


## SHORT REPORT

# The impact of the COVID-19 pandemic on different aspects of the delivery of physical therapy after total hip or knee surgery: Perspectives of patients and physical therapists

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## KEYWORDS

orthopaedics, physiotherapy, rehabilitation

## 1 | INTRODUCTION

The lifetime risk of total hip or knee arthroplasty (THA/TKA) following a diagnosis of osteoarthritis is approximately 14% and 30% respectively (Burn et al., 2019). In the Netherlands 99% of the patients receive physical therapy (PT) after THA/TKA surgery, with an average frequency of one to two sessions per week and a duration of more than 12 weeks (Peter et al., 2016). The effectiveness of post-operative PT in improving function, range of motion and quality of life has been extensively demonstrated (Kampshoff et al., 2018; Liebs et al., 2010; Lowe et al., 2007; Minns Lowe et al., 2009; Rahmann et al., 2009).

During the COVID-19 pandemic and ensuing lockdown, from 23rd of March 2020 until 11 May 2020, PT practices were closed and physical therapists were advised and supported by the Dutch Society for Physical Therapy (KNFG) to deliver their interventions by means of remote care, that is, telephone, e-mail or video consultations (KNGF, 2020). After practices were re-opened, physical therapists were still advised to provide remote care, work with personal protection equipment and keep 1.5 m distance of the patients as much as possible (KNGF, 2020). From February 2022 on, these advises are still given by the KNFG with the exception of remote care (KNGF, 2022).

Tele-rehabilitation showed to be promising in musculoskeletal PT during the COVID-19 pandemic (Turolla et al., 2020).

So far, it remains unclear to what extent the COVID-19 pandemic, the temporary closure of practices and the advices on remote care have influenced the delivery of PT after THA/TKA. Although the number of surgeries decreased during the first wave, patients who were operated just before the first lockdown were in need of postoperative PT precisely in the period where PT practices were closed.

Therefore, the aim of this study was to determine the impact of the COVID-19 pandemic on the delivery of PT after THA/TKA in the Netherlands, both from the perspectives of patients and their treating physical therapists.

## 2 | METHOD

### 2.1 | Study design and setting

The present study on the impact of the COVID-19 pandemic on the delivery of PT after THA/TKA used data obtained in the context of a randomized controlled trial, as well as additional information

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gathered among patients and physical therapists participating in that trial during the COVID-19 pandemic.

Participants of the present study were selected from the intervention arm of the Physiotherapeutic Treat-to-target Intervention after Orthopaedic surgery study (PATIO) (Trial ID NTR7129) (Groot et al., 2020). Ethical approval was obtained from the Medical Ethics Committee of the Erasmus MC, Rotterdam, The Netherlands (NL61763.078.17). All participants gave informed consent in accordance with the Handbook for Good Clinical Research Practice of the World Health Organization and Declaration of Helsinki principles (World Medical, 2013).

The protocol of the PATIO study was described earlier (Groot et al., 2020). In brief, the intervention concerned an optimised PT care pathway, where the content, frequency and duration of treatment were determined by the achievement of individual, functional milestones and treatment goals. All physical therapists delivering the intervention took part in a physical training. After the closure of the PT practices on 23 March 2020, physical therapists who were treating patients from the intervention group were instructed by the PATIO study group to continue the delivery of the intervention according to the recommendations from the government and their professional organization. These recommendations concerned providing remote care such as telephone or video call, work with personal protection equipment and keep 1.5 m distance of the patients as much as possible(8).

## 2.2 | Patients and physical therapists

We selected patients from the intervention group of the PATIO study, because the characteristics of the PT treatment were monitored in detail for this group. Moreover, the selection was limited to those patients who had completed at least the baseline assessment of the PATIO study and of whom the physical therapist had provided information on the delivery of the intervention. Patients using PT from 1 March 2020 until the end period of this study (December 2021) were classified in the COVID period group and those using PT in the period before March 2020 were classified in the pre-COVID period group.

