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RESEARCH ARTICLE



Return to work policies and practices after total hip or knee arthroplasty in Denmark, Germany, and the Netherlands: an exploratory study

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ABSTRACT

Purpose: To explore return-to-work (RTW) policies and practices for total hip arthroplasty (THA) and total knee arthroplasty (TKA) patients in three European countries.

Materials and methods: An exploratory study in Denmark, Germany, and the Netherlands consisting of three aspects: (1) description of the healthcare and social security systems; (2) identification of national RTW guidelines; (3) a survey to gain insight into RTW practices and perceptions of orthopaedic surgeons, including barriers, facilitators, and needs.

Results: Healthcare and social security systems differed (e.g. fast-track vs longer postoperative stay; coverage of rehabilitation costs). National guidelines were available in Germany (THA, TKA) and the Netherlands (TKA), containing limited RTW information. The survey was completed by 168 orthopaedic surgeons (Denmark $n=51$; Germany $n=39$; the Netherlands $n=78$). Overall, orthopaedic surgeons reported being in need of more knowledge and better collaboration with other healthcare practitioners.

Conclusion: We found considerable variation in healthcare and social security systems. When available, national guidelines contained limited information. In all three countries surgeons need more knowledge and better collaboration with other healthcare practitioners. We advise that RTW multidisciplinary recommendations post THA/TKA be established by the national associations of the healthcare practitioners involved.

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KEYWORDS

Return to work; policy;
practice guideline;
arthroplasty; knowledge;
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> IMPLICATIONS FOR REHABILITATION


- Orthopaedic surgeons (regardless of country) need more knowledge, including “guidelines”, “scientific evidence”, and “expertise with work/return-to-work”, to adequately support return to work.
- Orthopaedic surgeons need better collaboration with other healthcare practitioners to adequately support total hip arthroplasty or total knee arthroplasty patients to return to work.
- Multidisciplinary recommendations for returning to work after total hip arthroplasty or total knee arthroplasty should be established by the national associations of the healthcare practitioners involved.

Introduction

In end-stage hip or knee osteoarthritis (OA), total hip arthroplasty (THA) and total knee arthroplasty (TKA) are effective in reducing pain and improving function [1]. Recent decades have witnessed an increase in working-age patients who require a THA or TKA, and this trend is expected to increase further because of several developments [2–4]. From a societal perspective, we are confronted with an ageing society. Since ageing is recognised as a major OA risk factor, the prevalence of OA is on the rise [2]. Furthermore, due to the obesity epidemic and a physically inactive lifestyle, OA symptoms

develop at an earlier age, resulting in more younger (working-age) people suffering from OA [2,5,6]. Moreover, people in Western Europe are supposed to work longer due to an increasing retirement age [7,8], raising the number of working-age patients even further. Adding to this, from the orthopaedic surgeons’ perspective there is more willingness to perform arthroplasties on younger (working-age) patients thanks to improved surgical techniques, longer prosthetic survivorship, and increased surgical experience with arthroplasties [3,4]; and from the patients’ perspective this surgeons’ willingness also induces patients to be more demanding and request arthroplasties at a younger age [9].

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Within the context of these developments, return-to-work (RTW) after THA or TKA is an important rehabilitation goal today [2,10–13]. Postoperatively, patients may perceive difficulties returning to work and in the ability to perform their work [14,15]. This may lead to lower productivity, more sick leave, work disability, and early retirement [16,17]. These consequences are highly undesirable for patients and society. To prevent these consequences and guide patients in achieving this important rehabilitation goal, guidelines could be helpful for healthcare professionals.

Countries may organise RTW guidance for the working-age THA or TKA population in different ways, depending on their respective healthcare and social security systems. Consequently, it can be hypothesised that the organisation of healthcare might influence treatment and rehabilitation, and ultimately may influence health outcomes and return to daily activities such as work [18]. Social security systems regulate income substitution to prevent poverty due to work disability and early labour market exit [19]. However, social security systems are not identical, and here too it can be hypothesised that this will influence differences in work outcomes [20]. Previous research among patients with musculoskeletal disorders suggests that cross-country differences in policy (healthcare and social security) may contribute to different RTW outcomes and might mediate employment outcomes more than medical factors [21,22] – for example, results for THA patients reveal that German patients return to work 2.3 weeks earlier than Dutch patients [23]. Scandinavian countries like Denmark are considered frontrunners in healthcare and the development of RTW policies [24,25]. An exploratory study can thus be useful in unravelling RTW policies and practices across countries with different healthcare and social security systems, and the results could potentially be used to learn from each other.

In this context, the overall aim of the present study was to give an overview of current RTW policies and practices for THA or TKA patients in three European countries with their own specific healthcare and social security system, i.e. Denmark, Germany, and the Netherlands. The objectives were [1]: to provide an overview of key characteristics of the healthcare and social security systems [2], to explore the availability and content of national RTW guidelines, and [3] to map the actual RTW practices and perceptions by orthopaedic surgeons, including barriers, facilitators, and needs they experience.

