Jack Brockhoff Foundation Churchill Fellowship to study innovations in Aquatic Physiotherapy in the management of chronic diseases – Switzerland, Belgium, Spain, UK and USA

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Signed: Sophie Heywood

Dated: September 29 2009
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INTRODUCTION – AQUATIC PHYSIOTHERAPY

Aquatic Physiotherapy is a form of rehabilitation with widespread use in health care in Australia. Aquatic Physiotherapy is based on combining the physiology of immersion, hydrostatic and hydrodynamics principles particularly related to assistance or resistance with movement and exercise and it can also include hands-on techniques. Physiotherapists have unique knowledge and skills to provide individualised and evidence based treatment programs in water. The water has the properties of unloading and reduced weight bearing due to buoyancy and aquatic exercise has huge advantages in situations where movement is painful or difficult. The warmth of the water can also influence pain and improve connective tissue extensibility and flexibility. The forces of buoyancy and drag are not only used to assist movement but are primarily used to resist movement. Water is an environment with potential to allow a huge spectrum of exercise intensities, from low level through to high level. Health issues in the Australian population show an increase in the incidence of chronic presentations including obesity, diabetes, cardiovascular disease and chronic back pain and arthritis. Related to this increase there is now also a bigger focus on preventative exercise. Often these diseases present together with the patient dealing with multiple high priority health issues and a poor tolerance of land based exercise due to deconditioning or pain. Water based exercise is beneficial in these complex patients in the early stages of improving exercise tolerance and providing a means to continue to exercise independently after a period of rehabilitation. The challenge for Aquatic Physiotherapists is to maximise the potential of the environment for these patients, apply evidence based practice, continue to develop the evidence and provide support for ongoing exercise. The practice of Aquatic Physiotherapy in Australia is of a high standard. There is a limited influence of overseas techniques and approaches and also limited collaboration with other professionals working in an aquatic environment. The purpose of this trip was to investigate Aquatic therapy and exercise approaches across the world, to consider how they fit into current practice in Australia and also to look to the future with regard to the management of chronic conditions.

ACKNOWLEDGEMENTS

Clinical practice and research in Aquatic therapy across the world is carried out by some very dedicated, experienced and talented clinicians. They have been extremely generous and open in sharing their expertise and their resources and I am so thankful for the opportunity to spend time with them. I would also like to thank all the physiotherapists that I’ve worked with for providing encouragement and for acting as such excellent mentors. I would also like to thank all the past physiotherapy Churchill Fellows for their inspiration and time. I would like to acknowledge my sincere appreciation to the Jack Brockhoff Foundation and The Winston Churchill Memorial Trust for giving me an opportunity of a lifetime. I feel extremely privileged to be associated with two such special organisations.
EXECUTIVE SUMMARY

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CONCLUSIONS AND RECOMMENDATIONS
1. The Australian Physiotherapy Association Aquatic Physiotherapy Group must continue to increase links with overseas organisations.
2. Specificity with exercise prescription, dose response and outcome measurement remain high priorities.
3. A more formal consideration of the balance of land and aquatic based exercise should be considered by all clinicians.
4. Aquatic therapy methods have a great deal to offer in expanding clinical options but need further investigation and integration, not use in isolation.
5. Cardiovascular fitness and conditioning in an aquatic environment deserves greater use within clinical programs in chronic disease management.
6. The Australian Physiotherapy Association (APA) Level 3 Aquatic Physiotherapy Course currently exists as the only extended course for physiotherapists exclusively in the world and must continue to be supported.
7. Physiology of immersion, hydrostatics and hydrodynamics, clinical reasoning and evidence based practice remain as the key teaching content in aquatic physiotherapy education.
8. Physiotherapy students in Australia should be viewed as a valuable resource to assist to create material particularly with evidence based practice updates.
9. With limited resources in Australia, the UK HyDAT model may be useful to monitor outcomes in chronic disease management in Aquatic Physiotherapy.
10. Aquatic exercise remains a research priority along with cost effectiveness.
11. Further development of the project to start an International Aquatic group within the World Confederation for Physical Therapy is needed in the areas of recent research projects, education courses, guidelines of practice including clinical or safety standards and National or specific interest groups.
12. Aquatic Physiotherapy must consider developing one or two key messages for the community and for medical and physiotherapy colleagues related to movement and exercise.

ACTIONS TO DATE AND FURTHER INFORMATION DISSEMINATION
Sharing clinical resources with the Valens and Aquaevidence courses and the UK ATCP journal Aqualines will continue. An information session on overseas practice in aquatic physiotherapy will be held for Victorian members of the Australian Physiotherapy Association in December 2009, information will be available at the Aquatic Physiotherapy Conference in October 2009, all 250 members of the Aquatic Physiotherapy Group in Australia will receive links and parts of this report via email, practical professional development sessions will be completed at Sunshine Hospital in September and October 2009, undergraduate content at Monash University and The University of Melbourne will be updated as will the Level 3 Aquatic Physiotherapy course. All overseas contacts will be involved in any proposed on-line discussions for the further development of an International Aquatic Physiotherapy group through the WCPT.
### PROGRAM AND CONTACTS

<table>
<thead>
<tr>
<th>DATE</th>
<th>ORGANISATION OR INSTITUTION</th>
<th>CONTACTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 27, 2009</td>
<td>National Aquatics and Sports Medicine Institute, University of Washington State, USA</td>
<td>Dr Bruce Becker <a href="mailto:beckerb@wsu.edu">beckerb@wsu.edu</a></td>
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<tr>
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</table>
INNOVATIVE AND DIVERSE TREATMENT OPTIONS

Aquatic Physiotherapy is primarily focused on exercise in water but also includes hands-on techniques. This section details a variety of treatment approaches and techniques encountered during the Fellowship including:

- The Burdenko Method
- Halliwick
- Bad Ragaz Ring Method
- Ai Chi
- Balance training
- Passive relaxation
- Strengthening and stabilising
- Cardiovascular conditioning
- Adapted swimming
- Physiology of immersion and the Autonomic Nervous System
- Water as an environment for problem solving, teamwork and communication
BURDENKO METHOD

The Burdenko Method is a program of exercise using both land and water for conditioning, training and rehabilitation. The method was developed by Dr. Igor Burdenko, the founder of the Burdenko Water and Sports Therapy Institute. Igor’s background is in Physical Education with his research experience in Russia in human performance. Igor has a very energetic and positive approach when dealing with patients and life in general. His approach is based on his extensive experience, particularly with sports injuries and the Burdenko Method continues to change and evolve.

