



**Manchester  
Metropolitan  
University**

---

Theaker, J, Oldham, J, Callaghan, M ORCID logoORCID:  
<https://orcid.org/0000-0003-3540-2838> and Parkes, M (2022) Assessment  
of patients' self-reported levels of adherence to postoperative restrictions fol-  
lowing total hip replacement. *Physiotherapy*, 117. pp. 1-7. ISSN 0031-9406

---

**Downloaded from:** <https://e-space.mmu.ac.uk/632382/>

**Version:** Published Version

**Publisher:** Elsevier

**DOI:** <https://doi.org/10.1016/j.physio.2022.04.001>

**Usage rights:** Creative Commons: Attribution 4.0

Please cite the published version

<https://e-space.mmu.ac.uk>



# Assessment of patients' self-reported levels of adherence to postoperative restrictions following total hip replacement

Justine Theaker<sup>a,b,\*</sup>, Jackie Oldham<sup>a</sup>, Michael Callaghan<sup>a,b,c</sup>,  
Matthew Parkes<sup>a</sup>

<sup>a</sup> *Research in Osteoarthritis in Manchester Team, Faculty of Biology, Medicine and Health, University of Manchester, Manchester, UK*

<sup>b</sup> *Manchester University NHS Foundation Trust, Manchester, UK*

<sup>c</sup> *Manchester Metropolitan University, Manchester, UK*

## Abstract

**Background** Postoperative precautions that limit hip movement reduce the incidence of postoperative dislocation following total hip replacement (THR). It is assumed that patients adhere to these precautions, but true adherence is unknown.

**Aims** To assess adherence to postoperative precautions, including bending, twisting, crossing of legs, sleeping position and sitting position following primary THR surgery.

**Methods** A self-reporting questionnaire explored patient adherence to precautions following primary THR. Questionnaires were sent to 120 patients following elective primary THR at two orthopaedic centres in England between November 2016 and April 2017. Patients were also asked to report the duration of adherence and the difficulty associated with adherence to each of the precautions.

**Results** Eighty-three percent (99/120) of patients responded. Of these, 56% (56/99) were female and 44% (44/99) were male. Mean age was 66.0 (standard deviation 9.4) years. Seventy-six percent of patients were classified as 'highly adherent' to the precautions in hospital, and this reduced to 68% when patients went home. The median duration of adherence to the precaution to avoid crossing legs was 6 weeks [interquartile range (IQR) 6–6]. For the remaining four precautions, the median duration of adherence was consistently 6 weeks (IQR 4–6).

**Conclusion** High levels of adherence to precautions following THR were identified. However, patients reported difficulty adhering to the precautions, which may explain why 24% of patients were not able to adhere to the precautions > 90% of the time. Patients reported that the most difficult precaution to adhere to was supine sleeping, and the least difficult precautions to adhere to were avoiding crossing legs and using a raised chair.

© 2022 The Authors. Published by Elsevier Ltd on behalf of Chartered Society of Physiotherapy. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

**Keywords:** Hip replacement; Arthroplasty; Precautions; Adherence

## Introduction

Total hip replacement (THR) is one of the most common surgical procedures in the UK, with a growing number of procedures carried out each year [1]. The National Joint Registry of England and Wales report of 2020 identified that 281,196 THRs were performed over the preceding 3

years, representing 24.1% of the current registry [2]. THR is one of the most cost-effective medical interventions in society, making a significant contribution to improving the quality of life of each of these individuals [3].

THR has many associated risks, one of which is dislocation of the new prosthesis, with reported incidence in the weeks following surgery ranging from 1% to 3% [4]. One reason for the low dislocation rate is the restriction of postoperative activities, such as sleeping position, sitting in low chairs, and avoidance of crossing the legs, commonly referred to as the 'postoperative precautions' [5]. These precautions have been endorsed since the introduction of

\* Corresponding author at: Research in Osteoarthritis in Manchester Team, Faculty of Biology, Medicine and Health, University of Manchester, Manchester, UK.