Methods

Study design

An exploratory study conducted in Denmark, Germany, and the Netherlands, consisting of three aspects [1]: description of the healthcare and social security systems based on desk research [2]; identification of national RTW guidelines through expert consultations; and [3] a web-based survey to gain insight into RTW practices and perceptions of orthopaedic surgeons, including barriers, facilitators and needs they experience. The Medical Ethics Review Board of University Medical Center Groningen assessed the used methods and waived further approval requirements (METc no. 2022.250).

Description of the healthcare and social security systems

A description of the key characteristics of the healthcare and social security systems of each country was made based on desk research by the first author (TK). Information was gathered on the following aspects of the healthcare system: type of system, type and source of coverage, private health insurance, outpatient care, inpatient care; and on the following aspects of the social

security system: income compensation, coordinating bodies, reintegration plan, authorisation of short-term absence or sickness benefit. The Organization for Economic Cooperation and Development (OECD) Health System Characteristics online database and country health profiles were consulted first [26–29]. If further information was needed, additional literature was gathered *via* an exploratory search on PubMed. In case of ambiguity, a local expert (SB, GHS, SO) was asked to check the collected information and provide additional information if necessary.

Within this study we adhere to the description of rehabilitation formulated by the World Health Organisation: “a set of interventions designed to optimize functioning and reduce disability in individuals with health conditions in interaction with their environment” [30].

Identification of RTW guidelines

To identify RTW guidelines of each country an expert consultation was carried out. To this end, one representative of the authors (TK, GHS, SO) with a background in orthopaedics was asked to check the availability of national RTW guidelines for THA or TKA patients. They were specifically instructed to explore not only guidelines from the national orthopaedic associations but also whether multidisciplinary guidelines were available. If available, a summary of the guideline was prepared by the first author (TK).

RTW practices and perceptions

To gain insight into RTW practices and perceptions, a web-based survey focussing on orthopaedic surgeons was developed by the authors based on their clinical (TK, GHS, SO) and methodological expertise (SB, MGJG, MS). Representatives from the three countries (TK, GHS, SO) were asked to help finetune the survey in order to create a survey appropriate for use in all three countries. The total number of orthopaedic specialists per country is approximately: 110 in Denmark (only hip and knee surgeons), 4,141 in Germany and 960 in the Netherlands [31,32]. Full content of the survey can be found in [Supplemental File 1](#) (English version). Surveys were available in the native language of each country. Participants were explicitly asked for their informed consent. The survey consisted of [1] characteristics of the respondents [2]; daily practice of RTW management; and [3] barriers, facilitators, and future needs with regard to the RTW process. There was a minimum of 15 and a maximum of 40 questions, depending on the type of surgery the responders performed and their actual RTW practices. The survey had both closed and open questions, and space was provided to add remarks. The section on daily practice of RTW management consisted of seven items asking participants about who guides the RTW process, the availability of guidelines at their practice setting, the structural discussion of work/RTW, information used for this discussion, collaboration with other healthcare professionals, and recommended time to RTW. The section on barriers, facilitators, and needs consisted of three open-ended questions asking participants about their three most important barriers and three most important facilitators in guiding the RTW process, and their three most important needs to adequately support the RTW process in the future.

Procedure

Data from the survey were collected and managed *via* Research Electronic Data Capture (REDCap) tools hosted at University

Medical Center Groningen [33,34]. The survey was pilot-tested by three orthopaedic surgeons on technical aspects, content, and formulation of the questions. From September 2022, a public link to the survey was distributed to potential participants in various ways. Orthopaedic surgeons were approached as potential participants via the electronic newsletter and social media of their country's respective orthopaedic association (Danish Society for Orthopaedic surgery [DOS], Professional Association for Orthopaedics and Trauma Surgery e.V. [Berufsverband für Orthopädie und Unfallchirurgie; BVOU, Germany], Dutch Society for Orthopaedic surgery [Nederlandse Orthopaedische Vereniging; NOV]). A brief invitation and a hyperlink to the survey were included. Personal contacts of the research group and respondents were asked to distribute the survey to colleagues in order to create a "snowball" sampling method [35]. Among the invited participants, orthopaedic surgeons actually treating patients undergoing THA and/or TKA were asked to participate by filling out the online survey. In February 2023, the survey link was deactivated and data collection was ended. Prior to data collection, no formal sample size calculation was performed as a result of the exploratory nature of this study.