Igor Burdenko

The Burdenko Water and Sports Therapy Institute was founded in 1984 and includes the land and water based rehabilitation programs as well as alternative therapies. The aquatic part of the centre also uses a variety of pieces of equipment that Igor designed including in water rails, side wall fitted exercise station, pulleys hanging over the water, balance boards and a variety of underwater treadmills.

Most of the concepts in the Burdenko Method are very practical, sound and grounded in Sports Medicine and exercise theory. The general concepts include movement progression from simple to complex, gradually increasing the number of repetitions, working the whole body not just the injured area, exercising in multiple directions, safe, efficient and graceful movement, practice at varying speeds and also practice independently. Related to these concepts the exercises have a number of variations which from an aquatic rehabilitation perspective is very useful. The prescription of repetitions was one aspect of the Burdenko Method that appeared less targeted. For a rehabilitation phase the repetitions were up to 10 reps then progress to 3 slow repetitions, 3 medium speed repetitions, 3 fast repetitions then 1 slow repetition and then shake the limbs to finish. The conditioning repetitions were to build up to 21 repetitions then 7 slow, 7 med, 7 fast and then shake. The repetitions for training amateur athletes and professional athletes were up to 30 then 10 slow, 10 med and 10 slow, shake between. The classification of the Levels overlapped greatly and some of the terminology used to describe the exercises was variable. The Levels of the Burdenko Method are:

- Level 1 Balance
- Level 2 Coordination
- Level 3 Flexibility
- Level 4 Endurance
- Level 5 Speed
- Level 6 Strength
Within each level the exercises are broken up into lower body, upper body and trunk and spine. In addition to the bonus of variations within each exercise with speed and the combined movements in multiple directions was the combined approach of both water based exercise and land based exercise makes the Burdenko Method more complete than many other aquatic approaches with the potential for more carryover into function in activities of daily living and sport. The percentages for water and land indicate the time spent exercising in each environment within 1 rehabilitation, conditioning or training session.

<table>
<thead>
<tr>
<th>LEVEL</th>
<th>WATER</th>
<th>LAND</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Balance</td>
<td>100%</td>
<td>0</td>
</tr>
<tr>
<td>2 Coordination</td>
<td>80%</td>
<td>20%</td>
</tr>
<tr>
<td>3 Flexibility</td>
<td>70%</td>
<td>30%</td>
</tr>
<tr>
<td>4 Endurance</td>
<td>60%</td>
<td>40%</td>
</tr>
<tr>
<td>5 Speed</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>6 Strength</td>
<td>40%</td>
<td>60%</td>
</tr>
</tbody>
</table>

Within the context of land and aquatic based physiotherapy the concept of commencing rehabilitation in the water and then progressing slowly into land exercise is a common one although not often as structured as this model.

The progression of starting positions for exercises also has some structure. Progressions are

- Deep water
- Shallow water
- Horizontal positions on land
- Sitting
- Standing
  - Static
  - Dynamic

The exercises in deep water are predominantly in a vertical position initially and then go on to include horizontal and side lying positions. Although this is generally a good place to start as it is unloaded and non-weight bearing it is an extremely difficult position to maintain related to trunk control. This challenging level of exercise would be too difficult for most patients with chronic conditions presenting to public health rehabilitation centres in Australia. The shallow water part of the program was fairly limited and included squats, Russian dance, marching type sequences with some jumping, hopping or turning sequences also.

The land based part of the Burdenko Method includes mat exercises, half roll exercises, the use of elastic/resistance tubing, ball exercises, bench and stick exercises.
DOLPHIN KICK SEQUENCE
(Level 2 – Deep Water, Trunk and Spine)

LOG ROLLS (Level 2 Deep Water Trunk and Spine)
REFERENCES


www.burdenko.com

www.fitnessintelligence.net/wiki/doku.php
HALLIWICK

The Halliwick Concept was developed by the engineer James McMillan as a structured 10-point approach initially developed for children with physical limitations to move independently in water and to swim. The International Halliwick Association promotes the Halliwick concept of teaching swimming. The Halliwick approach has been modified with the collaborative input of many practitioners. The aquatic rehabilitation principles of the Halliwick concept have been further developed by Johan Lambeck in conjunction also with Urs Gamper. Johan is a physiotherapist and he was educated by James McMillan and started as a certified senior lecturer in the International Halliwick Association. He has founded the International Halliwick Therapy Network (IHTN) which and is focused on the application of Halliwick in therapy and in particular in aquatic physiotherapy. This approach is also termed Water Specific Therapy.

Based on the principles of hydrostatics and hydrodynamics the Halliwick approach is a clearly structured approach guided by a more contemporary 10-point program. The 10-points cover mental adaptation to the water as a new and different environment as well as the key concepts of holding a static position in the water and also the more dynamic control in the various planes of rotation in the water.

International Halliwick Therapy Network Contemporary 10-point program

<table>
<thead>
<tr>
<th>Contemporary Ten-point Program</th>
<th>Orientation and understanding of a new environment particularly related to hydrostatics and hydrodynamics particularly buoyancy. Breath control or safe and relaxed oral and nasal breathing or blowing underwater.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mental Adjustment</td>
<td>Rotation around the sagittal axis – stand or sit to side laying, left or right</td>
</tr>
<tr>
<td>Sagittal Rotation Control</td>
<td>Rotation around a transverse axis – sit or stand to supine</td>
</tr>
<tr>
<td>Transversal Rotation Control</td>
<td>Rotation around a longitudinal axis – supine to prone to supine</td>
</tr>
<tr>
<td>Longitudinal Rotation control</td>
<td>Rotation around 2 planes</td>
</tr>
<tr>
<td>Combined Rotation Control</td>
<td>Understanding the concept of submerging but always rising to the surface again</td>
</tr>
<tr>
<td>Upthrust/Mental Inversion</td>
<td>Holding a static vertical then horizontal positions in the water with mobility and stability of posture</td>
</tr>
<tr>
<td>Balance is stillness</td>
<td>Usually in supine, therapist facilitates or drags patient through the water</td>
</tr>
<tr>
<td>Turbulent gliding</td>
<td>Usually a sculling action of the arms progressing to independent propulsion through the water</td>
</tr>
<tr>
<td>Simple progression</td>
<td>Basic swimming stroke</td>
</tr>
</tbody>
</table>

The Halliwick method in an aquatic physiotherapy context is ideal as a program for 1 to 1 or individual neurological rehabilitation or with any condition with impaired trunk control or impaired balance. Most positions and techniques require hands-on by the therapist to facilitate the desired position or movement. The handling skills require
an understanding of the physics of movement and stability in water as well as practice. The concepts can also be used in groups.