E-mail address: [justine.theaker@mft.nhs.uk](mailto:justine.theaker@mft.nhs.uk) (J. Theaker).

THR in 1969, and remain largely unchanged despite the number of studies and systematic reviews which suggest no additional patient benefit from their continued use [5–7].

One major limitation in assessing the benefit of postoperative precautions in previous studies has been lack of knowledge regarding patients' adherence to the precautions. Early work examining adherence focused on specific precautions such as sleep alone [8] or limited surgical approaches [8,9], with reports of patient adherence of 96% and 54% at 6 and 12 weeks, respectively [8,9]. Consequently, these studies have achieved little in terms of changing practice, with limited generalisability and inadequate assurance for clinicians to modify advice.

Lightfoot et al. [10] presented an insight into patients' experiences and perceptions of the discontinuation of precautions in a subgroup analysis of 10 patients, with adherence being one of six themes identified during patient interviews. However, there was no specific questioning regarding adherence, and the adherence levels of the 367 patients in the primary study group were not reported.

Patient non-adherence to precautions was included in the findings of Tetreault et al., where compliance with mobilisation protocols were noted to be 'imperfect' [4]. In this study 25% of patients admitted non-adherence to precautions when questioned at their 6-week follow-up appointment. However, Tetreault et al. did not explore the point at which patients stopped adhering to precautions, or which precautions had higher adherence rates [4].

A better understanding of patient adherence to precautions could have a significant influence on decisions about their ongoing use in clinical practice. This has potential to have a positive impact on National Health Service resources and costs, influence patient recovery, and reduce fear and anxiety for patients and (potentially) surgeons [10].

### *Aim*

This study aimed to evaluate levels of patient adherence to postoperative precautions following THR during the initial 6 weeks following surgery.

### **Methods**

An anonymous self-reported postal adherence questionnaire was completed by patients, 6 weeks after THR.

### *Participants and place of research*

This study took place at two specialist elective orthopaedic centres in England between November 2016 and April 2017.

*Ethical approval:* Ethical approval was obtained from the University of Manchester Research Ethics Committee and the Health Research Authority, Research Ethics Committee of West Midlands–Solihull Research Ethics Committee (16/WM/0282).

### *Inclusion and exclusion criteria*

Patients aged  $\geq 18$  years who had undergone elective primary THR and provided written informed consent for study participation were included in this study. Patients who were unable to read English due to vision impairment, or due to language barriers with no access to translation of the questionnaires, were excluded from this study.

### *Questionnaire development*

There was no pre-existing adherence questionnaire to meet the needs of this study, so a self-reported anonymous questionnaire was developed. To optimise validity, the development process involved a clinical lead orthopaedic physiotherapist, an orthopaedic consultant surgeon, a clinical psychologist with experience of questionnaire development, and four patients. Four pilot tests of the questionnaire were undertaken, each involving 30 patients who had undergone THR [11]. The questionnaire is included in Appendix 1 (see online [Supplementary material](#)).

### *Sample size*

The sample size was limited by resources and time. As such, a 'fair' prospective continuous convenience sample of 120 patients was used [12].

### *Procedure*

In preparation for THR, patients routinely attend an education class where they are taught about hip precautions, which they are expected to follow for at least 6 weeks after surgery (Table 1). This class continued as usual during this study, and patients were assessed and issued with home equipment required to facilitate adherence to precautions following surgery. This equipment included a raised armchair, a raised toilet seat, a perching stool, bed raisers and dressing aids.

On the day of surgery, patients were given the participant information sheet; those patients who were willing to participate in this study gave written informed consent the day after surgery. After consent was given, all patients continued with routine postoperative rehabilitation, with support from the orthopaedic nursing, medical and therapy teams. Rehabilitation included assessment of mobility, functional activities and the provision of exercises, whilst being reminded to adhere to the recommended precautions (Table 1). Following hospital discharge, patients were contacted by the study team to answer any queries

regarding the study, and to confirm the date that the 6-week postal questionnaire would be sent.

