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Effectiveness of Aquatic Physiotherapy in Clinical Practice

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EDUCATION

Effectiveness of Aquatic Physiotherapy in Clinical Practice

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Current healthcare provision demands evidence of clinical effectiveness. Since 2007, The Measure Yourself Medical Outcome Profile (MYMOP2) questionnaire has been used in the Aquatic Physiotherapy (AP) Department at the Brighton and Sussex University Hospitals NHS Trust. This service evaluation presents a snapshot of pre- and post-MYMOP2 scores for a 3-month period. All patients (n = 125) attending for AP between January and March 2012 completed a MYMOP2 before and after treatment. AP was given according to Aquatic Therapy Association of Chartered Physiotherapists Guidance on Good Practice in Hydrotherapy. The MYMOP2 Profile score was calculated from the mean of the prepost differences of the 4 item scores. The majority of patients had musculoskeletal conditions; mean age was 56.8 years (*SD*: 16.5) and mean number of treatments was 5.21 (*SD*: 1.6). MYMOP2 profile score decreased in 90.8% of patients, signifying improvement. In real terms there was a median and significant improvement of 1.5 points (IQR:-1.5) on the 7-point MYMOP2 profile score (p = .0001). The majority of patients (77.3%) met or exceeded "the index of responsiveness, relating to the minimal clinically important difference" of 0.85 reported by Paterson (1996). The results demonstrate clinical effectiveness of AP for patients, who present with a diversity of conditions and provides real-world evidence of outcome. The MYMOP2 tool has been shown to be a feasible and responsive measure for use in AP.

Keywords: aquatic physiotherapy, hydrotherapy, outcome measures

Since Lord Darzi's report on the future of the NHS and with the introduction of patient reported outcome data collection for selected pre- and postoperative procedures demand has been growing for all health care services to demonstrate their effectiveness (Darzi, 2008). As part of routine practice physiotherapists must prove the value of their services and evaluating this from the patients' perspective is one of the most important aspects of quality increasingly expected to influence commissioning decisions (Guidance on the Routine Collection of Patient Reported Outcome Measures (PROMs) For the NHS in England 2009/10). Following participation in the HyDAT project, which focused on the demographics of patients

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completing a course of aquatic physiotherapy (AP) and therapists' impressions of benefit, the Brighton and Sussex University Hospitals NHS Trust (BSUH) introduced a PROM to all patients attending their service (HyDAT Team, 2009).

The AP service within the BSUH deals with approximately 850 referrals per annum. Referrals are accepted from BSUH Trust, West Sussex PCT, and neighboring PCTs with whom there are service level agreements. Consequently, all ages and conditions are referred for AP, the beneficial effects of which are considered the product of an individually tailored therapy program within an environment which "utilises the principles of hydrostatics and hydrodynamics to create challenges that promote health through exercise in water" (Batterham, Heywood, & Keating, 2011). In particular the warmth of the water and buoyancy, which decreases joint loading, is thought to reduce pain and muscle spasm and enable movement (Becker, 2009; Hall, Swinkels, Briddon, & McCabe, 2008). Conversely, resistance to movement as a result of turbulence and hydrostatic pressure enables muscle strengthening (Valtonen, Pöyhönen, Sipilä, & Heinonen, 2010; Rahmann, Brauer, & Nitz, 2009).

Since 2007, all patients attending for AP have been asked to complete a pre- and postintervention PROM (Measure Yourself Medical Outcome Profile: MYMOP2). This service evaluation examined patient perspectives of outcome for all adult patients discharged from AP between January to March 2012. The aim was to look at the change in scores pre- and posttreatment and to examine patterns of change across pathologies (i.e., musculoskeletal and neurological). This snapshot of time was selected because many of the practical issues of data collection, storage, and analysis had been resolved; thus the data were systematically collected by all aquatic therapists and collaboration with the audit department enabled the data to be entered and stored.

Method

The outcome measurement tool used has been in our routine clinical practice since 2007, and a snapshot of consecutive patient responses was used to evaluate clinical effectiveness using a pre- and posttest model. As such, this data collection exercise did not require ethical approval [Defining Research, National Research Ethics Service, December 2009. http://www.nres.nhs.uk/applications/is-your-project-research/ (1 February 2013)].

Setting

The setting for this clinical evaluation was the AP department of an Acute NHS hospital Trust. The pool temperature was maintained at 35°C and provided a depth of 1.2 m–1.4 m.