Data analyses

For statistical analyses all data from the online survey were exported from REDCap and converted into IBM SPSS statistics (IBM corp. released 2021, v28 Windows) or ATLAS.ti Scientific Software Development GmbH (v22 Windows). First, all records within the database were screened for completeness to assess whether they could be included. All records providing an answer for at least one question in the second (daily practice of RTW management) or third section (barriers, facilitators, future needs) were included. Records with no answers given in those sections (i.e. the participant stopped filling out the survey during or after the first section) were excluded. Danish and German responses to the open-ended questions were translated into English with the help of DeepL translator [36].

Descriptive statistics – mean (SD), n (%) – were used to describe individual responder characteristics and RTW practices. The responses to the open-ended qualitative questions were analysed, separately per country, using conventional content analysis [37]. An inductive approach to data analysis was used, in which the themes emerged from the data without using a pre-existing coding frame [37]. The responses were repeatedly and systematically read and organised, resulting in codes. After open-coding data of one country, the preliminary codes were used to code the data of the other two countries and new codes were added when data did not fit the existing codes. Next, all data within a code was examined, resulting in some codes being combined and others split. The final codes were subsequently classified into broader subthemes and themes [37]. This was done both independently (TK) and collectively, by discussing and reviewing the data with three other authors (SB, MGJG, MS) in several meetings.

Results

First, relevant characteristics of the healthcare systems (type of system, type and source of coverage, treatment after THA or TKA, associated costs) and the social security systems (authorisation of short-term absence from work, income compensation, responsibilities of actors and coordinating bodies in the RTW process) are outlined. In-depth information can be found in [supplemental Table](#)

1. Second, the availability and content of national RTW guidelines are reported. Last, RTW practices and perceptions (barriers and facilitators) and needs of orthopaedic surgeons are described.

Key characteristics of the healthcare and social security systems

Healthcare systems

All three countries have tax-funded basic health insurance, albeit with variations in the type of coverage. In Denmark, all citizens are covered by the national healthcare system; German insurance is linked to a specific contribution based on individuals' income or professional group [26,27]; Dutch citizens have a free choice of multiple insurance companies [28].

In Denmark and the Netherlands, patients generally undergo fast-track surgery, aiming for early discharge within three days after surgery [38–42], whereas German patients stay in the hospital for about eight days postoperatively [42,43]. Unlike Denmark and the Netherlands, where all orthopaedic physicians perform some kind of surgery, in Germany physicians specialised in orthopaedics can, for example, work in a hospital or have their own practice seeing patients before and after their surgery and not necessarily perform surgery themselves.

In Denmark and Germany, the public health care system's basic medical or pension insurance covers the costs for rehabilitation, while in the Netherlands the first 20 rehabilitation treatments are not covered by basic health insurance [44–46]. Dutch patients need additional insurance to cover partly or fully the first 20 postoperative physiotherapy sessions, which the overwhelming majority (82,5%) of Dutch citizens also has [44,47]. Danish patients will receive a rehabilitation plan, which can be home-based or guided at municipality rehabilitation centres, depending on the region [45]; German patients may choose between inpatient and outpatient rehabilitation at a specialised rehabilitation centre [46,48].

Social security systems

In Denmark and Germany, the orthopaedic surgeon is authorised to certify short-term absence from work [49,50]. In addition, in Denmark a physician working for a public or private insurance company, and in Germany a general practitioner, are authorised to certify short-term absence from work (i.e. with a prospect to return to the same workplace after recovery [49,50]). This is unlike the Netherlands, where this task can only be fulfilled by the occupational physician [51].

Income loss for individuals who report sick leave is prevented in all three countries where the employer is initially responsible for income replacement [24]. Therefore, employers are incentivised to implement and guide RTW trajectories of their employees. However, the length of income replacement by the employer differs [24]: it is the shortest in Denmark and Germany, where employers pay income during absence due to sickness for a maximum of 30 days and 6 weeks, respectively [24, 27], whereas in the Netherlands employers are obliged to pay sickness absence compensation from a minimum of 70% of the salary up to a maximum of 2 years [24,28], although in daily practice this often is 100% in the first year. In all three countries, after the period of employer-paid income compensation, the social security system provides income to the sick-listed individual for a predefined period [24,27,28].

In all countries, the employer has a responsibility to make a reintegration or RTW plan, but the presence of coordinating bodies differs. Coordinating bodies link the vocational, medical, and

social rehabilitation with the actual RTW [24]. They ensure that workers have a “one-stop shop” instead of taking multiple steps [24]. Both Denmark and Germany have coordinating bodies supporting the RTW process [24]: in Denmark the municipality and Germany the statutory accident insurance (Deutsche Gesetzliche Unfallversicherung [DGUV]) and statutory pension insurance (Deutsche Rentenversicherung [DRV]) schemes [24]. In the Netherlands, no single coordinating body exists to link the medical aspect of the rehabilitation process with the actual RTW process, the role of coordinator can be fulfilled by the occupational physician [24].