The practice of the Halliwick concept in therapy or Water specific therapy has a focus on goal setting and reassessment. There is also emerging research in this area. The most clinically interesting part of the Halliwick therapy is the huge number of variations within this method in each position to progress and change the practice.

Repetition without repetition includes

- holding a position versus moving
- changing supports
  - proximal (usually at S2) or distal
  - cranial or caudal
  - many points or no points
  - lateral or medial (particularly interesting at the knees or feet)
  - large or small surface area of support
  - firm or loose grip
- direction of rotation control
- turbulence (surface area or speed) and also the use of fins
- metacentre
- change in depth
- effect of waves
- using obstacles (underwater hurdles) or moveable balance platform plates

There are a number of options within Halliwick for assessment including:

- WOTA (Water Orientation Test of Alyn) 1 and 2 (Tirosh 2008). The WOTA has also undergone reliability testing (Tirosh 2008).
- AIM (Aquatics Independent Measure (Hacham)
- ICF (International Classification of Functioning, Disability and Health, WHO 2001) based Halliwick Assessment (Lambeck 2007)

The options for assessment and reassessment within this method allow further structure and improved planning for the aquatic intervention.
OPTIONS FOR STARTING POSITIONS IN THE HALLIWICK CONCEPT

All photos from the Valens Aquatic course
REFERENCES


www.halliwick.net

www.halliwick.org
BAD RAGAZ RING METHOD

The Bad Ragaz Ring Method (BRRM) was developed in Bad Ragaz in Switzerland where a warm spring has been used since the 13th Century. As early as the 1930’s therapist were using the water to provide resistance for patients. The current patterns of resisted movement have developed from the Wildbader Method and also Proprioceptive Neuromuscular Facilitation (PNF) techniques into three dimensional, diagonal movement patterns with ring floatation (Zinn 1975 and Egger 1990). PNF includes the concepts of tactile stimuli (usually distally), adapted resistance (optimal but varied), traction and approximation, irradiation (overflow of activity from stronger to weaker synergists), timing and patterns that are anatomically and physiologically based. The most significant differences between PNF and the BRRM are that in the water the therapist is stationary and the patient is in floatation aids and is moving.

In Australia the use of Bad Ragaz patterns is widespread but often limited to more strengthening based modified patterns not including rotation such as unilateral hip abduction or uni or bilateral knee or hip and knee flexion and extension. Modified patterns in the trunk are also commonly used.

The Bad Ragaz Ring Method as it exists today is more focused towards the principles of PNF and includes trunk, arm and leg patterns. Within the arm patterns flexion is always combined with external rotation and extension always combined with internal rotation and within the leg patterns abduction is always combined with internal rotation and adduction is always combined with external rotation. The leg patterns can be bilateral and symmetrical or bilateral and reciprocal.

The refined grip technique is an intrinsic one similar to how you use chopsticks. The techniques are complex and difficult to execute well. They require exact handling from the therapist with high stability challenges during the patterns.

Urs Gamper demonstrating a trunk pattern, Valens Aquatic course, Switzerland
Within each pattern there are some additional techniques that can be applied including:

- Rhythmic initiation (the pattern of movement is first shown by the therapist passively on the patient, then the pattern is completed in an active assisted way, then fully resisted and can be progressed to fully independent).
- Combination of isotonics (concentric muscle activity within the pattern alternating with some isometrics holding and also some eccentric activity “let me win”).
- Hold relax and contract relax (usually at the end of range to increase stretch).
- Repeated stretch/contractions (repeating the same pattern again).
- Timing for emphasis (repeated contraction with only one element of the pattern, for example, hip external rotation).
- Reversal of antagonists or Dynamic reversal (using one pattern then the opposite pattern immediately afterward).

Bad Ragaz patterns appear primarily to be most beneficial with regard to strengthening and learning how to grade activity. The physiology of muscles and exercise is incorporated to specify the training related to the volume, intensity and resistance with the training. With the variety of patterns and techniques there is also the opportunity to increase range of movement, improve selective movement, address relaxation and pain.

REFERENCES


www.badragazringmethod.org

Bad Ragaz Ring Method leg pattern
http://nl.youtube.com/watch?v=frhm42nNddg&feature=related
AI CHI

Ai Chi was developed by Japanese aquatic fitness practitioner and swimming coach Jun Konno in the mid 1990s. It combines Tai-Chi and Qigong concepts with Shiatsu and Watsu based movements. It was designed as a preparation to Watsu. The most appropriate application and efficacy of the method is yet to be tested. It is primarily used for trunk stabilisation, pain management or active relaxation with a growing trend toward the therapeutic use of the technique in the area of balance training and falls prevention. The limited number of very slow movements are performed in a particular order in about chest deep water in a wide based semi squat position. The movements include large shoulder abduction (to the surface of the water only), flexion and external rotation movements with an upright posture. Weight is transferred from side to side and forward to back between the legs. The final sequence includes progression on to 1 leg and also a leg crossover and trunk rotation movement. There is specific breathing patterns with each movement. Ai Chi Ni is done with a partner and Wall Ai Chi is done staying in contact with the side of the pool. The basic movement patterns are similar. The method is innovative and relaxing but performing the same sequence in the same order has significant limitations. The interest from a therapeutic perspective would be modifying the movements in an evidence based context to increase the specificity and variety in different populations. The technique is being trialled in Australia in a small number of centres with sessions for patients with low back pain, joint replacements and in the elderly. Outcome measures, compliance and patient participation and enjoyment appear promising.
Anne Bommer at the Valens Aquatic course, Switzerland

Wall Ai Chi
REFERENCES


BALANCE TRAINING

The aquatic environment can be an exercise medium safe from falls or injury, it can also be highly challenging more at the edge of balance limits including practice in single limb stance. Larger movements of the centre of gravity, limbs and trunk are therapeutically useful but it is unclear if any influence on the fear of falling. Balance is specific to the environment and the task but aquatic programs have shown carryover into land based measures.