## 2.3 | Assessments

Paper or electronic questionnaires were administered to patients preoperatively and 6 months after THA/TKA surgery. PT questionnaires were administered in both patients and physical therapists when the patient's PT treatment was completed.

### 2.3.1 | Sociodemographic and disease characteristics of patients and physical therapists

The following sociodemographic information was collected at baseline: age, sex, height and weight to calculate the body mass index

(BMI), treated joint (hip or knee), living condition (alone, with partner and/or kids), education (low, middle, high) (Opleidingsniveau, 2019) and the presence of comorbidities using a questionnaire developed by the Dutch Central Bureau of Statistics (CBS) (Reeuwijk et al., 2010). In physical therapists, their years of work experience and specialisation was collected.

### 2.3.2 | Physical functional status

At baseline, physical functional status was assessed with short versions of the validated Dutch translation of the Hip disability and Osteoarthritis Outcome Score (HOOS-PS) (de Groot et al., 2007) and Knee injury and Osteoarthritis Outcome Score (KOOS-PS) (de Groot et al., 2008), respectively yielding a score ranging from 0 (severe functional impairments) to 100 (no functional impairments). Functional limitations in several daily activities and pain intensity were assessed by the Oxford Hip score (OHS) (Gosens et al., 2005) or Oxford Knee Score (OKS) (Haverkamp et al., 2005), with overall scores running from 0 to 48 with 48 being the best functional outcome. Hip and knee pain severity in rest and during activities in the past week were assessed by the Numeric Rating Scale (NRS) (McCaffery, 2001), with the score ranging from 0 (no pain) to 10 (worst pain imaginable).

### 2.3.3 | Impact of covid-19 pandemic on pt delivery

Patients and their physical therapists received a questionnaire on the PT treatment after the full completion of the PT treatment. This questionnaire included several questions about the frequency, duration and content of the given PT treatment and was based on previous research of Peter et al. (2016). Questions about duration and frequency of PT were reported by the physical therapists. Additionally, from May 2020 onwards questions were added regarding the possible impact of COVID-19 pandemic on different aspects of PT treatment.

## 2.4 | Statistical analysis

Descriptive statistics (mean and standard deviation (SD) or percentage) were used to present the general characteristics of the study population, and the results of the questionnaires. Characteristics of patients, physical therapists and the PT treatment were stratified between the COVID-19 period group and the pre-COVID-19 period group. All analyses were performed using SPSS software, version 25.0. Armonk, New York: IBM Corporation.

## 3 | RESULTS

Baseline characteristics of the study population and their physical therapists are shown in Table 1.

**TABLE 1** Baseline characteristics of patients participating in a study on postoperative physical therapy after THA or TKA and their treated physical therapists

	THA patients		TKA patients		Physical therapists N = 99
	Pre-COVID period n = 73	COVID period n = 39	Pre-COVID period n = 66	COVID period n = 40	
Age, years	64.8 (9.3)	66.5 (9.0)	66.4 (6.5)	66.4 (7.0)	-
Sex, female, n (%)	38 (52.1)	16 (41.0)	39 (59.1)	24 (60.0)	-
BMI, kg/m <sup>2</sup>	27.2 (4.6)	26.7 (4.2)	29.1 (5.2)	30.0 (5.4)	-
Living condition, n (%)					
-Alone	21 (28.8)	5 (12.8)	11 (16.7)	7 (17.5)	-
-With partner and/or kids	52 (71.2)	34 (87.2)	55 (83.3)	33 (82.5)	-
Education, n (%)					
-Low	27 (37.0)	15 (38.5)	34 (51.5)	17 (42.5)	-
-Middle	19 (26.0)	15 (38.5)	22 (33.3)	11 (27.5)	-
-High	27 (37.0)	9 (23.0)	10 (15.2)	12 (30.0)	-
One or more Comorbidity/Comorbidities, n (%)	57 (78.1)	28 (71.8)	51 (77.3)	27 (67.5)	-
HOOS/KOOS -PS (0–100),	40.8 (16.6)	40.0 (14.6)	42.8 (13.4)	46.1 (17.3)	-
OHS/OKS (0–48)	24.8 (8.8)	25.5 (7.7)	27.5 (7.1)	25.1 (8.0)	-
Pain NRS (0–10)					
-Rest	5.1 (2.5)	4.8 (2.1)	4.3 (2.2)	5.2 (2.1)	-
-Activity	3.8 (3.0)	3.3 (2.9)	6.6 (1.6)	7.0 (1.9)	-
Physical Therapists experience of treating THA/TKA patients, n (%)					
-0–5 years	-	-	-	-	32 (32.3)
-6–10 years					32 (32.3)
-11–15 years					9 (9.1)
-16–20 years					9 (9.1)
->20 years					17 (17.2)
Physical therapists Type of specialisation, Yes, n (%) <sup>a</sup>					
-Manual					19 (19.2)
-Children					1 (1.0)
-Oncological/oedema					2 (2.0)
Geriatric					2 (2.0)
-Sports					19 (19.2)