National RTW guidelines

Country representatives indicated that national RTW guidelines were not available in Denmark (for either THA or TKA patients) or in the Netherlands (for THA patients), neither from the orthopaedic association nor a multidisciplinary guideline. Limited information was available in German guidelines (for both THA and TKA patients) and Dutch guidelines for TKA patients [39,52].

Table 1. Characteristics of survey responders (orthopaedic surgeons).

Characteristics	Denmark (n = 51)	Germany (n = 39)	The Netherlands (n = 78)
Sex, n (%)			
• Male	50 (98%)	31 (80%)	70 (90%)
• Female	1 (2%)	8 (20%)	8 (10%)
Type of arthroplasty performed, n (%)			
• Hip arthroplasties	22 (43%)	0 (0%)	13 (17%)
• Knee arthroplasties	17 (33%)	1 (3%)	19 (24%)
• Both hip and knee arthroplasties	12 (24 %)	13 (33%)	46 (59%)
• No surgery	0 (0%)	25 (64%)	0 (0%)
Experience, n (%)			
• 0-5 years	3 (6%)	1 (3%)	12 (15%)
• 6-10 years	8 (16%)	2 (5%)	19 (24%)
• 11-15 years	6 (12%)	8 (21%)	19 (24%)
• 16-20 years	5 (10%)	8 (21%)	11 (14%)
• > 20 years	29 (57%)	20 (51%)	17 (22%)
Practice setting, n (%)			
• Non-academic hospital without residents	0 (0%)	0 (0%)	27 (35%)
• Non-academic hospital with residents	10 (20%)	2 (5%)	25 (32%)
• Academic hospital	35 (69%)	4 (10%)	8 (10%)
• Private clinic	5 (10%)	14 (36%)	18 (23%)
• Rehabilitation clinic	0 (0%)	19 (49%)	0 (0%)

In Germany, the post-treatment recommendations (“Nachbehandlungsempfehlungen, 2022”) from the German Society for Orthopaedics and Trauma (Deutsche Gesellschaft für Orthopädie und Unfallchirurgie; [DGOU]) advise that patients may return to light working duties 12 weeks after THA or TKA and to medium-to-heavy work 16 weeks postoperatively [52]. The Dutch multidisciplinary national guideline “total knee prosthesis” from the Federation of Medical Specialists (dated 31 August 2021) recommends aiming for work resumption within three months postoperatively, possibly in phases and preferably supervised by an occupational physician [39], stating that returning to work does not seem to cause complications and earlier revision surgeries, and therefore should not be a reason to avoid physical labour [39].

Return to work practices and perceptions of orthopaedic surgeons

Sample description

In total, 168 orthopaedic surgeons completed the survey (Table 1). Most of the respondents were male (>80%). For the most part, Danish respondents worked at an academic public hospital, German respondents at a rehabilitation clinic, and Dutch respondents at a non-academic hospital (see Table 1).

RTW practices

In Denmark, the majority answered that the orthopaedic surgeon and the general practitioner guide the RTW process. Additionally, the physiotherapist, case manager, and municipality play a role. In Germany the orthopaedic surgeon, the general practitioner, and the rehabilitation physician guide the RTW process. In the Netherlands, the majority replied that the occupational physician guides the RTW process and a minority indicated that the employer plays a role (Figure 1).

The majority in all three countries answered that local RTW guidelines are absent. However, in Denmark (12%) and Germany (26%) surgeons do have a RTW protocol at their practice setting, compared to none in the Netherlands. Most orthopaedic surgeons in all three countries structurally discuss work/RTW, both pre- and postoperatively, based on their clinical expertise (Table 2). The few orthopaedic surgeons not discussing RTW with their patients stated that it was not part of their duties and/or expertise and thus should be done by another (specialised) physician. Several Dutch respondents also answered that they only discussed RTW if patients explicitly asked about it.