Within the Halliwick concept and Ai Chi there are options to explore balance training and applications for falls prevention. Additionally to these 2 approaches some purpose built equipment including hurdles and moveable balance platforms provide novel options. Considerations for movements simulating putting on clothes and standing on 1 leg may be functional beneficial.

Hurdles

Moving balance platform
Equipment for reaching tasks

REFERENCES


PASSIVE RELAXATION

Aqua T Relax and Watsu® are based on stretching meridians and have a strong nurturing focus. Watsu was developed by Harold Dull and is based on Zen Shiatsu in water. It is performed 1 to 1 with the patient totally relaxed and predominantly supine position with the therapist in a wide based stance, supporting with one arm under the neck and other arm under the hips or knees. The patient is also moved into sitting, prone and foetal positions. There is a set series of movements performed. These techniques have limited applications within the context of Aquatic physiotherapy in Australia working with a chronic population. Some positions and movements may be useful for mobilising, stretching and pain relief. The therapist focus on tuning in to the breathing patterns of patients and synchronising movements with breathing is an interesting concept that could be explored further in aquatic relaxation sessions with patients with chronic disease.

The nature of the application is totally passive, close physical contact and it is unclear and unpredictable as to how each patient reacts from a psychological perspective. When primary goals with chronic patients are functional strengthening, fitness and endurance and self management, this method offers a very dependent relationship with the therapist and no up skilling of the patient’s relaxation skills. There is no doubt that patients would enjoy passive relaxation with a therapist one to one but it is unlikely to be a high priority within an aquatic physiotherapy session.

Student practical at the Valens Aquatic course, Switzerland
STRENGTHENING AND STABILISING

Nearly all aquatic approaches and exercises offer direct benefits to stabilising or strengthening. The Astronaut training at the Johnson Space Center in Houston offers a number of insights into strengthening and stabilising. Watching footage of movement on the International Space Station shows minimal push off leading to long glides when the Astronauts are getting around the Station. Similarly in aquatic physiotherapy, small movements can lead to large momentum in rotational planes. Often this acts as a magnifier to poor control in the water. The Astronauts train in the Neutral Buoyancy Lab (NBL), a huge pool fitted out with a replica Space Station to enable them to complete a mock training exercise for about 6 hours similar to an Extra-Vehicular Activity that they will complete when in space. The Astronauts are fitted out in their space suit. The suit for the NBL run contains pockets for weights or foam. On entry into the water, they complete a 360 degree spin in many different planes to identify whether they are actually neutrally buoyant or not. The Divers that accompany the Astronauts add the weights and the foam to balance out any issues with uneven density.

From a clinical perspective, for a truly accurate estimate of resistance to movement related to strengthening and forces involved with stabilising, each limb or body segment has a different density that may be relatively more or less than that of water. This will vary not only between body segments or limbs but also between individuals. Consideration should be given to the volume of the segment and the likely make up of body tissue. Tissue with higher density such as bone and muscle needs to be estimated and compared to lower density tissue such a lung/air or fat. The assistance or resistance from buoyancy will vary greatly depending on the overall density of the moving segment. A large, limb with greater amounts of fat and an overall relative density of less than 1 will float and get more assistance from an upward buoyancy assisted movement and will find a downward, buoyancy resisted movement more difficult than a limb with minimal fat tissue and a large amount of muscle bulk which is likely to have a relative density of greater than 1. Without complex equipment the exact volume and tissue make up of each limb or even the body overall cannot be calculated but consideration should be given to an estimate of relative density particularly with stabilising and strengthening exercises.

The Astronauts on the US Space Program do extensive resisted weight training when on the Space station predominantly to maintain bone density but also muscle mass. The transition to land exercise on return is quick with reassessment and then the reconditioning protocol including weighted resisted exercise from day 3 or 4. With regard to aquatic physiotherapy the transition out of the water after a 45 or 60 minute session is still noted by most patients. It is worth considering what the mix of land versus aquatic strengthening and stabilising exercise is changing or being
progressed. Also consideration could be given to following up gains in posture or
motor control in the water with 1-2 exercises on land immediately after the session to
assist with transfer of skills. Transition of aquatic gains on land is key. At the very
least a home program of exercises should be in place for all patients. Reinforcement
of the connection of water based exercises (i.e. step ups) with land based function
should also be discussed.
Isoinertial torque and muscle power, EMG activation and cross sectional area of knee
flexors and extensors have been shown to increase with 2-3 sessions per week over
10 weeks of intensive aquatic exercise in normal subjects (Poyhonen et al 2002).
Progressively larger resistance boots to increase surface area and drag were used in
this study. Using a similar methodology following knee joint replacement aquatic
exercise was completed twice a week for 12 weeks with the progressively larger
resistance boots. 5 exercises were completed involving kicking with 30% more
repetitions and sets for the operated leg with good results in muscle torque and
power, muscle mass and stair ascending time. Resistance training in aquatic
physiotherapy can have excellent outcomes. Clear protocols with progressive load,
understanding the physics of the environment and measuring forces is important.

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Schneider S, Amonette WE, Blazine K, Bentley J, Lee SM, Loehr JA, Moore AD,
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www.wylelabs.com/services/medicaloperations/ascr.html (Astronaut Strength and
Conditioning Specialists)
CARDIOVASCULAR CONDITIONING

The aquatic environment is ideal for cardiovascular training not only for sporting populations or basic musculoskeletal rehabilitation but also in chronic conditions with support documented in patients with Rheumatoid Arthritis (Hall et al 2004), chronic low back pain (Barker et al 2003) and stroke (Driver et al 2004). The nature of any chronic condition is often reduced mobility and subsequently reduced VO2 max. With continuing research into this area consideration should be given in all chronic patients to planning part of each session to address improving their VO2 max.

Aquatic Fitness to music

The use of music in a more sports science fitness approach in the water may have good carryover to use in aquatic physiotherapy. The benefit of using music is with motivation. Importantly also it can be used to specify a certain speed or range of movement, thereby quantifying load related to turbulence or also related to cadence or steps per minute to quantify physiological load with fitness activities. Beats per minute (bpm) are specific to certain movements. 70-100 bpm is most appropriate for walking, 50-80 bpm for strengthening movements and 90-140 bpm for jogging (Brunner 2009).