### Questionnaire administration

The questionnaire was posted to 120 patients, 6 weeks after THR. A follow-up telephone call took place 1 week later to remind patients to complete and return their questionnaire in an effort to optimise the response rate (Fig. 1).

The questionnaire asked patients to record their levels of adherence to each of the individual precautions. Using a Likert scale, adherence levels were categorised as:

- adhered almost all of the time (>90% of the time);
- adhered most of the time (>50% but <90% of the time);
- adhered occasionally (>20% but <50% of the time); or
- adhered none of the time (0–20% of the time).

The questionnaire asked about patient adherence to the postoperative precautions in hospital and at home. Patients were also asked how long they had adhered to the precautions, and to rate how difficult they found adherence to each of the precautions using a numerical rating scale (NRS) (0 = not difficult at all, 10 = very difficult) [13]. Given that the avoidance of dislocation is the principal driver for recommending the precautions, hip dislocation was recorded in the patient questionnaire.

### Analysis

Data were analysed using STATA Version 14.0 [14], with descriptive statistics to assess the proportion of patients who adhered to the precautions, and the difficulty associated with adherence to each of the precautions.

For analysis, the four categories were dichotomised. This technique has been used previously to assess adherence to advice and follow-up after surgery [15]. Limits of non-adherence were previously set to < 66%. However, this study wanted to capture the most adherent patients, so the categories were dichotomised into ‘highly adherent’ (if patients reported adhering to precautions for 90–100% of the time) and ‘less adherent’ (if patients reporting adhering to precautions for <90% of the time) (Table 2).

As the study included patients from two different sites, it was important to ensure that all patients responded in the same manner with homogeneity across sites. Wilcoxon rank sum test was therefore used to assess homogeneity, with comparison of adherence data from both sites as two independent groups.

## Results

Eighty-three percent of patients (99/120) responded to the questionnaire. Of the respondents, 56% were female

Table 1  
Postoperative precautions recommended for a minimum of 6 weeks following total hip replacement.

Avoid bending past 90° at the hip
Use of recommended raised chair
Avoid twisting in either standing or sitting
Avoid crossing legs
Avoid sleeping on side

(56/99) and 44% (44/99) were male. Age was normally distributed, with a mean of 66 (standard deviation 9.4) years. None of the respondents reported hip dislocation. Apart from age, all data were non-normally distributed with a negative skew; as such, data are reported as median and interquartile range (IQR). There were no significant differences between the two sites in any of the adherence parameters, difficulty associated with adherence, duration of adherence or age ( $P > 0.05$ ). Data from the two groups across the two sites were therefore analysed as one dataset.

### Adherence

Evaluation of adherence to each of the individual precautions was undertaken to establish if there were any differences in adherence between precautions (Fig. 2).

Most patients adhered to the precautions in hospital and at home. In hospital, the proportion of highly adherent patients ranged from 74% to 83% for the individual precautions, and this reduced to 62–80% when patients went home (Table 2).

All precautions were grouped to give an overall assessment of adherence. Seventy-six percent of patients were classified as highly adherent whilst in hospital, and this reduced to 68% after discharge home (Table 3).

The median duration of adherence to all the precautions was 6 weeks, with very little difference in range of any of the precautions when considering IQR (Table 4).

Using an NRS, patients were asked to record how difficult they found it to adhere to each of the precautions, as it was thought that this may affect adherence (Table 5). Patients reported most difficulty adhering to the precaution to sleep supine (NRS 7, IQR 3–9), followed by avoiding bending and twisting (NRS 4, IQR 1–7). Patients reported least difficulty adhering to the precautions to avoid crossing legs and using a raised chair, with the same median and IQR. A similar pattern may be expected with these two precautions and duration of adherence; however, this was not observed in the data (Table 4).