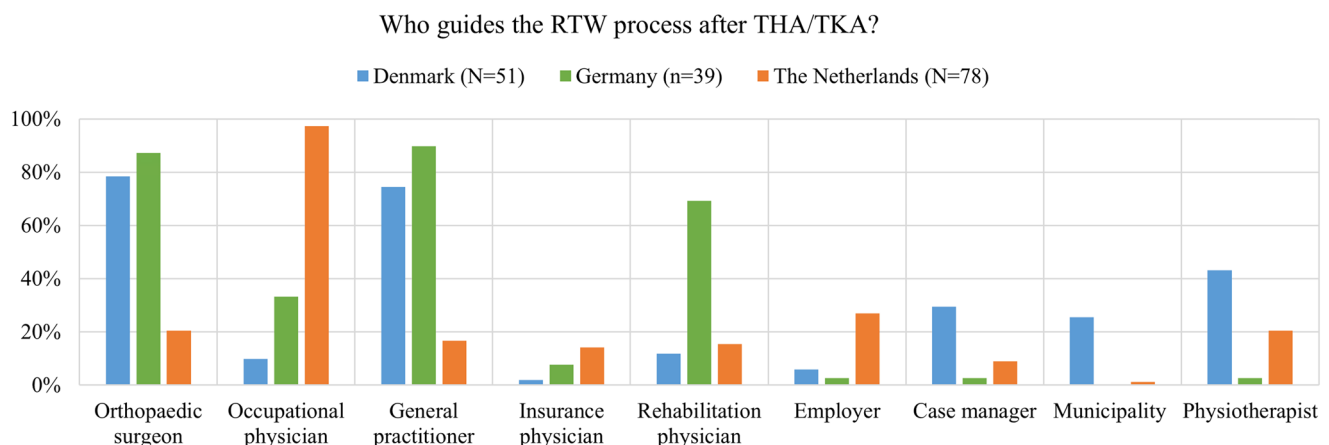


Figure 1. Actors in guiding the RTW process after THA or TKA.

In all three countries, a minority of orthopaedic surgeons refer to, collaborate with, or ask advice from other physicians or professionals regarding work/RTW (DK, 10%; DE, 23%; NL, 30%). If they collaborate, at the minimum collaboration with physical therapists takes place in all three countries. In addition, orthopaedic surgeons in Denmark collaborate with general practitioners, in Germany with general practitioners and rehabilitation physicians, and in the Netherlands mostly with occupational physicians (Table 2).

Although recommended time to RTW differed between the three countries, it was shortest in all countries for THA patients doing white-collar work (i.e. office work) and longest for TKA patients doing blue-collar work (i.e. manual work); it was longest in Germany and shortest in the Netherlands (Figure 2).

RTW perceptions

For each factor, the proportion of participants mentioning a factor as “barrier” and as “facilitator” are presented in Table 3. Needs to adequately support the RTW process are presented next (Table 4).

Barriers and facilitators in guiding RTW. In all three countries, limited physical functioning of the patient was among the top three barriers (range 31-85%). Limited knowledge of the orthopaedic surgeon was one of the top-3 barriers in Denmark and the Netherlands. In Denmark, the top-3 barriers were limited knowledge of the orthopaedic surgeon (54%), limited physical functioning of the patient (31%), and lack of support from the employer (20%). In Germany, the top-3 barriers were limited physical functioning of the patient (85%), mainly physical or

Table 2. Daily practice of return to work management of orthopaedic surgeons.

Aspects	Denmark (n = 51)	Germany (n = 39)	The Netherlands (n = 78)
Availability of local RTW guidelines, n (%)			
• Yes	6 (12%)	10 (26%)	0 (0%)
• No	37 (73%)	19 (49%)	57 (73%)
• Not that I am aware of	5 (10%)	7 (18%)	20 (26%)
Is work/RTW structurally discussed (yes), n (%)	47 (92%)	32 (82%)	60 (77%)
Timing of discussion on work/RTW			
• Preoperatively	17 (33%)	3 (8%)	16 (21%)
• Postoperatively	0 (0%)	14 (36%)	5 (6%)
• Both pre- and postoperatively	30 (59%)	15 (39%)	39 (50%)
Advice regarding RTW is based on, n (%)			
• Guidelines	2 (4%)	1 (3%)	11 (14%)
• Experience	43 (84%)	26 (67%)	42 (54%)
• Other	2 (4%)	5 (13%)	7 (9%)
Collaboration with another healthcare professional regarding work/RTW? (yes) n (%)*	5 (10%)	9 (23%)	23 (30%)
If affirmative, collaboration with ... regarding work/RTW?, (yes) n (%)*			
• Occupational physician	1 (20%)	4 (44%)	22 (96%)
• General practitioner	3 (60%)	7 (78%)	10 (43%)
• Insurance physician	1 (20%)	3 (33%)	4 (17%)
• Rehabilitation physician	0 (0%)	5 (56%)	14 (61%)
• Physical therapist	5 (100%)	6 (67%)	17 (74%)
• Employer	1 (20%)	4 (44%)	4 (17%)
Advised time to RTW after THA			
White-collar, mean (95%CI)	7,2 (6,1 – 8,2)	11 (9,1 – 12,9)	6,1 (5,2 – 7,1)
Blue-collar, mean (95%CI)	10,6 (9,5 – 11,7)	13,7 (11,8 – 15,7)	9,6 (8,7 – 10,6)
Advised time to RTW after TKA			
White-collar, mean (95%CI)	8,3 (7,2 – 9,5)	11,6 (9,8 – 13,4)	6,9 (6,2 – 7,7)
Blue-collar, mean (95%CI)	11,2 (10,5 – 11,9)	15,1 (13,0 – 17,1)	11,6 (10,5 – 12,6)

*Collaboration also includes referring to and asking for advice from another physician or healthcare professional. Blue-collar workers perform manual work; white collar workers perform office work.