Matthias Brunner, Aquademy® for Water Fitness, Bern, Switzerland at the Valens Klinik

The movement is water is obviously subject to different forces and is not the same as the rhythm for using music on land. The music and intensity of repeated movements can have an estimated rating of perceived exertion for a particular age group and level of conditioning and can be used to plan physiological load during a session (Soares 2009).

Planning an aquafitness session involves considering aerobic load, local load on specific muscles and level of resistance, energy systems, equipment, music and structure of the session. In most circumstances the Instructor is poolside but sometimes they may jump in to the water for part of a demonstration.
Susana Soares, University of Porto, Portugal at Aquaevidence, University of Leuven, Belgium

Deep water running and chronic non-specific low back pain

Deep water running and adapted snorkel swimming offer excellent options for cardiovascular conditioning in chronic disease. The dose response related to time and intensity needs to be further investigated and the importance of measuring intensity of the intervention can not be underestimated for safety and also for effect. Documenting heart rate in addition to a Borg scale of perceived exertion is necessary due to the hydrostatic pressure leading to increased venous return, stroke volume and cardiac output and typically lower heart rate even when exercising. Temperature of the water will obviously have a significant effect on peripheral resistance and thermoregulation. Most hydrotherapy pools are too warm to complete higher intensity or longer cardiovascular sessions but may provide the basic understanding and education to the patient related to how they can monitor and progress their own training at a local pool with cooler water.

Deep water running, Aquaevidence, Belgium

Another option for measuring intensity is based on a study of 16 patients with chronic low back pain comparing a cycle ergometry test and a deep water running test using incremental load until fatigue. The deep water running was completed at 28 degrees
and the subjects were tethered with rubber tubing to the side of the pool. Cadence started at 60 cycles/min for five minutes and increased by 10 cycles/min every two minutes until fatigue. HR was monitored, ratings of perceived exertion (RPE) was also measured using the 10-point Borg Scale (0-10 scale). At the end of each two-minute stage blood lactate was measured. The deep water running test showed lower HR when compared to the land test. Measurement of the blood lactate shows a consistent response and allows the use of correlation equation that could be useful to make an estimation of target heart rates for exercising in water, obtained from land cycloergometer test (Cuesta 2007).

A further study in patients with chronic low back pain investigated the effect of the addition of a 20 minute high intensity deep water running session to standard physiotherapy which included a 60 minute program made up of manual therapy, motor control exercise and education 3 times a week for 15 weeks. Both groups had significant changes in pain (Visual Analogue Scale), disability (Roland-Morris questionnaire), physical health state (Physical Health Component PSC-12), strength and endurance. The group completing the additional deep water running showed a larger change. The influence of high intensity aerobic exercise on pain modulation is positive but needs further investigation.

REFERENCES


Cuesta A (2007): Correlation of heart rate in cycloergometer and deep water running in chronic non-specific low back pain for exercise prescription. 6th Interdisciplinary World congress on low back pain and pelvic pain, Barcelona.


Hall J, Bisson D and O'Hare P (1990): The physiology of immersion. Physiotherapy 76(9):517-521


www.ayto-torremolinos.org/pmdt/websp/asalud.asp

www.ayto-torremolinos.org/pmdt/videos/videos.asp (Actividad Acuatica)
ADAPTED SWIMMING

Adapted swimming covers all strokes that may be in some way modified. Adapted swimming offers not only a cardiovascular training, musculoskeletal challenge in terms of endurance and range of movement but most importantly it offers so much with regard to participation. While the body of literature in hydrotherapy, aquatic therapy or aquatic physiotherapy continues to grow there is another source of information on movement in water that should not be overlooked. Literature related to swimming includes a huge amount of performance and biomechanical data as well as studies in situations that are more closely related to aquatic physiotherapy such as the swimming stroke parameters of amputees, fitness and mental health in stroke patients that exercise in water and performance of swimmers with a physical impairment or an intellectual disability. Paralympic swimming offers more information that is interesting from a clinical perspective including classification procedure and systems as well as data on performance.

www.paralympic.org/release/Summer_Sports/Swimming/Photo_Gallery

Adapted swimming with a snorkel, Torremolinos, Spain
REFERENCES


www.paralympic.org/release/Summer_Sports/Swimming/Classification/

www.paralympic.org/release/Summer_Sports/Swimming/IPC_Swimming_Summit/
THE PHYSIOLOGY OF IMMERSION AND THE AUTONOMIC NERVOUS SYSTEM

The physiological changes upon immersion in thermoneutral water are well documented including the blood volume shift from the periphery to the central circulation due to hydrostatic pressure (Hall 1990). The impact of increased stroke volume and cardiac output and reduced heart rate in addition to lung volume changes appears clinically well tolerated and beneficial but needs further investigation in chronic populations for general fitness or rehabilitation following a cardiac event or with pulmonary rehabilitation. The autonomic nervous system is made up of two opposing branches, the sympathetic (fight or flight) component and the parasympathetic (relaxation and recharging) component. Many chronic disease states have autonomic system changes or an imbalance between the two components. Increased sympathetic nervous system activity has been associated with cardiac dysfunction and autonomic imbalance is likely to also have a significant impact during and after prolonged periods of stress and influence mental health. The mechanisms of autonomic nervous system function are complex and the exact influences leading to reduced sympathetic nervous system activity when immersed are unknown. This area of research may help to further understand some physical and mental or emotional health interrelationships with immersion leading to a similar response to relaxation or meditation. Testing the autonomic nervous system can involves measuring blood hormone levels, skin conductivity, respiratory rate, blood pressure, heart rate and more recently heart rate variability (HRV) using electrocardiogram (ECG). HRV assesses beat-to-beat interval or time between each cardiac cycle with a normal test showing a regular pattern but with instantaneous variation which will depend on the central nervous system and the peripheral nervous system including the autonomic nervous system. A recent study, the first one to examine the effect of temperature and water immersion on the autonomic nervous system, at the Washington State University indicated that warm water (39 degrees C) had a more beneficial influence on sympathovagal balance when compared with thermoneutral water (36 degrees C) (Becker et al 2009). In contrast cold water immersion (31.1 degrees C) produced a result more similar to a stress response with an increase in sympathetic nervous system activity. Further investigations will also assess the differences in age related to temperature and immersion. The changes in autonomic nervous system function in immersion are gaining more interest particularly in the area of concentration, memory and positive mood states.