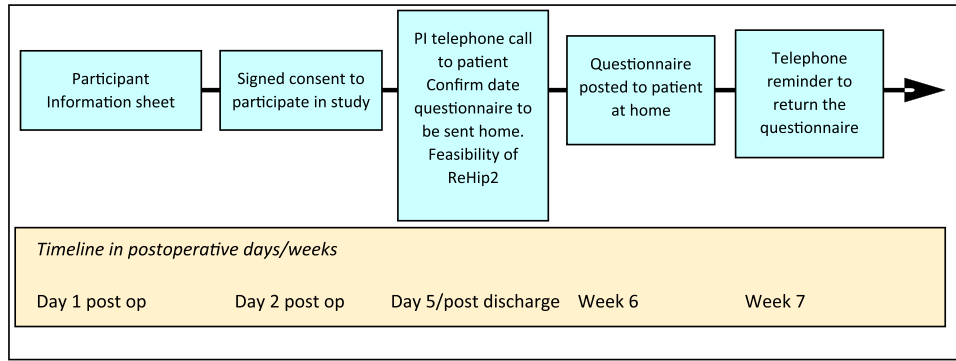


Fig. 1. Schedule of events. PI, primary investigator.

Table 2  
Proportion of patients adhering to individual precautions following total hip replacement (% (n)).

Adherence levels	Time frame	
	Patients adhering immediately post-op in hospital n=99	Patients adhering at home following discharge n=99
<b>Avoid bending past 90° at the hip</b>		
Highly adherent (90–100%)	83 (82)	70 (69)
Less adherent (<90%)	17 (17)	30 (30)
<b>Avoid crossing legs</b>		
Highly adherent (90–100%)	81 (80)	80 (79)
Less adherent (<90%)	19 (19)	20 (20)
<b>Use of recommended raised chair</b>		
Highly adherent (90–100%)	77 (76)	65 (65)
Less adherent (<90%)	23 (23)	35 (35)
<b>Avoid sleeping on side</b>		
Highly adherent (90–100%)	76 (75)	68 (67)
Less adherent (<90%)	24 (24)	32 (31)
<b>Avoid twisting in either standing or sitting</b>		
Highly adherent (90–100%)	74 (73)	62 (61)
Less adherent (<90%)	26 (26)	38 (38)

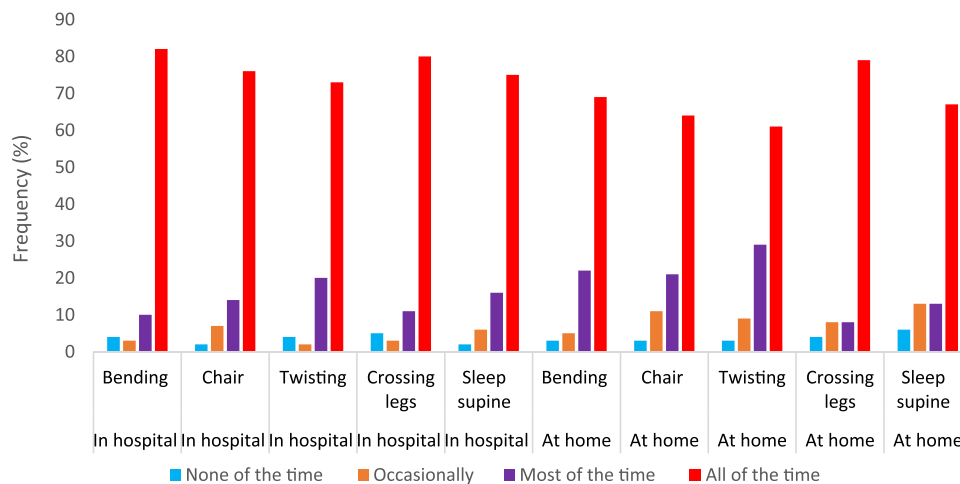


Fig. 2. Self-reported adherence to precautions in hospital and at home.

