

Knee osteoarthritis and aquatic cycling

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Valorisation addendum



„Knowledge is of no value unless you put it into practice.“ Anton Chekov

Exercise is a cornerstone in the conservative management of knee osteoarthritis. Physical therapists and scientists are driven to alleviate symptoms and slow down the progression of knee osteoarthritis. In daily practice and in research we aim to *“get them up, moving and out the door”*.¹ Ideally, recommendations and results from physical therapy and research should be integrated and accessible in the daily life of patients. However, the translation of research outcomes to the real world needs some careful thinking on how the results could add value to our society in the broadest sense. This process is called knowledge valorisation and is defined as the *“process of creating value from knowledge, by making knowledge suitable and/or available for social (and/or economic) use and by making knowledge suitable for translation into competitive products, services, processes and new commercial activities”*. (adapted definition based on the National Valorisation Committee 2011:8).

In this chapter, we outline the potential relevance of our project for society. Furthermore, we describe the actions that were taken to disseminate our knowledge to different target groups.

Relevance

Osteoarthritis is already the most common joint disease in older adults worldwide.² In addition, obesity and muscle impairments, but also knee injuries accelerate the onset of osteoarthritis at younger ages.³ Therefore, an adequate care management of knee osteoarthritis is and will be of great importance. The younger patients (± 45 years of age) will suffer for a longer period of time from this chronic disease, which is likely accompanied by the need for medical treatment. As a result, healthcare utilisation for knee osteoarthritis will increase further. Moreover, indirect costs related to knee osteoarthritis, such as productivity loss or lost wages, will also increase since these younger patients still belong to the workforce.⁴ Because care management for knee osteoarthritis should be personalised and acceptable to patients,⁵ exercise therapy should meet the exercise preferences preferred by this younger generation of osteoarthritis patients.⁶ Aquatic cycling might be an attractive option as it is a trending sports activity offered by local swimming pools and modern sports studios. The latter facilities clearly meet the aesthetic dimension that is nowadays often related to exercise.⁷ Furthermore, aquatic cycling is easy to learn, which might be appealing to people who do not have much experience with exercising. In addition, obese patients might appreciate this type of aquatic activity, since the stable character of the bike prevents them from floating too much. Furthermore, water immersion reduces body exposure.

This dissertation focused on the development and evaluation of a head-out aquatic cycling exercise programme for patients with mild to moderate knee OA. So far, the

evidence on the effects of aquatic cycling for patients with knee osteoarthritis or other target populations is scarce. We hope that our project increased the awareness among patients, healthcare providers, and aquatic fitness professionals to consider aquatic cycling as a suitable and effective exercise modality for themselves or their patients or clients.

Target groups

Researchers

This PhD project contributed to the academic field of aquatic exercise therapy. To our best knowledge, our randomised trial was the first that evaluated an aquatic cycling programme for patients with knee osteoarthritis. Researchers can use our results as a starting point for further research; possibly about the impact of aquatic cycling on various other outcomes relevant for patients with knee osteoarthritis or its effect among other patient groups. Hopefully, the detailed reporting of the intervention characteristics of our own trial and the results from our literature review will stimulate fellow researchers to summarise their interventions comprehensively. This would increase our understanding of the effects of aquatic cycling and increase reproducibility and comparability of interventions and findings.⁸

Furthermore, researchers should actively support the translation from scientific evidence into information that is useful and understandable to aquatic therapists and aquatic fitness instructors. The process of discovering new knowledge and its application in public health and clinical settings can take a long time⁹ and the translation from the scientific knowledge about aquatic cycling into daily practice will need some time as well. In order to be able to transfer our evidence into daily practice, we need to learn more about the effectiveness of aquatic cycling (for example in community settings). Since aquatic cycling is a niche in the field of aquatic exercise and aquatic therapy, the (relatively few) individuals and intermediaries with expertise in aquatic cycling, such as (local) health professionals, researchers, aquatic exercise professionals, educators, and opinion leaders in the field of aquatic fitness and therapy, should collaborate to increase our scientific knowledge about aquatic cycling and to transfer the results into daily practice.¹⁰