REFERENCES


Hall J, Bisson D and O'Hare P (1990): The physiology of immersion. Physiotherapy 76(9):517-521
WATER AS AN ENVIRONMENT FOR PROBLEM SOLVING, TEAMWORK AND COMMUNICATION

Within the Chronic Pain Program at Adelante, a rehabilitation centre in Hoensbroeck, Netherlands, the aquatic sessions fit within a cognitive behavioural framework. The sessions involve problem solving and team work and are designed to teach the participants about decision making and their communication with others. The cardiovascular and musculoskeletal benefits are secondary to the problem solving and interactions with others. The participants of the sessions act individually or in groups move from one side of the pool to the other with different criteria prescribed by the physiotherapist, Rob Pelt. Some examples of the criteria would be: to all start and finish at the same time and swim on your back, in groups of three using 2 kickboards to tow one member of the group without them touching the bottom or to start and finish consecutively. As a novel environment, these activities can quickly demonstrate how well a group is working together and how choices or decisions are made by individuals. There is a wider application for this type of approach in many clinical situations related to timing and control of movement also.

www.adelante-zorggroep.nl/
info@adelante-zorggroep.nl
PROFESSIONAL DEVELOPMENT COURSES

<table>
<thead>
<tr>
<th>Burdenko Part I</th>
<th>Levels 1,2,3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location of the course</td>
<td>Near Boston but courses are also available in other parts of the United States</td>
</tr>
</tbody>
</table>
| Course presenters and background | Dr Igor Burdenko – Sports Science background  
Paul Salvi – Physical Therapist  
Tom Barbeau – Sports Coach |
| Language | English |
| Length of the course | 3 days |
| Cost in 2009 | $800USD |
| Time of year | Varied |
| Course participants | There are no prerequisites for attending the course. On this occasion the course participants were approximately 1/3 ex-patients of the Burdenko Water and Sports Therapy Institute, 1/3 interested members of the community, 1/3 sport or alternative medicine or allied health background including masseurs, sporting coaches or therapists |
| Course contents | Predominantly practical sessions with some theory included.  
Lower body, trunk and spine and upper body exercises demonstrated and practiced for Level 1 Balance (deep water exercises), Level 2 Coordination (deep water, mat and half roll exercises) and Level 3 (deep water, shallow water, long tubing mat, half roll, bench, ball and stick exercises). Structure was learn the exercise, practice the exercise and then teach the exercise to another participant. |
| Course materials | Comprehensive manual including all the exercise.  
DVD of exercises as well as text books and equipment available for purchase at the course or via the Burdenko website |
<p>| Other information | Part II – Instructor programs – Levels 4,5,6 and Part III – Master Instructor courses also available for $800USD each |
| Further course details | <a href="http://www.burdenko.com">www.burdenko.com</a> |
| Summary | Some very interesting and varied exercise options presented particularly within the deep water component of the course. Practical sessions were the highlight. The more structured mix and progression of the land and water components was good. Clear course manual provided. |</p>
<table>
<thead>
<tr>
<th>Valens Klinik Aquatic Therapy Course</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Location of the course</strong></td>
</tr>
<tr>
<td><strong>Course presenters and background</strong></td>
</tr>
<tr>
<td><strong>Language</strong></td>
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<tr>
<td><strong>Length of the course</strong></td>
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<tr>
<td><strong>Cost in 2009</strong></td>
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<tr>
<td><strong>Time of year</strong></td>
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<tr>
<td><strong>Course participants</strong></td>
</tr>
<tr>
<td><strong>Course contents</strong></td>
</tr>
<tr>
<td><strong>Course materials</strong></td>
</tr>
<tr>
<td><strong>Summary</strong></td>
</tr>
</tbody>
</table>
**Aquaevidence: an intensive course. The Evidence Base for Aquatic Therapy in persons with Disabilities**

<table>
<thead>
<tr>
<th>Location of the course</th>
<th>University of Leuven, Belgium</th>
</tr>
</thead>
</table>
| Course presenters and background | Professor Daniel Daly - Sports Science background  
Johan Lambeck - Physiotherapist  
Various presenters from Universities all over Europe including University of Leuven, Belgium; Porto University, Portugal; University of Malaga, Spain; Lithuanian Academy of Physical Education, Lithuania; University of Jyvaskyla, Finland; University of Maastricht, Netherlands; University of Castilla La Mancha, Spain in addition to other presenters from hospitals in the Netherlands. Other partners of the course include Universities in the UK, Germany and Hungary. |
| Language | English |
| Length of the course | 10 days over 13 days |
| Cost in 2009 | 200 Euro for students from partner Universities  
1000 Euro for all other students  
Course fees include accommodation and food (and travel allowance for students from partner universities) |
| Time of year | Usually held in July |
| Course participants | Allied Health professionals with an interest in aquatic therapy. Usually in the final year or Honours year of study. Opportunities exists for more experienced post-graduate therapist involvement as a mentor to the undergraduate students in their projects. |
| Course contents | The course includes specific lectures and practical sessions from experts from all over Europe. The course is primarily theory based and focused on the skills needed to complete a systematic review, search strategies, critical appraisal systems and reviewing literature on a specific aquatic topic and presenting it at the end of the course. Additional practical sessions are presented by Johan Lambeck. |
| Course materials | All lecturers PowerPoint presentations and additional information and resources on systematic reviews and critical appraisal are supplied. |
| Other information | Course is likely to rotate to Spain and Finland |
| Further course details | www.aquaevidence.eu  
In 2010 the course will focus more on outcomes and measurement and will be retitled “Aquaoutcomes” |
| Summary | Fantastic standard and diversity of presenters from many backgrounds. Unique opportunity for undergraduate students to benefit from this expertise with some additional practical sessions and also a clinical visit. Excellent opportunity for more experienced physiotherapists to learn or even consider participating in a mentoring role. |
Method based approaches such as Burdenko or Halliwick provide great diversity in aquatic treatment options but should not be used in isolation. Australian Aquatic physiotherapy education has focussed on a more integrated approach, merging all methods and techniques to provide high level clinical reasoning and evidence based practice. The Australian Physiotherapy Association Level 3 Aquatic Physiotherapy course compares favourably with International options for education. It is currently the only aquatic physiotherapy specific advanced course in the world. It has a very high standard of teaching and covers a huge variety of conditions and approaches with multiple presenters and some distance learning theory units in physiology of immersion, applied physics, clinical reasoning, evidence based practice and research and pool management. The Australian approach to aquatic physiotherapy clinical reasoning has been shared and used in some of these International courses. The Australian course will benefit from links to the Valens course with Halliwick and Bad Ragaz Ring Method theory available to share. This course should develop stronger links with the UK ATCP organisation to ensure ongoing high standards. The use of Undergraduates to produce articles and resources as demonstrated in the Aquaevidence course was very impressive and should be developed in Australia.
## SERVICE DELIVERY