Table 3  
Proportion of patients adhering to all precautions following total hip replacement (% (n)).

Adherence levels	Time frame	
	Patients adhering immediately post-op in hospital n=99	Patients adhering at home following discharge n=99
Highly adherent (90–100%)	76 (75)	68 (67)
Less adherent (<90%)	24 (24)	32 (31)

Table 4  
Median duration (weeks) of adherence to precautions.

Precaution	Median	IQR
Avoid bending past 90° at the hip	6	4–6
Use of recommended raised chair	6	4–6
Avoid twist in either standing or sitting	6	4–6
Avoid sleeping on side	6	4–6
Avoid crossing legs	6	6–6

IQR, interquartile range.

Table 5  
Patient rating of difficulty associated with adhering to each precaution (numerical rating scale).

Precaution	Median	IQR
Avoid sleeping on side	7	3–9
Avoid bending past 90° at the hip	4	1–7
Avoid twist in either standing or sitting	4	1–7
Avoid crossing legs	2	0–6
Use of recommended raised chair	2	0–6

IQR, interquartile range.

0 = not difficult at all; 10 = very difficult.

### Interpretation of results

The main finding from this study was that 76% of patients were highly adherent to postoperative precautions following THR when they were still in hospital. It was expected that almost all patients would be highly adherent during the immediate postoperative period for several reasons: (i) the constant contact and observation of healthcare professionals reinforcing the advice and subsequent observer effect [16]; (ii) as postoperative pain in this early period would result in pain avoidance behaviours and an aversion to extreme positions and movements, which could facilitate adherence [3]; and (iii) patients were informed in the pre-operative education session that dislocation is the

most common cause of re-admission in the early post-operative phase, and this was expected to reinforce the importance of adherence to the precautions [17,18]. The decrease in the proportion of highly adherent patients to 68% after discharge home was unsurprising, and can be explained by patients' requirements to be more active and independent with daily activities, coupled with the absence of healthcare professionals monitoring adherence.

In terms of the burden of the precautions on patients, adherence to supine sleeping was reported to be the most difficult (median NRS 7, IQR 3–9), with 32% of patients not adhering to this precaution after discharge home. The ability to adhere to supine sleeping may have been influenced by postoperative pain. When sleep is pain-free, a change of position would be less likely to result in waking up. This would be the point when patients who had undergone THR would receive a painful reminder to remain supine. The shorter duration of adherence to the precaution to sleep supine may therefore be associated with pain-free sleep and lack of awareness, rather than a deliberate choice not to adhere to this precaution.

Sleep deprivation has a significant burden on patients' quality of life, exacerbates existing pain and co-morbidities, and contributes to all-cause mortality [19]. Poor sleep due to adherence to precautions may have potentially deleterious effects on postoperative recovery [19–21]. Therefore, restoration of good sleep quality, with a move away from the precaution to sleep supine, may influence the progression of patients' function with an associated positive impact on quality of life.

Patients reported that avoidance of crossing legs (NRS 2, IQR 0–6) and using a raised chair (NRS 2, IQR 0–6) were the easiest precautions to adhere to after discharge home (Table 5). This may be because these precautions had a limited impact on function and quality of life after THR. Although this study did not explore the association, it is also possible that adherence was high for these two precautions because crossing legs and sitting in a low chair increase pressure and strain on the hip wound, potentially causing pain.

### Strengths and limitations

Although the sample size of this study may be considered small, the response rate was 83%, which is well above the global average of 70% for respondents in healthcare surveys [22]. Given the lack of incentives to participate, this high response implies a positive survey experience for participants. It suggests an appreciation of the value of their involvement, in addition to the intrinsic reward of improving the experience for other patients [23]. The response rate would also have been enhanced by the timing of the telephone call, when patients were discharged from hospital, to confirm the date that the questionnaire would arrive. The reminder telephone call by the research team after the questionnaire had been sent would also have boosted the response rate [22].