Participants

The participants comprised 125 adult patients discharged from AP between January to March 2012. Patients were referred from a variety of sources (e.g., consultant, general practitioners, physiotherapists) and included patients with musculoskeletal, orthopedic, rheumatology, or neurological conditions. Many patients had

multipathologies (e.g., patients with osteoporosis and rheumatoid arthritis) and comorbidities (e.g., diabetes, cardiac and respiratory dysfunction, epilepsy, mental health problems).

Intervention

All patients accepted for AP had been assessed for suitability as per "Guidance on Good Practice in Hydro" (ATACP Guidance, 2006). As a risk assessment, this allowed the clinical specialist to determine the level of supervision required during AP. Patients with multipathology and comorbidities were considered high risk; therefore initial individual treatment by a trained aquatic physiotherapist was given. Once a patient's response to AP had been determined, group therapy (maximum of six patients per group) was continued. Patients with less complex needs were treated, after assessment, by technical instructors, under the guidance and protocols of the aquatic physiotherapist in a group session.

AP consists of a number of physiotherapy techniques conducted during immersion in warm water. At the BSUH, various techniques are employed during AP, including exercise methods (e.g., Halliwick, Bad Ragaz, Ai Chi, modified Mackenzie, modified pilates), relaxation (supine floating, Watsu), and manual therapy (e.g., Maitland mobilizations). A maximum of six sessions, each lasting 30 min, is permitted before a dry-land review is recommended. A major aim of AP is to enhance long-term concordance with exercise behaviors; on discharge, patients are encouraged to attend the AP maintenance groups at the hospital or local leisure pool and/or the Exercise referral scheme in Mid Sussex.

Outcome Measures

Patients completed the MYMOP2 before and after AP intervention (Paterson, 1996). The MYMOP2 has been shown to be a valid, reliable, and responsive measure of self-reported patient outcome in patients and has been used in previous studies of AP (Jackson, 2001; Jackson & Jackson, 2003; Jackson, Kuisma, Mason & Cox, 2004). It consists of four rating scales, anchored at one end with "as good as it could be" (0) to "as bad as it can be" (6), with two of the scales relating to patient selected symptoms, and one each of an activity of daily living affected and general well-being. In addition, information about medication may be collected if relevant. Due to limited time available for data entry, information on medication was not recorded.

The MYMOP2 was completed pre- and post-AP intervention under the therapists' guidance. At the end of the course of treatment, patients were asked whether they wished to continue AP via the maintenance group (the pool is made available out-of-hours for assistant-supervised practice), the local exercise referral scheme, or independently at their local leisure pool.

Information on patient demographics including age, sex, reason for AP referral, and whether individual or group treatment was received was collected and classified according to the HyDAT classification (HyDAT Team, 2009). This classification system has recently been developed for clinical categorization of pathologies and body areas. Specific AP interventions were not documented in this clinical evaluation due to data storage issues.

MYMOP2 Scoring and Data Analysis

The MYMOP2 questionnaires were scored according to the questionnaire instructions (http://www.bris.ac.uk/primaryhealthcare/docs/resources/Downloads/adminandscoring.pdf [February 1, 2013]). The MYMOP2 Profile is provided by the mean of the 4-item scores or in cases where a second symptom is not reported by the mean of symptom 1 and well-being only. The initial MYMOP2 Profile is subtracted from the postintervention MYMOP2 Profile to find whether there has been an improvement, worsening, or no change following the intervention. Following examination of the variables using the Kolmogorov-Smirnov Test, all MYMOP2 data were analyzed using the Wilcoxon signed rank test to examine differences for those patients who completed the questionnaire at pre- and posttreatment. The Kruskal Wallis test was used twice: to examine differences in profile change scores by HyDAT classification and duration of symptoms, and to compare the age, sex, and condition of those patients who completed only the pretreatment MYMOP2 with those who had completed the measure at both time points. SPSS 15.0 for Windows was used throughout.

Results

Over the data collection period 205 patients were referred for AP and 197 completed pretreatment MYMOP2 questionnaires. A total of 125 patients were discharged within the data collection period and 94 patients returned their questionnaires posttreatment—a return rate of 75.26%. Most patients who did not return a posttreatment questionnaire were recorded as Unable to Attend or Did Not Attend. The mean age (n = 94) was 56.8 years (sd: 16.5), and there were 67 females. Table 1 shows the numbers of patients in each HyDAT classification, their gender, and age. The majority of patients (77.1%) had a chronic condition as defined by symptom duration more than three months, indeed 48.2% of patients reported having symptoms for more than a year.