<table>
<thead>
<tr>
<th>Centre</th>
<th>Pool/s</th>
<th>Therapist to patient ratio for individual programs</th>
<th>Groups</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Klinik Valens Switzerland</td>
<td>2 Hydrotherapy Pools</td>
<td>1:1 20 minutes</td>
<td>Joint replacement Fitness</td>
<td></td>
</tr>
<tr>
<td>Burdenko Water and Sports Therapy Institute</td>
<td>1 Hydrotherapy pool (32.2 degrees C)</td>
<td>1:1</td>
<td></td>
<td>Patients are encouraged to purchase a membership to the pool for their independent exercise and practice</td>
</tr>
<tr>
<td>Ayuntamiento de Torremolinos, Patronato Municipal de Deportes, Area de Salud Torremolinos Spain</td>
<td>1 Hydrotherapy pool 2 lap swimming pools 1 Recovery and relaxation pool with jets</td>
<td>1:6-8 30 minutes land exercise 30 minutes water exercise for musculoskeletal and chronic pain 1:1 neurological</td>
<td></td>
<td>Variety in pool temperature and type allows great clinical flexibility</td>
</tr>
<tr>
<td>Royal National Hospital for Rheumatic Diseases Bath UK</td>
<td>1 Hydrotherapy pool</td>
<td>1:3-4 musculoskeletal 1:1 neurological</td>
<td></td>
<td>Ankylosing Spondylitis Chronic Pain</td>
</tr>
<tr>
<td>Nuffield Orthopaedic Centre Oxford UK</td>
<td>1 Hydrotherapy pool</td>
<td>1:2 30 minutes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>University of Leuven Belgium</td>
<td>1 lap swimming pool</td>
<td>1:6-10</td>
<td></td>
<td>Fitness and participation goals</td>
</tr>
</tbody>
</table>
Funding for aquatic services is diverse and variable. There appears a trend for more funding through Education and Special needs facilities for children and less funding through traditional hospital based or health services. Most decisions about therapist to patient ratios appear partly pragmatic and partly traditional.

Swimming pool, hydrotherapy pool and jet/recovery pool, Torremolinos, Spain
## RESEARCH

<table>
<thead>
<tr>
<th>Primary Researcher or Institution</th>
<th>Current or recent Research</th>
<th>Future research directions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr Bruce Becker University of Washington State USA</td>
<td>1. Asthma study 3x/week for 12 weeks Land v Aquatic, RPE Aq 4-8, Land 3-7, 30-45 min class (15 min warm up), DWR, cross country ski, high knees, flip kicks, sprint jogs, outcomes - body comp, VO2max etc 2. Autonomic nervous system and Immersion in cold/neutral/warm water in older adults as an extension of the data published in the following article Becker B, Hildenbrand K, Whitcomb R and Sanders J (2009): Biophysiologic effects of warm water immersion. International Journal of Aquatic Research and Education, 3:24-37.</td>
<td>Future projects may involve 1. animal studies (immersion and muscle and bone blood flow, production of synovial fluid, OA inflammatory blood markers and bone healing for stress fractures) 2. OA study - blood inflam markers.</td>
</tr>
<tr>
<td>Klinik Valens Switzerland</td>
<td>1. Total hip and total knee joint replacements Usual aquatic physiotherapy treatment versus increased balance challenges and more dynamic content in aquatic physiotherapy 2. EMG findings with Bad Ragaz Ring Method patterns</td>
<td></td>
</tr>
<tr>
<td>Torremolinos Spain</td>
<td>1. Maximal physiological responses with aquatic exercise in chronic low back pain 2. Aquatic therapy and Chronic Obstructive Pulmonary Disease 3. 1 versus 2 versus 3 sessions of therapy per week and influence on outcomes</td>
<td>1. RCT of hormonal response including cortisol levels after high intensity deep water running in chronic low back pain.</td>
</tr>
<tr>
<td>University of Bath</td>
<td>Cold or warm water immersion for 5 minutes versus control recovery</td>
<td></td>
</tr>
<tr>
<td>Chartered Society of Physiotherapy (UK) Aquatic Therapy Association of Chartered Physiotherapists (ATACP)</td>
<td>National Hydrotherapy Data collection (HyDAT) Project involved the collection and analysis of 1762 data sets from 74 contributing aquatic physiotherapy units from across the UK. Data included information on demographics, aquatic physiotherapy intervention, patient outcome questionnaire based on the Measure Your Medical Outcome Profile (MYMOP). Results included the following: 74% of the aquatic physiotherapy patients had long-term conditions, 14% (the biggest single group) had back pain, 62% of the sample had co-existing mobility problems, 77% of</td>
<td>Follow up projects possible using the HyDAT model including analysis of outcomes from Parkinsons Disease patients by Jackie Pattman.</td>
</tr>
</tbody>
</table>
patients achieved their physiotherapy goals - at least partially. Treatment details: 55% of patients were described as having at least one of: range of movement exercises, active strengthening exercises, self-management and functional exercises. The average (mode) number of treatments was 6. 51% of patients were given written advice, 10% were involved with a specialist treatment such as Bad Ragaz, Halliwick, Watsu or Ai-Chi.

Goal achievement: 78% of all patients achieved all or some of their goals on discharge.