Although the questionnaire used in this study has not been validated, it was developed by an appropriately skilled team with significant clinical experience in the field of study. The questionnaire was also evaluated repeatedly with THR patients during pilot testing, ensuring that the questionnaire was fit for purpose. The pilot work and subsequent modifications may have had a positive influence on the response rate.

Although patients were assessed retrospectively at 6 weeks after THR, the risk of recall bias was reduced with the prior knowledge that they would be required to report adherence at 6 weeks.

A disadvantage of self-reporting measures of adherence was potential social desirability bias. To mitigate the risk of such bias, patients were assigned a questionnaire ID and were reassured of the anonymity of their responses throughout [24].

Generalisability of the findings of this study is affected by the sample size and distribution of the data; however, the high response rate reduces the impact when compared with usual response rates in questionnaire studies.

### Conclusion

This survey found that 76% of patients were highly adherent to postoperative precautions when they were still in hospital after THR surgery, and this reduced to 68% after discharge home. Patients reported difficulty adhering to precautions, which may explain why 24% of patients were not able to adhere > 90% of the time. Patients found that supine sleeping was the most difficult precaution to follow; this precaution was 30% more difficult to adhere to than avoiding bending and twisting, and 50% more difficult to adhere to than avoiding crossing legs or using a raised chair. Given the proportion of less-adherent patients, this provides additional evidence that precautions may not be necessary after THR, particularly as there were no dislocations in this patient cohort. This survey highlights the need for further work to explore the requirement for routine postoperative precautions after THR, particularly given the

difficulties with adherence experienced by patients. This knowledge will enable clinicians to shape future pathways to either support the current practice or recommend changes to the post-THR regimen.

**Funding:** The National Institute for Health Research supported the study through an Integrated Clinical Academic MPhil Fellowship grant through the University of Manchester.

**Ethical approval:** Ethical approval was obtained from University of Manchester Research Ethics Committee and the Health Research Authority, Research Ethics Committee of West Midlands–Solihull Research Ethics Committee (16/WM/028).

**Conflict of interest:** None declared.

### Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at [doi:10.1016/j.physio.2022.04.001](https://doi.org/10.1016/j.physio.2022.04.001).

### References

- [1] Blom AW, Donovan RL, Beswick AD, Whitehouse MR, Kunutsor SK. Common elective orthopaedic procedures and their clinical effectiveness: umbrella review of level 1 evidence. *BMJ* 2021;374:n1511.
- [2] National Joint Registry. 17th Annual Report. Hemel Hempstead: NJR; 2020.
- [3] Snell DL, Dunn JA, Jerram KAS, Hsieh CJ, DeJong G, Hooper GJ. Associations between comorbidity and quality of life outcomes after total joint replacement. *Qual Life Res* 2021;30:137–44.
- [4] Tetreault MW, Akram F, Li J, Nam D, Gerlinger TL, Della Valle CJ, et al. Are postoperative hip precautions necessary after primary total hip arthroplasty using a posterior approach? Preliminary results of a prospective randomized trial. *J Arthroplasty* 2020;35:S246–51.
- [5] van der Weegen W, Kornuijt A, Das D. Do lifestyle restrictions and precautions prevent dislocation after total hip arthroplasty? A systematic review and meta-analysis of the literature. *Clin Rehabil* 2016;30:329–39.
- [6] Lightfoot CJ, Sehat KR, Coole C, Drury G, Ablewhite J, Drummond AER. Evaluation of hip precautions following total hip replacement: a before and after study. *Disabil Rehabil* 2021;43:2882–9.
- [7] Smith TO, Jepson P, Beswick A, Sands G, Drummond A, Davis ET, et al. Assistive devices, hip precautions, environmental modifications and training to prevent dislocation and improve function after hip arthroplasty. *Cochrane Database System Rev* 2016;7:CD010815.
- [8] Modi CS, Gudipati S, Poole S, Brooks S. Compliance with sleep instructions after total hip arthroplasty. *Webmail Central*. DOI: 10.9754/journal.wmc.2012.0021642012.
- [9] Peak EL, Parvizi J, Cimminiello M, Purtill JJ, Sharkey PF, Hozack WJ, et al. The role of patient restrictions in reducing the prevalence of