Table 1 Number of Patients (n = 94) in Each HyDAT Classification Condition, Their Gender, and Ages

	Total	Males/ Females	Age (years; mean and SD)
Orthopedic and musculoskeletal	72	20:52	56.3 (16.9)
Upper limb/lower limb/back and neck	10/48/14	-	-
Rheumatology	17	13:4	58.3 (13.5)
Fibromyalgia/osteoarthritis/rheumatoid arthritis/osteoporosis	3/10/2/2	-	-
Neurology	5	3:2	60.3 (25.3)
Multiple sclerosis/muscular dystrophy/other (unilateral chorea)	2/1/1/1	-	-

Most patients were treated individually (n = 62); the remainder were treated in small groups of up to six patients. Nineteen of the individually treated patients were able to continue with group treatment following a single session with the clinical specialist. The mean number of treatments was 5.21 (*SD*: 1.6) with no differences between patients treated individually or by group in terms of age, gender, or HyDAT classification. The majority of patients (62.3%) stated they would like to continue with AP, either within a maintenance group or through local pool use. Patients who completed the MYMOP2 pre- and posttreatment did not differ from those who completed the before questionnaire only in respect of age, gender, or HyDAT classification.

Of the 94 posttreatment questionnaires returned, 87 were completed in full and thus allowed calculation of the MYMOP2 profile score. Overall, the MYMOP2 profile score decreased in 90.8% of patients (n = 79), signifying improvement; increased in 3.4% (n = 3); and remained unchanged in 5.7% (n = 5). In real terms, there was a median and significant improvement of 1.5 points (IQR:-1.5) on the 7-point MYMOP2 Profile score (z = -7.7, < 0.001) as shown in Figure 1. This improvement was independent of disease duration and condition (for all profile change scores $p > .5$). The majority of patients (77.3%) met or exceeded "the index of responsiveness, relating to the minimal clinically important difference" of 0.85 reported by Paterson (1996).

At baseline the primary symptoms most frequently reported were pain (79.5%) and stiffness (10.8%). Half the patients had experienced their primary symptom for more than one year. Most patients (80.5%) reported a second symptom: stiffness (32.2%), pain (27.1%), muscle weakness (13.6%), fatigue and depression (8.5%),

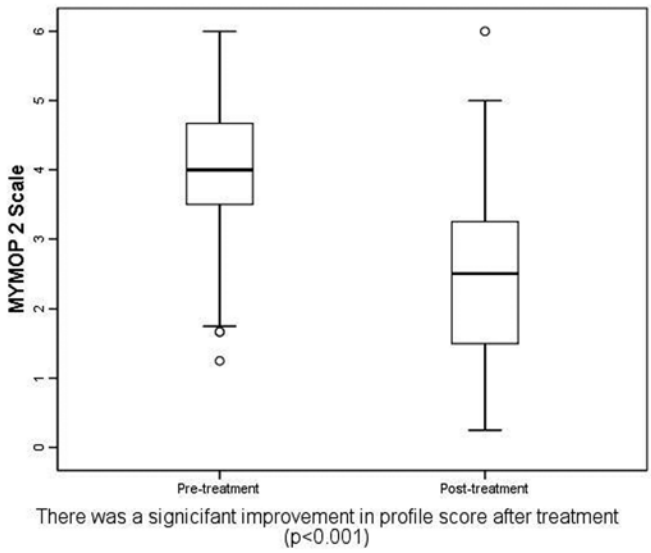

Figure 1 — MYMOP2 profile scores before and after aquatic therapy (n = 87).

balance difficulties (6.8%), and miscellaneous (11.9%: e.g., swelling, breathing difficulties, numbness). A statistically significant change in symptoms was noted, signifying improvement (symptom 1: z = -7.5, p = .001; symptom 2; z = 6.1, p = .001). There were no significant differences between HyDAT classifications, hence Figure 2 shows symptoms pre- and posttreatment for all patients. Similarly, for activity and wellbeing, the Wilcoxon tests were significant showing that patients reported benefit following AP (Activity: z = -7.05, p = .001; Wellbeing: z = -6.7, p = .001); again there were no group differences (Figure 3). Using the minimal clinically important differences (MCID) reported by Paterson (1996) for symptoms 1 and 2, activity and wellbeing 46.3%, 62%, 46.8%, and 70.5% patients met or exceeded these values, respectively.