Aquatic exercise professionals

Aquatic professionals, including aquatic exercise instructors and aquatic therapists, are the most important target group to bring our scientific knowledge into (clinical) practice. The information from this PhD project can provide guidance in the set-up of aquatic cycling classes for patients with knee osteoarthritis. To increase the knowledge transfer, the evidence should be summarised and become available in sources frequently consulted by aquatic professionals. For instance, aquatic fitness and therapy

associations could publish the information on their websites or incorporate the knowledge in their course manuals. Aquatic fitness professionals have the opportunity to follow a two-day course that educates them to become an aquatic cycling instructor. The available knowledge from our study and fellow researchers regarding aquatic cycling for patients could be implemented in these courses or could serve as a basis for an advanced aquatic cycling instructor course. Offering training courses, which allows potential users to observe and experience aquatic cycling with patients themselves before acquiring this training modality and applying it, will stimulate the transition of knowledge into practice. In order to stimulate this development, this dissertation will be sent to several aquatic fitness associations.

Aquatic fitness industry and providers

The aquatic fitness industry is another possibility to disseminate research results. Manufacturers of aquatic bikes and organisations that provide aquatic training (e.g. rehabilitation centres, larger physiotherapy centres, and local swimming pools) are a group that may receive financial incentives for establishing aquatic cycling programmes for patients with knee osteoarthritis. For these activities, a dissemination plan, possibly with a more market-oriented approach, to disseminate our findings needs to be developed.^{11,12} However, the development of such a dissemination plan is beyond the scope of this dissertation. And, it should be noted that there is a risk that our findings could be overestimated or generalised for such marketing purposes. Currently, the fitness industry already promotes aquatic cycling with various benefits ranging from reducing cellulitis to improving coordination and supporting rehabilitation and treatment of musculoskeletal disorders. In fact, none of these benefits are completely false since aquatic exercise, in general, has a positive influence on the above-mentioned conditions. However, most aquatic cycling classes, as provided in local public swimming pools, very likely do not fit the needs of the average knee osteoarthritis patient. For example, a very fast pedalling tempo or long-lasting out-of-saddle intervals might reduce patients' ability for proper alignment of the knee, which can increase the risk of knee pain (for example by causing irritation of the collateral ligaments or increased loading of the knee joint).

Patients with knee osteoarthritis

The strongest motivation of medical research is to improve the health of patients, and our research was driven by the motivation to explore aquatic cycling as an exercise opportunity for patients with knee osteoarthritis. The evaluation of our trial showed a positive impact on the impairments of our intervention group. Furthermore, our feasibility study suggested that most patients accepted and enjoyed this type of exercise. Thus, participation might not only have resulted in improvements of symptoms, but might also have increased the patients' motivation to stay active after

the end of the trial. We hypothesize that participants gained a positive impression about exercise, which is a facilitator for future exercise adherence and maintenance. Possibly, patients with mild symptoms or at a higher risk for developing knee osteoarthritis (e.g. overweight persons) might also benefit from aquatic cycling exercises and, depending on their exercise abilities, might be able to join regular aquatic cycling classes provided by sports instructors. However, from anecdotal evidence from our trial participants, we feel that patients need more guidance in the development of an active lifestyle and exercise routine. Our patients reported typical barriers to physical activity and exercise like doubting the effectiveness, not being aware of adequate (low-cost) exercise opportunities, lacking support from health professionals, or limited financial coverage of health services by health insurances.^{13,14} Physical therapists are commonly the primary healthcare practitioners to whom patients with knee osteoarthritis are referred for support in their osteoarthritis management. However, comparable to other conservative treatment options, physical therapy is under-utilised in the management of knee osteoarthritis.¹⁵ To increase utilisation of physical therapy in the management of knee osteoarthritis, 12 annual physical therapy sessions for osteoarthritis of the knee or the hip have recently been added to the basic healthcare package in The Netherlands. This is an important step towards the needs of osteoarthritis patients¹⁶ and will hopefully increase exercise participation among this large group of patients.