Note: Data reported as mean (standard deviation) for continuous data.

Abbreviations: BMI, Body Mass Index; HOOS-PS, Hip disability and Osteoarthritis Outcome Score-Physical function Short form; KOOS-PS, Knee injury and Osteoarthritis Outcome Score-Physical function Short form; NRS, Numeric Rating Scale; OHS, Oxford Hips Score; OKS, Oxford Knee Score; THA, total hip arthroplasty; TKA, total knee arthroplasty.

<sup>a</sup>Type of specialisation: multiple answers possible.

### 3.1 | Impact of COVID pandemic on PT treatment

Table 2 shows the patients and physical therapists perceptions of the impact of the COVID-19 pandemic on PT treatment. 12 (30.8%) of the THA and 4 (10%) of the TKA patients reported that they had

received remote care during the COVID pandemic. Approximately half these patients would have preferred PT in practice.

Regarding the perspectives of physical therapists, it was found that if remote care was provided, physical therapists reported that most THA patients coped well and started working at home with an

**TABLE 2** Perspectives of patients undergoing THA or TKA and physical therapists on the impact of COVID-19 on PT treatment during the pandemic

	THA patients N = 39		TKA patients N = 40	
	Patients	Physical therapist	Patients	Physical therapist
Delivery of remote care due to COVID-19, <i>n</i> (%)				
-Total		12 (30.8)		7 (17.5)
-Telephone		6 (15.4)		3 (7.5)
-Video call		6 (15.4)		4 (10)
Preference for face-to-face treatment, <i>n</i> (%)				
-Yes	5 (41.7)		2 (50.0)	
-No	5 (41.7)		2 (50.0)	
-No, however there were more possibilities in PT practice	2 (16.6)		0 (0.0)	
In case of remote care, perception that care was optimal, <i>n</i> (%)				
-Yes		8 (75.0)		2 (28.6)
-Somewhat		4 (25.0)		5 (71.4)
-No		0 (0.0)		0 (0.0)
Impact on frequency per week, <i>n</i> (%)				
-Yes, more treatments		0 (0.0)		1 (2.5)
-Yes, fewer treatments		13 (33.3)		9 (22.5)
-No changes		22 (56.3)		28 (70.0)
-Missing		4 (10.3)		2 (5.0)
Impact on duration, <i>n</i> (%)				
-Yes, longer period		9 (23.1)		7 (17.5)
-Yes, shorter period		1 (2.6)		3 (7.5)
-No changes		25 (64.1)		28 (70.0)
-Missing		4 (10.3)		2 (5.0)
Impact on total number of sessions, <i>n</i> (%)				
Yes, considerably less treatments		1 (2.6)		2 (5.0)
Yes, less treatments		8 (20.5)		8 (20.0)
Yes, more treatments		5 (12.8)		2 (5.0)
No		21 (53.8)		26 (65.0)
Missing		4 (10.3)		2 (5.0)
Impact on duration of individual sessions, <i>n</i> (%)				
Yes		2 (5.1)		5 (12.5)
No		33 (84.6)		33 (82.5)
Missing		4 (10.3)		2 (5.0)
Impact on content of treatment, <i>n</i> (%)				
No changes in exercises		28 (71.8)		28 (70.0)
Different exercises/therapy with same end goals		5 (12.8)		7 (17.5)
Different exercises/therapy and harder to work on end goals		2 (5.1)		3 (7.5)
Missing		4 (10.3)		2 (5.0)