Discussion

This routine clinical data collection of consecutive patients attending out-patient hospital AP demonstrated that the majority gained significant therapeutic benefit independent of their condition or duration of symptoms. Over 90% of patients reported a statistically significant decrease in MYMOP2 profile with over 77% showing a level of change consistent with a clinically important difference (Paterson, 1996). This is all the more encouraging given that anecdotal evidence suggested many patients were referred for AP only after land physiotherapy had failed to alleviate their symptoms. Equally encouraging, and conceivably indicative of perceived benefit, was the patients' pledge to continue with AP, either via hospital-based maintenance groups or at the local leisure pool.

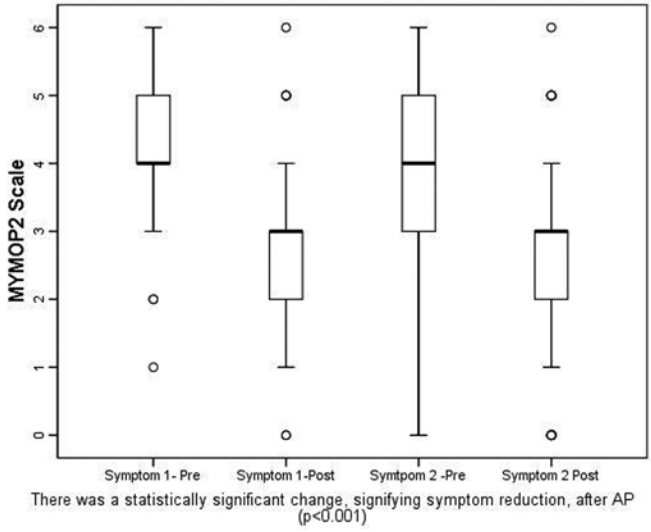

Figure 2 — Symptoms before and after aquatic physiotherapy (n = 87).

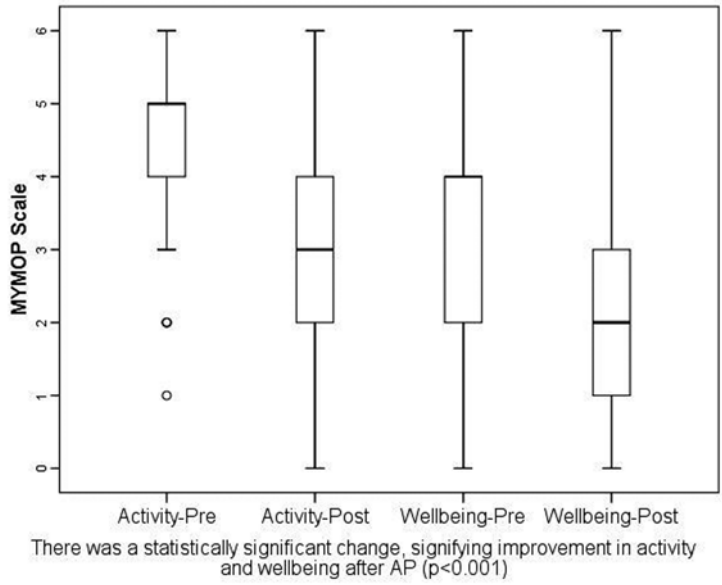

Figure 3 — Activity and well-being before and after aquatic physiotherapy.

The strength of these data lies in the consistent direction of the results for the majority and the nature of the data collection within routine clinical practice. Effectiveness data are important as results from experimental studies do not always translate to real-world outcomes (Johnson, Hall, Barnett, Draper, Darbyshire, Haynes, & Goebel, 2012). Our results resonate with those of experimental and secondary paradigms in AP. For example, the systematic review by Geytenbeek (2008) provided evidence to support AP in the management of a wide variety of conditions, including musculoskeletal, orthopedic, rheumatology, and neurological conditions. In particular, the evidence substantiated the use of AP in reducing pain and improving well-being.