- early dislocation following total hip arthroplasty – a randomized, prospective study. *J Bone Joint Surg AM* 2005;87A:247–53.
- [10] Lightfoot CJ, Coole C, Sehat KR, Drummond AER. Hip precautions after total hip replacement and their discontinuation from practice: patient perceptions and experiences. *Disabil Rehabil* 2021;43:2890–6.
- [11] Perneger TV, Courvoisier DS, Hudelson PM, Gayet-Ageron A. Sample size for pre-tests of questionnaires. *Qual Life Res* 2015;24:147–51.
- [12] Gunawan J, Marzilli C, Aunguroch Y. Establishing appropriate sample size for developing and validating a questionnaire in nursing research. *Belitung Nurs J* 2021;7:356–60.
- [13] Ornetti P, Dougados M, Paternotte S, Logeart I, Gossec L. Validation of a numerical rating scale to assess functional impairment in hip and knee osteoarthritis: comparison with the WOMAC function scale. *Ann Rheum Dis* 2011;70:740–6.
- [14] StataCorp. STATA Version 14. College Station, TX: StataCorp; 2015.
- [15] Goldenshluger A, Elazary R, Cohen MJ, Goldenshluger M, Ben-Porat T, Nowotni J, *et al.* Predictors for adherence to multi-disciplinary follow-up care after sleeve gastrectomy. *Obes Surg* 2018;28:3054–61.
- [16] Svensberg K, Kalleberg BG, Mathiesen L, Andersson Y, Rognan SE, Sporrang SK. The observer effect in a hospital setting – experiences from the observed and the observers. *Res Soc Admin Pharm* 2021;17:2136–44.
- [17] Gausden EB, Parhar HS, Popper JE, Sculco PK, Rush BNM. Risk factors for early dislocation following primary elective total hip arthroplasty. *J Arthroplasty* 2018;33:1567.
- [18] Lindberg-Larsen M, Petersen PB, Jorgensen CC, Overgaard S, Kehlet H, Madsen F, *et al.* Postoperative 30-day complications after cemented/hybrid versus cementless total hip arthroplasty in osteoarthritis patients > 70 years. A multicenter study from the lundbeck foundation centre for fast-track hip and knee replacement database and the danish hip arthroplasty register. *Acta Orthopaed* 2020;91:286–92.
- [19] Dolan R, Huh J, Tiwari N, Sproat T. A prospective analysis of sleep deprivation and disturbance in surgical patients. *Ann Med Surg* 2016;6:1–5.
- [20] Khan MS, Aouad R. The effects of insomnia and sleep loss on cardiovascular disease. *Sleep Med Clin* 2017;12:167–77.
- [21] Loprinzi PD, Joyner C. Meeting sleep guidelines is associated with better health-related quality of life and reduced premature all-cause mortality risk. *Am J Health Promot* 2018;32:68–71.
- [22] Meyer VM, Benjamins S, El Moumni M, Lange JFM, Pol RA. Global overview of response rates in patient and health care professional surveys in surgery: a systematic review. *Ann Surg* 2022;275:E75–81.
- [23] Linderman N. What's the average survey response rate? (2021 benchmark). *Survey Anyplace*; 2021 Available at: <https://surveyanyplace.com/blog/average-survey-response-rate/> [accessed 21.04.22].
- [24] Caputo A. Social desirability bias in self-reported wellbeing measures: evidence from an online survey. *Univ Psychol* 2017;16.

Available online at [www.sciencedirect.com](http://www.sciencedirect.com)

**ScienceDirect**