Abbreviations: PT, physical therapy; THA, total hip arthroplasty; TKA, total knee arthroplasty.

exercise schedule. In TKA patients, most physical therapists reported that they did not give the most optimal treatment because the patient had some difficulties to cope well with the remote care therapy.

Most physical therapists reported no changes in frequency of sessions in 22 (56.3%) THA and 28 (70%) TKA patients or in duration in weeks of treatment in 25 (64.1%) THA and 28 (70%) TKA patients due to COVID-19. Physical therapists reported in more than half of the patients no impact of COVID-19 on the total amount of sessions. In about 70% of the patients, physical therapists reported no changes in type of exercise.

### 3.2 | Use of physical therapy before and during COVID-19 pandemic

Before and during the COVID-19 pandemic, most patients reported PT sessions in the practice of the PT (range 63%–80%). Physical therapists reported an average frequency of 2 times a week (range 47%–67%), with the exception of the THA patients who were treated during COVID, where an average of 1 time per week was mostly reported (43.6%). In the THA pre-COVID group, the mean total PT

sessions was 19 ( $\pm$ SD 20) and 23 ( $\pm$ SD 19) in the during COVID group. In TKA patients the mean total sessions was 26 ( $\pm$ SD 16) in the pre-COVID group and 34 ( $\pm$ SD 23) in the during-COVID group (Table 3).

## 4 | DISCUSSION

Before and during the COVID-19 pandemic, most THA/TKA patients reported an average of 2 PT sessions per week in PT practices. The average number of PT sessions per patient was lower in the pre-COVID group compared to the COVID group, in both THA/TKA. The impact of COVID on frequency and duration of PT and type of exercises seemed limited. More THA patients received remote care during the COVID pandemic. Physical therapists reported that most THA patients coped well with remote care although these patients preferred PT in practice.

Our results on the average frequency and duration of post-operative PT in both the pre-COVID and COVID periods are in line with previous research of Peter et al. (2016), although the present study showed somewhat lower numbers. Possible explanations might be our younger study population or the use of a treat-to-target

TABLE 3 Characteristics of physical therapy treatment before and after the COVID-19 pandemic, asked to physical therapists

	THA patients		TKA patients	
	Pre-COVID n = 73	During COVID n = 39	Pre-COVID n = 66	During COVID n = 40
Location of PT, n (%) <sup>a</sup>				
-Home	25 (34.2)	17 (43.6)	27 (40.9)	17 (42.5)
-Practice of PT	46 (63.0)	31 (79.5)	47 (71.2)	31 (77.5)
-Remote care	6 (8.2)	12 (30.8)	4 (6.0)	4 (10.0)
-Other (hospital, rehabilitation centre)	9 (12.3)	1 (2.6)	11 (16.7)	4 (10.0)
Frequency per week, n (%)				
<1	20 (27.4)	7 (17.9)	7 (10.6)	3 (7.5)
1	19 (26.0)	17 (43.6)	15 (22.7)	13 (32.5)
2	34 (46.6)	14 (35.9)	44 (66.7)	23 (57.5)
$\geq$ 3	0 (0.0)	1 (2.6)	0 (0.0)	1 (2.5)
Duration (weeks), n (%)				
<2	10 (13.7)	1 (2.6)	0 (0.0)	0 (0.0)
2-4	9 (12.2)	1 (2.6)	3 (4.5)	2 (5.0)
5-8	10 (13.7)	6 (15.4)	7 (10.6)	0 (0.0)
9-12	16 (21.9)	10 (25.6)	19 (28.8)	9 (22.5)
>12	28 (38.5)	21 (53.8)	37 (56.1)	29 (72.5)
Total number of treatment sessions, mean (SD)	19.56 (20.5)	22.92 (19.4)	26.33 (16.34)	34.4 (23.0)
Satisfaction with the result of treatment? (0–10), mean (SD) <sup>b</sup>	7.93 (2.2)	7.51 (3.0)	8.25 (1.6)	8.45 (1.1)