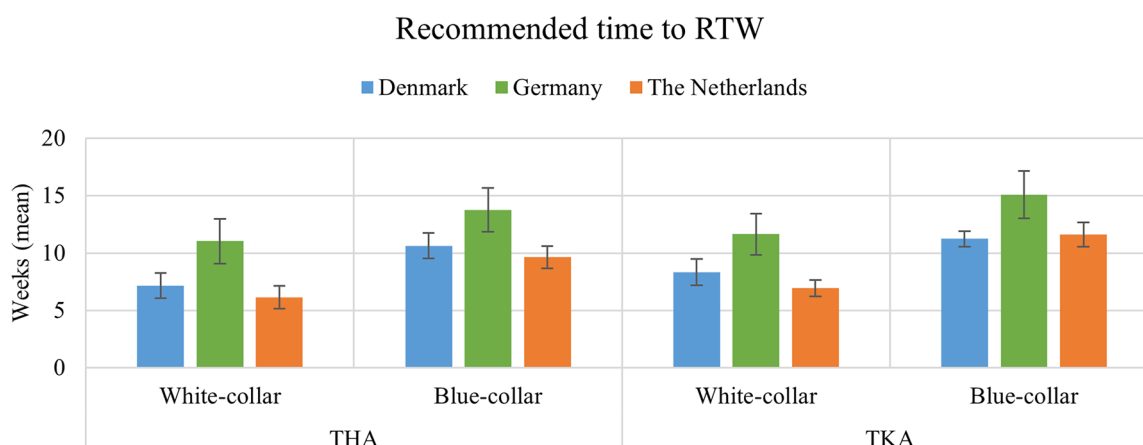


Figure 2. Recommended time to RTW of white-collar and blue-collar THA or TKA patients per country by orthopaedic surgeons. The error bars resemble the 95% confidence interval.

Table 3. Barriers and facilitators for orthopaedic surgeons in guiding the return to work process after THA or TKA.

Theme	Subtheme/factor	Denmark		Germany		The Netherlands	
		Facilitators (+) (n = 20)	Barriers (–) (n = 26)	Facilitators (+) (n = 20)	Barriers (–) (n = 26)	Facilitators (+) (n = 53)	Barriers (–) (n = 62)
Patient	Physical functioning	40%	31%	28%	85%	49%	48%
Individual professional	Psychosocial factors	30%	15%	40%	33%	43%	19%
	Accessible postoperative check-up	5%	8%	8%	11%	4%	8%
	Knowledge	50%	54%	8%	22%	51%	55%
	Adequate information provision / educational materials	15%	8%	0%	4%	9%	0%
	Collaboration with healthcare practitioner	5%	0%	20%	4%	25%	13%
	Collaboration with employer	0%	0%	4%	0%	2%	3%
	Collaboration with public sector or social services	10%	0%	8%	4%	0%	0%
Organisational context	Referral option	5%	4%	0%	0%	0%	0%
	Time/reward	0%	19%	4%	0%	8%	19%
	Not part of tasks	0%	0%	4%	0%	2%	23%
	Type of work/working conditions	5%	8%	32%	52%	9%	15%
	Work accommodations	15%	8%	44%	22%	11%	5%
System	Type of contract	0%	0%	0%	0%	8%	0%
	Support from employer	0%	20%	0%	30%	4%	16%
	Social security (rules / organisation)	0%	12%	0%	7%	0%	0%

Physical functioning included "functioning", "comorbidities", "pain", "rehabilitation"; psychosocial factors included "expectations and satisfaction", "motivation", "anxiety"; Type of contract included "self-employed or salaried employment", "job security", "income"; Support from the employer included "acceptance of decrease in performance", "facilitating role".

Table 4. Needs of orthopaedic surgeons to adequately support the return to work process after THA or TKA.

Theme	Subtheme	Denmark (n = 17)	Germany (n = 23)	The Netherlands (n = 57)
Patient	Physical functioning	6%	9%	11%
Individual professional	Psychosocial factors	12%	9%	5%
	Accessible Postoperative check-up	18%	17%	0%
	Knowledge	76%	65%	75%
	Adequate information provision/educational materials	6%	0%	7%
	Collaboration with healthcare practitioner	12%	35%	49%
	Collaboration with employer	0%	35%	4%
	Collaboration with public sector or social services	6%	13%	2%
Organisational context	Referral option	18%	0%	2%
	Time/reward	6%	4%	19%
	Not part of tasks	0%	0%	11%
	Work accommodations	6%	26%	5%
Work	Support from employer	0%	17%	2%

Physical functioning included "functioning", "comorbidities", "pain", "rehabilitation"; psychosocial factors included "expectations and satisfaction", "motivation", "anxiety"; Knowledge included "scientific evidence", "guidelines", "expertise with work/RTW"; Support from the employer included "acceptance of decrease in performance", "facilitating role".

repetitious work (52%), and adverse psychosocial factors related to the patient (33%). In the Netherlands, the top-3 barriers were limited knowledge of the orthopaedic surgeon (55%), limited physical functioning of the patient (48%), and orthopaedic surgeons not perceiving RTW guidance as a part of their tasks (23%). Regarding responsibilities, Dutch orthopaedic surgeons mainly mentioned that RTW guidance is a duty of the occupational physician.

