mean total RAPT score was 8.0 [standard deviation (SD 2.1)] out of 12, the mean age of the patients was 66.7 (SD 8.0) years, and 78% of the patients were women. Eighty percent of patients were ambulant within 350 m or more, and 64% could ambulate without a walking aid. Seventy-nine percent of patients had a caregiver at