Abbreviations: PT = physical therapy; THA = total hip arthroplasty; TKA = total knee arthroplasty.

<sup>a</sup>Location of PT: multiple answers possible.

<sup>b</sup>Asked to patients.

protocol led to quicker termination of treatment. Only in THA COVID group patients we observed less total PT sessions per week compared to the study of Peter et al., which might be due to the restrictions of COVID-19 or the use of a treat-to-target PT protocol. We did not find these differences in TKA patients which might be explained by an on average faster recovery after THA surgery and the more complex rehabilitation process in TKA patients (Anis et al., 2021; Bourne et al., 2010).

Regarding the delivery of remote care in THA/TKA patients, previous research showed positive results compared to the usual face-to-face PT. Patients achieved similar or better outcomes regarding reduction in pain, muscle strength, and functional activities (Agostini et al., 2015; Davila Castrodad et al., 2019; Jiang et al., 2018; Pastora-Bernal et al., 2017; Shukla et al., 2017; Tur-olla et al., 2020) and it was found cost-effective (Azhari & Parsa, 2020; Zampolini et al., 2008). Other studies showed that implementing tele-rehabilitation was adequate and feasible (Miller et al., 2021) and that home-based exercise appears effective to improve muscle-strength, endurance, power and balance during the COVID-19 pandemic (Chaabene et al., 2021). Patients who underwent THA/TKA during the COVID-period reported that the restrictions imposed by COVID-19 had limited their rehabilitation process due to limited access to PT, no face-to-face follow-up and the inability to exercise (MacDonald et al., 2021). Which is partially in line with our results where half of the patients prefer face-to-face PT.

Strengths of this study are its nationwide multicenter design, the stratified analysis of THA/TKA patients and both patient and physical therapists perspectives were able to be analysed. A limitation of the study was the relatively small sample size. Selection bias may have occurred in our study due to several reasons. First, only patients in the PATIO study intervention group were selected. These patients followed a standardized, treat-to-target postoperative PT strategy which can influence the PT treatment. Secondly, it is possible that questionnaires were mostly filled in by patients/physical therapists with more dedication regarding the treatment.

Based on the results of our study we can conclude that the impact of COVID-19 on the delivery of PT seems limited. We only observed differences in the total amount of PT sessions between the pre-COVID and the COVID group. Specific questions related to the COVID-19 pandemic indicated that also within the COVID period most patients received treatment according to the protocol with regard to type, duration and frequency of PT. The impact of the changes on PT on the quality of care delivered was not covered in this study.

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## CONFLICT OF INTEREST

The authors declare that they have no competing interests.

## ETHICS STATEMENT

The study has been reviewed and approved by the Medical Ethics Committee (registration code NL61763.078.17) of the ErasmusMC, Rotterdam, The Netherlands. This approval covered all study sites. All participants signed an informed consent form prior to start of the study.

## AUTHOR CONTRIBUTIONS

Maaïke Gademan, Wilfred F. Peter, Thea Vliet Vlieland and Max Reijman have contributed to the conception of the study. Lichelle Groot performed the analysis and wrote the manuscript. Ümit Yildiz supported Lichelle Groot with conduction of analysis and writing. All authors were involved in the study design and revising the manuscript critically for important intellectual content. All authors read and approved the final manuscript.

## DATA AVAILABILITY STATEMENT

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

## CONSENT FOR PUBLICATION

No individual person's data will be published, therefore consent for publication is not applicable.

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