Among the top-3 facilitators in all three countries were psychosocial factors related to the patient (i.e. expectations, satisfaction, motivation, absence of anxiety). The same top-3 were found in Denmark and the Netherlands: more knowledge of the orthopaedic surgeon (DK, 50%; NL, 51%), better physical functioning of the patient (DK, 40%; NL, 49%), and psychosocial factors related to the patient (DK, 30%; NL, 43%). In Germany, the top-3 facilitators were work accommodations (44%), psychosocial factors related to the patient (40%), and no physical or repetitious work (32%).

Dissimilarities in barriers and facilitators existed in terms of lack of time and collaboration with healthcare practitioners. Lack of time was identified as a barrier to guide work resumption by 19% of Danish and Dutch respondents, compared to 0% of German respondents. Collaboration with healthcare practitioners was a facilitator for 20% of German and 25% of Dutch respondents, compared to 5% of Danish respondents. Other than that, no major differences were found.

Future needs to adequately support the RTW process. Among the top-3 needs in all countries was a need for more knowledge, which included "scientific evidence", "guidelines", and "expertise with work/RTW". In Germany and the Netherlands, professionals also reported a need for better or increased collaboration with healthcare practitioners. In Germany, respondents mentioned a variety of healthcare practitioners with whom better or increased collaboration is needed (i.e. general practitioner, rehabilitation physician, physiotherapist, company doctor). In the Netherlands, respondents specifically stressed the need for collaboration with an occupational physician.

In Denmark the top-3 needs were more knowledge (76%), more postoperative follow-ups of patients (18%), and referral options (18%). In Germany the top-3 needs were more knowledge (65%), better or increased collaboration with healthcare practitioners (35%), and increased collaboration with employers (35%). In the Netherlands the top-3 needs were more knowledge (75%),

better or increased collaboration with healthcare practitioners (49%), and additional time or reward (19%). Dissimilarities in needs existed at the work level, since mainly German respondents mentioned that work accommodations (26%) and support from the employer (17%) are needed, compared to a small proportion of orthopaedic surgeons (<6%) in Denmark and the Netherlands.

Discussion

To our knowledge, this is the first study to explore RTW policies and practices after THA or TKA in three European countries: Denmark, Germany, and the Netherlands. The results show that rehabilitation differs between the three countries. Nevertheless, overall it can be concluded that orthopaedic surgeons are in need of more knowledge, including “guidelines”, “scientific evidence”, and “expertise with work/RTW”. Additionally, there is a need for better collaboration with other healthcare practitioners.

As a result of different structures in the healthcare and social security systems of the three countries, the RTW policies and practices can be characterised differently. In Denmark this is a multidisciplinary approach (orthopaedic surgeon, general practitioner, case manager), organised mainly locally (role of the municipality), and work-oriented. In Germany this is a medical orientation with a leading role for physicians specialised in orthopaedics, rehabilitation physicians, and general practitioners. In the Netherlands RTW guidance is characterised by the central role of the occupational physician guiding the patient back to work.

Rehabilitation differences may be the result of differences in rehabilitation cost coverage by healthcare systems or insurance. In Denmark and Germany, rehabilitation is covered by the public health care system or basic health or pension insurance, and is standardised. This is in contrast with the Netherlands, where the first 20 rehabilitation sessions are not covered by basic health insurance [44]. Dutch patients need additional insurance to cover partly or fully the first 20 postoperative physiotherapy sessions, which the overwhelming majority of Dutch citizens also has [44, 47]. Consequently, variations in rehabilitation practices may have the potential to induce differences in the recovery process and eventually may cause differences in RTW practices [53,54]. For example, work participation has been established as one of the quality indicators for rehabilitation, according to a panel of clinicians, researchers, and patients [55]. Accordingly, countries with standardised (high-quality) rehabilitation may focus more on work participation as a treatment goal compared to countries without standardised rehabilitation.

Regarding the social security system, orthopaedic surgeons in Denmark and Germany have a gatekeeping role, as they authorise sickness absence. Previous studies show that a majority of orthopaedic surgeons experience problems authorising sickness absence, such as assessing work ability [56]. Ultimately, this has the potential to induce different RTW practices [57]. Compare this with the Netherlands, where instead of orthopaedic surgeons it is occupational physicians who focus on keeping individuals well at work and assess aspects such as work ability [58].