With respect to pain, a meta-analysis of 5 randomized controlled trials demonstrated a small treatment effect (SMD:-0.17; 95% CI:-0.33 to -0.01) of AP on pain with the authors citing water temperature, depth, and treatment duration as possible mediators (Hall et al., 2008). Our data showed that, for most patients, pain was the predominant symptom with almost 50% experiencing a reduction consistent with the MCID. Furthermore, significant improvements in well-being, with 70% of patients meeting or exceeding the MCID, confirmed findings in experimental studies (Lim, Tchai & Jang, 2010; Tomas-Carus, Gusi, Häkkinen, Häkkinen, Raimundo, & Ortega-Alonso, 2009; Dundar, Solak, Yigit, Evcik, & Kavuncu, 2009). Given that a large number of patients also expressed a desire to continue with AP independently after completion of the intervention suggested there may be a relationship between well-being and exercise adherence, although it is recognized that we were unable to monitor adherence to continuing aquatic exercise.

The literature on AP is dominated by studies on musculoskeletal conditions (e.g., osteo- and rheumatoid arthritis, fibromyalgia), and only recently has evidence started to appear for the benefits of AP in neurological conditions (Bansi, Bloch, Gamper, & Kesselring, 2013; Kargarfard, Etemadifar, Baker, Mehrabi, & Hayatbakhsh, 2012; Castro-Sánchez, Matarán-Peñarrocha, Lara-Palomo, Saavedra-Hernández, Arroyo-Morales, & Moreno-Lorenzo, 2012; Vivas, Arias, & Cudeiro, 2011). This lack of "endorsement" perhaps explained why patients with neurological disorders made up a small percentage of the patients seen in our clinical evaluation. Despite the small number, these patients demonstrated similar levels of benefit to those patients with orthopedic or rheumatological complaints. While in no way definitive, these results should encourage more neurological referrals to AP; in addition, they support the recent literature.

A second point on referral diagnosis is worth making. Published research in AP is limited to patients with single pathology [e.g., OA of lower limb (Lin, Davey, & Cochrane, 2004)] or fibromyalgia (Munguía-Izquierdo & Legaz-Arrese, 2008); our results show that in practice many patients attending for AP had significant comorbidity. This may encourage researchers to include a more heterogeneous sample and will stimulate our further evaluations to include subanalysis of effect by pathology and comorbidity as our numbers increase.

While it is recognized that the observational nature of routine data collection does not provide causal evidence of effect, the degree of benefit in a diverse sample in which over half the patients had long-term conditions is encouraging for the future of AP. In addition, the relatively few treatments required to exert a beneficial effect suggests that AP is a feasible financial option and suggests current pool closures to be shortsighted, ill-considered, and inappropriate (Campbell, 2013; Gusi & Tomas-Carus, 2008). Future snapshots could use the MYMOP2-qual in which patients are asked to reflect on their treatment and its relationship to their changed health status (Paterson, Unwin, & Joire, 2010). Including follow-up data at 3 or 6 months posttreatment would further strengthen our results, but the practical difficulties of completing pre- and postmeasures per se precluded further efforts; the logistics of collecting PROMs in clinical settings has been well reviewed by Rose and Bezjak (2009). Despite these shortcomings, our findings will be of interest, not only to other healthcare practitioners, but also to commissioners in providing evidence of AP effectiveness on which to base their commissioning decisions.

Utilizing the MYMOP2 within the AP department remains a challenge. Principally, time and resource constraints continue to impact on our ability to ensure all patients attending AP complete pre- and posttreatment MYMOP2s. The brevity and simplicity of the MYMOP2 and its wide applicability, especially useful for the diagnostic diversity attending AP, recommend its continuing use in AP. Given the recent introduction of a standardized system, the EQ-5Dà (European Quality of Life-5 Dimensions; a standardized instrument for use as a measure of health outcome), for demonstrating the effectiveness of physiotherapy for musculoskeletal outpatients by the Chartered Society of Physiotherapy, it may be that examining this tool against the MYMOP2 should be considered to enhance future commissioner decisions (Tolan & Ten Hove, 2012). In addition given the self-report nature of the EQ5D some of the issues relating to the desirability of independent completion and therapist time in providing guidance on first MYMOP2 completion may be averted, thus enhancing the return rate (Dawson, Doll, Fitzpatrick, Jenkinson, & Carr, 2010).