Service related details: Average (median) number of weeks waiting time was 2 weeks. The HyDAT tool was found to be user-friendly and provides valuable information for clinical and research debate. The HyDAT is a useful tool that provides information regarding the clinical effectiveness of aquatic physiotherapy as well as providing a baseline for future data collection. HyDAT gives us:


For further information see the CSP website http://www.csp.org.uk/director/members/practice/informationmanagementandinformation/standardiseddatacollection.cfm

2. EMG and Bad Ragaz Ring Method  
3. Human autonomic responses to water immersion |
| University of Leuven Belgium | Aquatic exercise and adapted swimming for stroke patients |
There are many questions still to be answered in the aquatic environment. Experienced researchers Dr Bruce Becker (USA) and Dr Jane Hall (UK) highlight how much of the basic science as well as impact in clinical situations is still unknown with areas of interest in immersion and immersion and exercise including dose response, age related autonomic and pain system responses, temperature specific studies, cardiovascular exercise and obesity and diabetes, cumulative effects, cost effectiveness, identifying responders and non-responders and the shift in focus to patient choice, satisfaction and wellness. Aquatic research appears to exist in isolated pockets and is generally not well connected or supported by academic or large clinical research institutions. Consideration should be given to stronger links to patient groups such as Arthritis Foundations to assist funding for research and help drive research with input from patients. The body of knowledge continues to build and communicating results, collaborating formally or informally and supporting new researchers is important continue to develop the evidence in this field.
RECOMMENDATIONS

CLINICAL PRACTICE

1. For Aquatic Physiotherapy to continue to develop in Australia with regard to evidence based practice and research there must be strong links with overseas groups. The Australian Physiotherapy Association (APA) Aquatic Physiotherapy Group must continue to increase links with other organisations, particularly ones with a similar knowledge base and standard of practice such as the UK Aquatic Therapy Association of Chartered Physiotherapists, to ensure ongoing information sharing. This offers a broader base of interested physiotherapists that can contribute to moving the profession forward.

2. Specificity with exercise prescription remains a high priority along with further considering dose response to aquatic physiotherapy. Focus must continue on outcome measures for measuring effectiveness and objective measures to improve accuracy of estimating load such a metronome or music for speed and resistance from turbulence, volume of floatation for buoyancy resisted exercise, repetitions and sets and measures of cardiovascular load. The use of outcome measures and objective measures will facilitate the transition from practice to research and vice versa.

3. A more formal consideration of the balance of land and aquatic based exercise should be considered by all clinicians.

4. Aquatic therapy methods have a great deal to offer in expanding clinical options but need further investigation. The focus in Australia must continue on integrating all techniques, analysing movement and exercises based on hydrostatic and hydrodynamic theory and evidence based practice. Aquatic Physiotherapy in Australia can embrace methods for increasing diversity of practice but must undertake a structured comprehensive clinical reasoning process to combine all treatment options that fit the individual rehabilitation situation.

5. Cardiovascular fitness and conditioning in an aquatic environment is a key treatment opportunity for most presentations in chronic disease and deserves greater use within most clinical programs.

EDUCATION

6. The Australian Physiotherapy Association (APA) Level 3 Aquatic Physiotherapy Course currently exists as the only extended course for physiotherapists exclusively in the world and must continue to be supported by the APA. Developing further links and information sharing with other extended courses such as the Valens course in Switzerland and AquaEvidence in Belgium must continue. New links with Universities and opportunities in the UK must continue to be explored to keep this course up to date, innovative, at a high clinical level of practice and as an opportunity to continue to produce Educators and Leaders in this field in Australia.

7. Physiology of immersion, hydrostatics and hydrodynamics remain as the key teaching content in aquatic physiotherapy education.
RESEARCH AND EVIDENCE BASED PRACTICE RESOURCES

8. Physiotherapy Students in Australia should be viewed as a valuable resource to assist to create material and consideration should be given to developing a project for students to further develop evidence based practice updates.

9. With limited resources in Australia, linking in with the UK HyDAT project may offer an opportunity to monitor outcome measures in chronic disease management in Aquatic Physiotherapy.

10. Exercise remains the most valued aquatic treatment option that should be a research priority with the autonomic nervous system showing some interesting results that may have applications in chronic disease management. Cost effectiveness must be linked to future Aquatic Physiotherapy research projects.

INTERNATIONAL LINKS

11. Initial early gains with the World Confederation for Physical Therapy project to develop an International Aquatic group should be further developed with potentially 4 new on-line discussions to gather info and interest prior to the 2011 conference
   a. Current or recent research projects or quality projects in different countries
   b. Education courses and structure of post-graduate and undergraduate teaching in aquatic physio
   c. Collect guidelines of practice - clinical or safety standards.
   d. Aquatic Physiotherapy National or Specific area interest groups - which countries have formal groups and what are they doing? Are there informal networks operation? Would you like to form a group in your country?

KEY MESSAGES FOR AQUATIC PHYSIOTHERAPY

12. Aquatic Physiotherapy must consider developing one or two key messages for the community and for medical and physiotherapy colleagues to market itself within a very diverse and varied field of practice. Consideration should be given to what the aquatic physiotherapy offers most individuals and a focus on movement and exercise may be the way forward.
ACTIONS TO DATE
1. The 2008 Australian Physiotherapy Association Aquatic Physiotherapy Evidence Based Practice Guide has been shared with most other National physiotherapy groups overseas. It is being used actively in the Valens course in Switzerland and the Aquaevidence course in Belgium and has been reproduced in parts in the UK ATACP journal Aqualines throughout 2009.
2. The UK ATACP journal Aqualines and the Aquatic Physiotherapy Group publication Newsplash have developed an informal arrangement for sharing articles.
3. The Australian Physiotherapy Group approach to clinical reasoning has been shared and is being used in the Valens course.
4. The distance learning units from the Level 3 Aquatic Physiotherapy Course in Australia have been shared with the UK ATACP group with a view to future collaboration with advanced extending Aquatic Physiotherapy education.
5. Johan Lambeck and Urs Gamper have approved the used of Halliwick and Bad Ragaz Ring Method written theory to be used within the Level 3 Aquatic Physiotherapy course in Australia.
6. Links with The University of Malaga may continue related to Australian physiotherapists assisting to translate aquatic research into English.

FURTHER INFORMATION DISSEMINATION
1. An information session on overseas practice in aquatic physiotherapy will be held for Victorian members of the Australian Physiotherapy Association in December 2009.
2. All participants at the Australian Physiotherapy Association conference in October 2009 will be aware of the Churchill Fellowship and the website link to this report.
3. All 250 members of the Aquatic Physiotherapy Group in Australia will receive links and further information contained in this report.
4. Practical professional development sessions will be completed at Sunshine Hospital in September and October 2009.
5. Undergraduate content at Monash University and The University of Melbourne will be updated.
6. The Level 3 Aquatic Physiotherapy will next be conducted in Melbourne October 2010 and the content will reflect updated material shared by overseas colleagues.
7. All overseas contacts will be involved in any proposed on-line discussions for the further development of an International Aquatic Physiotherapy group through the WCPT.