According to our study, none-to-limited national or local RTW guidelines were available. Within the limited national German and Dutch guidelines, recommendations on time to RTW varied between 12-16 weeks and only distinguished between light and medium-to-heavy work duties. The recommendations did not distinguish between types of arthroplasty or consider specific work-related activities such as kneeling or lifting. In contrast to a recent study showing that 18/43 Dutch hospitals provided local recommendations on work, no local RTW guidelines were available

according to the Dutch respondents [59]. We could not compare our findings about Danish or German national or local RTW guidelines to other studies due to lack of research investigating those guidelines.

Despite the lack of guidelines, our study shows that most of the orthopaedic surgeons in all three countries discuss work/RTW with patients, which due to lack of guidelines is based on their expert opinion. The differences in work-oriented or medical-oriented RTW guidance might influence aspects like recommended time to RTW.

Regardless of the aforementioned differences, all orthopaedic surgeons encountered roughly the same barriers with regard to RTW guidance and are in need of similar changes to improve it. These barriers were lack of knowledge of the orthopaedic surgeon about RTW, patient-related factors (limited physical functioning or adverse psychosocial factors), and work-related factors (physical or repetitious work and absent support from the employer) which hamper RTW. Our findings are consistent with previous research on factors influencing the RTW process after THA and TKA, from both the patient's and the employer's perspective [60–62].

To overcome these barriers and to adequately support RTW, orthopaedic surgeons are mainly in need of modifications in knowledge and collaboration with healthcare practitioners. The reported need for knowledge, such as an evidence-based guideline, is in line with a recent study showing that large variations existed between local recommendations of Dutch hospitals on return to daily life activities [59]. Besides the need for knowledge, a substantial proportion of German and Dutch respondents are in need of better collaboration with other healthcare practitioners involved in RTW guidance, as currently only a minority engages in such collaboration. This need aligns with new conceptual models of healthcare, which encourage healthcare practitioners to work more closely together (both inter-professionally and cross-sector) to improve coordination of patient care in order to achieve better health and work outcomes [63,64]. Strong evidence shows that healthcare practitioners play a key role in the RTW process, and poor communication between healthcare practitioners may even affect the RTW process negatively [62,65].

Strengths and limitations

To our knowledge, this is the first cross-country study exploring RTW policies and practices of THA and TKA patients, thereby bridging the gap in the extant literature. Although we have made efforts to include a diverse range of orthopaedic surgeons from three countries, it is important to acknowledge that the snowball sampling could have led to a potential selection bias. Also, as we used a public survey link we could not obtain information on response rates or non-responders. Still, in our opinion the study provides a first valuable insight into RTW policies and practices in different countries. The distribution of practice settings is not completely representative for each country and may affect the transferability of our findings [66–70]: mostly academic hospitals for Danish respondents, rehabilitation clinics for German respondents, and non-academic hospitals for Dutch respondents. Nevertheless, a recent international comparative study shows there is no standard definition of an academic hospital, revealing considerable differences in academic settings between countries [67]. Focussing on case-mix and complexity of treated patients (e.g. those with multimorbidity, polypharmacy, or anatomical deviations) instead of type of work practice might be better to assess transferability. Unfortunately, we did not collect that type of data. Also, our

methods did not allow us to explore barriers and facilitators in depth. Future qualitative studies may help further exploration, for which our study could serve as starting point.

Conclusion

We found considerable variation in healthcare and social security systems. In Denmark and Germany rehabilitation is standardised and always financially covered, in contrast to the Netherlands where the first 20 rehabilitation treatments are not covered by basic health insurance but only partly or fully by an additional insurance on a voluntary base. In terms of the social security system, orthopaedic surgeons in Denmark and Germany have a gatekeeping role, as opposed to the Netherlands, where occupational physicians fulfil this task. These differences have the potential to induce different RTW practices. Additionally, national guidelines were available in Germany (THA and TKA) and the Netherlands (TKA) but contained only limited information. Regarding actual practices, RTW guidance in Denmark can be characterised by a multidisciplinary approach, in Germany by medical orientation, and in the Netherlands by the central role of the occupational physician. Overall, orthopaedic surgeons are in need for modifications in knowledge.

In perspective, there seems to be a need for multidisciplinary RTW recommendations after THA/TKA which should be made by the national associations of the involved healthcare practitioners. Last, this will also help to fulfil the need for better collaboration with other healthcare practitioners.

Author contributions

TK conceived and designed the study, wrote the manuscript, conducted analyses, prepared the figures. SB conceived and designed the study, supervised the work, made substantial changes to the manuscript. GS arranged the data, critically assessed and corrected the survey and manuscript. SO arranged the data, critically assessed and corrected the survey and manuscript. MG conceived and designed the study, supervised the work, made substantial changes to the manuscript. MS conceived and designed the study, supervised the work, made substantial changes to the manuscript.

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Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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