Conclusion

The results of this routine data collection exercise demonstrated the clinical effectiveness of a short course of AP for patients with a diversity of short- and long-term conditions. In addition and importantly it provides real-world evidence of outcome. The MYMOP2 tool has been shown to be a feasible and responsive measure for use in AP and with increasing requirements for PROMS use is recommended as the measure of choice in AP. Future evaluation would benefit from long term follow-up data and the use of the MYMOP2-qual to explore patients' attributions for perceived benefit.

References

Bansi, J., Bloch, W., Gamper, U., & Kesselring, J. (2013). Training in MS: influence of two different endurance training protocols (aquatic versus overland) on cytokine and neurotrophin concentrations during three week randomized controlled trial. *Multiple Sclerosis, 19(5)*, 613–21. PubMed

Batterham, S.I., Heywood, S., & Keating, J.L. (2011). Systematic review and meta-analysis comparing land and aquatic exercise for people with hip or knee arthritis on function, mobility and other health outcomes. *BMC Musculoskeletal Disorders, 12(1)*, 123. PubMed doi:10.1186/1471-2474-12-123

Becker, B.E. (2009). Aquatic therapy: scientific foundations and clinical rehabilitation applications. *PMR Sep, 1*(9), 859–72. doi: 10.1016/j.pmrj.2009.05.017.

Campbell, D. (2013, January, 22). Hydrotherapy pool closures leave NHS patients high and dry. *The Guardian*. Retrieved from: http://www.theguardian.com/society/2013/jan/22/hydrotherapy-pool-closures-nhs-cuts

Castro-Sánchez, A.M., Matarán-Peñarrocha, G.A., Lara-Palomo, I., Saavedra-Hernández, M., Arroyo-Morales, M., & Moreno-Lorenzo, C. (2012). Hydrotherapy for the treatment of pain in people with multiple sclerosis: a randomized controlled trial. *Evidence-Based Complementary and Alternative Medicine,* 2012;2012:473963*,* 10.1155/2012/473963. PubMed

Chartered Society of Physiotherapy (2006). *ATACP guidance on good practice in hydrotherapy*. London, UK:author.

Darzi, A. (2008). *High Quality Care for all: NHS Next Stage Review Final Report*. London, Department of Health. Retrieved from: http://www.official-documents.gov.uk/document/cm74/7432/7432.pdf

Dawson, J., Doll, H., Fitzpatrick, R., Jenkinson, C., & Carr, A.J. (2010). The routine use of patient reported outcome measures in healthcare settings. *British Medical Journal, 340,* 186. PubMed doi:10.1136/bmj.c186

Dundar, U., Solak, O., Yigit, I., Evcik, D., & Kavuncu, V. (2009). Clinical effectiveness of aquatic exercise to treat chronic low back pain: A randomized controlled trial. *Spine (Phila Pa 1976), 15, 34*(14), 1436-40. doi:0.1097/BRS.0b013e3181a79618.

Geytenbeek, J. (2008). *Aquatic Physiotherapy Evidence-based Practice Guide*. National Aquatic Physiotherapy Group, Australian Physiotherapy Association. Retrieved from:www.apfisio.pt/GIHFMA_/index.php?option=com_docman&task=doc_download&gid=45&Itemid=93.

Guidance on the routine collection of Patient Reported Outcome Measures (PROMs) For the NHS in England 2009/10. Retrieved from: http://www.mstrust.org.uk/competencies/downloads/NHS-PROMS.pdf

Gusi, N., & Tomas-Carus, P. (2008). Cost-utility of an 8-month aquatic training for omen with fibromyalgia: a randomized controlled trial. *Arthritis Research & Therapy, 10*(1), R24. PubMed doi:10.1186/ar2377

HyDAT Team. (2009) *The HyDAT Project: UK Aquatic Physiotherapy Data Collection*. London: Chartered Society of Physiotherapy. Retrieved from: http://www.csp.org.uk/publications/hydat-project-uk-aquatic-physiotherapy-data-collection

Jackson, A. (Autumn, 2001). Using Measure Yourself Medical Outcome Profile (MYMOP) in hydrotherapy. *Aqualines,* 8-20.

Jackson, A., & Jackson, C.J. (*Spring*, 2003). The outcome of different combinations of physiotherapy treatment with an emphasis on combinations that include hydrotherapy. *Aqualines,* 6-9.

Jackson, A., Kuisma, R., Mason, Z., & Cox, J. (2004). Older people's experience of water-based exercise programmes. *Aqualines, 16*(2), 5–11.