Activities and products

This PhD project resulted in various activities to increase awareness and knowledge regarding aquatic cycling exercise in the above-mentioned target groups. Results of our studies are or will be published in (open access) journals for health care and exercise professionals. Furthermore, we presented our results at national and international conferences, national symposia, and informal hospital meetings to physical therapists, aquatic exercise professionals, and orthopaedic surgeons. Next to our scientific output, undergraduate professionals of physical therapy and movement science participated in our project during their internships at the Maastricht University Medical Centre+ or as part of their bachelor and master theses.

Another activity of this project was the collaboration with „Maastricht Sport“, an organisation of the municipality of Maastricht that aims to support inhabitants of Maastricht to achieve an active lifestyle. The organisation is based in the building of the newly built public swimming pool, the “Geusseltbad”, which opened its doors in 2014; a few months after we had started our trial. Because the “Geusseltbad” offered aquatic cycling classes, the research team of this PhD project approached “Maastricht Sport” for collaboration. This resulted in the set-up of an aquatic cycling group for patients with musculoskeletal problems in the lower extremities and/or a low fitness level. The author of this dissertation provided the training sessions for the first two years (2014 to

2016), and the training was based on elements of the 12-week programme for the intervention group. Participants of the control group of our trial were invited to this group and could participate in 12 free try-out sessions. In addition, participants from the intervention group and other interested people could join the group as well against payment of the regular admission fee. The group size grew from around five participants from our trial population by word-of-mouth recommendation to approximately twelve participants every week. In total, 24 patients from the control group (out of 39 people who completed all three measurements and received the invitation) and ten people from the intervention group (out of 42 who followed the intervention and participated in all three measurements) participated in these sessions. After the last patient from our trial had finished the free try-out sessions (summer 2016), the “Geusseltbad” continued with offering these classes due to the high demand of the participants. To date (April 2018), the classes are on the regular schedule of the “Geusseltbad”.

Thus, the knowledge of our research project could be implemented in the schedule of aquatic fitness activities of the “Geusseltbad” and provides an exercise opportunity to a population beyond our original trial population. Although the evidence of the effectiveness of this community approach is lacking, the positive response of the ‘new’ participants is promising. However, the implementation of our programme should be investigated systematically to prevent generalisation of our trial data and to serve as an example for other community sports facilities and research projects about the effectiveness of aquatic cycling. As a starting point and inspiration for this future work, the author of this dissertation asked the team leader from “Maastricht Sport” to reflect on the cooperation and to share some ideas for future collaborations. *“The collaboration had a positive impact on several aspects. First, we could attract a new target group to our aquatic cycling classes, which we had not thought of before. In addition, our aquatic fitness instructors learned how to adjust the regular lessons to the needs of people with knee osteoarthritis.”* Furthermore, he explained that the participants benefitted from a positive exercise experience. *“Once participants realise that exercise is fun, they get open-minded and interested in other activities. For example, some participants from the aquatic cycling trial started with dry-land exercise like tai chi.”* Future collaborations with researchers and health professionals from acute care should be installed to evaluate the effectiveness of aquatic cycling and to create a guidance and support network helping patients with knee osteoarthritis to become and to stay physically active. The team leader emphasised that *“the collaboration was a starting point to expand a community support system for hospital-based and primary care therapy activities in the Maastricht area.”* For example, in collaboration with medical specialists, “Maastricht Sport” developed the exercise intervention „beweeg bewust“ (Engl. move deliberately; <http://www.maastrichtsport.nl/maastricht-sport/maastricht-sport-verbindt/gezondheid/beweegbewust>) to help patients moving from acute care management through revalidation into an active lifestyle maintenance.

We encourage the partners of this project to continue their collaboration and to develop research-practice partnerships¹⁷ that support the collaboration across sectors and that speed up the translation of evidence-based exercise interventions into practice. We hope that many aquatic interventions will be developed, evaluated and disseminated by this partnership and by other care-to-lifestyle projects because aquatic exercise/therapy suits the needs of many patients. *„We feel there is a bright future for the field [of aquatic therapy] as a better scientific understanding of the many physiologic benefits emerges, therapeutic techniques evolve, more therapists are educated in the techniques and public and professional awareness of these broadens utilisation. A wetter world should lead to faster and more efficient health recovery from injury or surgery, [and] health maintenance in an aging population...“* (Bruce E. Becker, MD; Andrew J. Cole, MD).¹⁸

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