Johnson, S., Hall, J., Barnett, S., Draper, M., Darbyshire, G., Haynes, L., & Goebel, A. (2012). Using Graded Motor Imagery for Complex Regional Pain Syndrome in clinical practice: failure to improve pain. *European Journal of Pain (London, England), 16*(4), 550–561. PubMed doi:10.1002/j.1532-2149.2011.00064.x

Hall, J., Swinkels, A., Briddon, J., & McCabe, C.S. (2008). Does aquatic exercise relieve pain in adults with neurologic or musculoskeletal disease? A systematic review and meta-analysis of randomized controlled trials. *Archives of Physical Medicine and Rehabilitation, 89*(5), 873–883. PubMed doi:10.1016/j.apmr.2007.09.054

Kargarfard, M., Etemadifar, M., Baker, P., Mehrabi, M., & Hayatbakhsh, R. (2012). Effect of aquatic exercise training on fatigue and health-related quality of life in patients with multiple sclerosis. *Archives of Physical Medicine and Rehabilitation, 93*(10), 1701–1708. PubMed doi:10.1016/j.apmr.2012.05.006

Lim, J.Y., Tchai, E., & Jang, S.N. (2010). Effectiveness of aquatic exercise for obese patients with knee osteoarthritis: a randomized controlled trial. *PM R, 2*(8), 723–731. PubMed doi:10.1016/j.pmrj.2010.04.004

Lin, S.Y., Davey, R.C., & Cochrane, T. (2004). Community rehabilitation for older adults with osteoarthritis of the lower limb: A controlled clinical trial. *Clinical Rehabilitation, 18*(1), 92–101. PubMed doi:10.1191/0269215504cr706oa

Munguía-Izquierdo, D., & Legaz-Arrese, A. (2008). Assessment of the effects of aquatic therapy on global symptomatology in patients with fibromyalgia syndrome: a randomized controlled trial. *Archives of Physical Medicine and Rehabilitation, 89*(12), 2250–2257. PubMed doi:10.1016/j.apmr.2008.03.026

Paterson, C. (1996). Measuring outcome in primary care: a patient-generated measure, MYMOP, compared to the SF-36 health survey. *British Medical Journal, 312,* 1016–1020. PubMed doi:10.1136/bmj.312.7037.1016

Paterson, C., Unwin, J., & Joire, D. (2010). Outcomes of traditional Chinese medicine (traditional acupuncture) treatment for people with long-term conditions. *Complementary Therapies in Clinical Practice, 16*(1), 3–9. PubMed doi:10.1016/j.ctcp.2009.08.001

Rahmann, A.E., Brauer, S.G., & Nitz, J.C. (2009). A specific inpatient aquatic physiotherapy program improves strength after total hip or knee replacement surgery: a randomized controlled trial. *Archives of Physical Medicine and Rehabilitation, 90*(5), 745–755. PubMed doi:10.1016/j.apmr.2008.12.011

Rose, M., & Bezjak, A. (2009). Logistics of collecting patient-reported outcomes (PROs) in clinical practice: an overview and practical examples. *Quality of Life Research, 18*(1), 125–136. PubMed doi:10.1007/s11136-008-9436-0

Tolan, S. & Ten Hove, R. (2012). What's the score? *Frontline 6, 10*, 18.

Tomas-Carus, P., Gusi, N., Häkkinen, A., Häkkinen, K., Raimundo, A., & Ortega-Alonso, A. (2009). Improvements of muscle strength predicted benefits in HRQOL and postural

balance in women with fibromyalgia: An 8-month randomized controlled trial. *Rheumatology, 48*(9), 1147–1151. PubMed doi:10.1093/rheumatology/kep208

Valtonen, A., Pöyhönen, T., Sipilä, S., & Heinonen, A. (2010). Effects of aquatic resistance training on mobility limitation and lower-limb impairments after knee replacement. *Archives of Physical Medicine and Rehabilitation, 91*(6), 833–839. PubMed doi:10.1016/j.apmr.2010.03.002

Vivas, J., Arias, P., & Cudeiro, J. (2011). Aquatic therapy versus conventional land-based therapy for Parkinson's disease: an open-label pilot study. *Archives of Physical Medicine and Rehabilitation, 92*(8), 1202–1210. PubMed doi:10.1016/j.apmr.2011.03.017