

Royal Children's Hospital

Aquatic Physiotherapy Information Sheet for Health Professionals

Aquatic physiotherapy is the term which describes physiotherapy treatment that utilizes the properties of the water and a warm environment to enhance treatment effect and improve patient outcomes. The RCH pool is located on Level 1 and hosts aquatic physiotherapy.

Basic information regarding the effects of immersion is included in this document to assist medical staff in clearing clients for aquatic physiotherapy. Please note that the list of precautions and contraindications is not exhaustive. Also research into the effects of immersion in the paediatric population is very limited. Therefore one of the limitations of this document is that the data it contains has been taken from studies of the adult populations.

Medical Clearance

- Prior to commencement of aquatic physiotherapy all RCH inpatients require medical clearance
- RCH outpatient's with complex medical conditions or those whose conditions may impact their ability to exercise in an aquatic environment may also require medical clearance
- If the medical team have any queries or reservations regarding a client's appropriateness for aquatic physiotherapy please do not hesitate to contact the treating physiotherapist and/or the senior clinician in aquatic physiotherapy (ph 93459399, ASCOM:52456)

Points of considerations for clearance include:

Hydrostatic Pressure

- Water pressure varies directly with depth.
- The numerous effects of hydrostatic pressure are discussed further in relation to cardiovascular, respiratory and renal effects of immersion when reading this information please consider effect of both:
 - Hydrostatic pressure while in the water
 - Removal of hydrostatic pressure when a client exits the pool

Cardio-Vascular Effects of Immersion

Cardiac output varies in different positions: In supine when immersed a person's cardiac output remains relatively unchanged, in standing immersed to the neck cardiac output increases up to approximately 63%

- Increased central circulation of up to approximately 700ml, stroke volume increased by just over 50% and a 30% increase in heart size within 6 seconds of immersion (in the adult population)
- Decrease in peripheral resistance
 - Initially an increase in blood pressure followed by an overall reduction through the period of immersion
 - A further decrease in BP on exit from the pool :

Respiratory Effects of Immersion: Increased work of breathing and decreased lung volumes attributed to via some or all of the following

- Negative pressure breathing effect
- Increased perfusion
- Decreased ventilation
- May increase risk of pulmonary oedema especially with exertion
- Upward displacement of diaphragm

Renal effects of immersion:

- ↑ central blood volume induced by hydrostatic pressure stimulates the cardiopulmonary and arterial baroreceptors
- ↓ Sympathetic NS activity, systemic peripheral resistance, arginine vasopressin (AVP) and the renin-angiotensin-aldosterone axis
- Resulting in sodium excretion and diuresis
- Some studies have also shown a reduction in proteinuria as a result of normalization in blood pressure
- It should be noted that in thermoneutral water glomerular filtration rate (GFR) is altered very little
- With cooler water temperatures GFR ↑'s, further ↑ diuresis → greater strain on the kidneys and increasing the risk of dehydration

Haematological effects of immersion: Immersion may cause haemodilution it has been hypothesised this is a result of extracellular fluid shift into the vascular spaces.

Temperature effects: The RCH pool is heated to approx 34 degrees and a patient's ability to dissipate heat is reduced in this environment due ineffectiveness of sweating when immersed

GIT: Esophageal motor function and intragastric pressure have been found to be altered by full-body water immersion. Furthermore, the pressure gradient between LEHPZ and intragastric pressures was maintained at a high level, and esophageal peristaltic pressure was elevated with immersion.

Chemical treatment of water: Water can provide a means of transmission of body fluids and therefore infection. Chlorine and UV is used to disinfect the RCH pool. A by-product of insufficient chlorine reacting with organic matter is trichloramines which may irritate the skin

Exercise and immersion:

- The renal effects of immersion and exercise can cause hypervolaemia to dissipate during water exercise
- Left ventricular and diastolic distension during mild to moderate exercise is greater in water
- Water exercise results in a relatively lower heart rate and higher stroke volume compared with land exercise
- Oxygen consumption is greater with water exercise
- BP increases generally in proportion to land based equivalent with exercise
- No known research has been done comparing land based exercise to water based exercise and its effect on BGL, however, anecdotally patients who exercise in the pool typically have faster and more pronounced drops in their BGL

Faecal Incontinence

- Incontinent patients should wear commercially produced swimming nappies. All other children must be toileted immediately prior to using the pool.
- If break/disruption to bowel regimen pool entry contraindicated until reliable (includes aperients missed or ineffective)
- NOTE: faecal accident in pool results in pool closure of up to 3 days due to infection control requirements as per government regulations

Cytotoxic and DMARD medications: require precautions due to possible exposure via bodily fluids/incontinence in the pool

The aquatic environment increases the risks associated with patients at risk of **seizures and aspiration**

QUICK REFERENCE: CONTRAINDICATIONS / PRECAUTIONS INCLUDE

ABSOLUTE CONTRAINDICATIONS:	CARDIAC CONTRAINDICATIONS	RELATIVE CONTRAINDICATIONS:
Unstable medical conditions Poorly controlled cardiac failure Febrile and unwell Diarrhoea and/or vomiting Aortic aneurysm Infected wounds that need to be kept dry or are /unable to be covered Patients in respiratory distress Uncontrolled diabetes Uncontrolled epilepsy Within 14 days of gastroenteritis symptoms	Unstable conditions with activity restrictions Decompensated heart failure Myocardial infarct less than 6 weeks Myocarditis less than 6 months Unstable ischaemia Uncontrolled arrhythmias Severe and symptomatic aortic stenosis Hypertrophic cardiomyopathy Severe pulmonary hypertension Active or suspected myocarditis or pericarditis Suspected or known dissecting aneurysm Thrombophlebitis Recent systemic or pulmonary embolism Resting SBP above 200mmHg Resting DBP above 110mmHg	Acute infections Febrile Cardiac conditions Kidney failure Acute sinusitis Active TB Ear infections Faecal incontinence without a reliable bowel regimen

CONDITIONS CARRYING PRECAUTIONS INCLUDE:

Cardiovascular system: History of hyper/hypotension Cardiac disease Headaches Peripheral vascular disease Respiratory Respiratory disease Tracheostomy CNS Epilepsy/fitting Swallowing defects GIT Bowel control issues Colostomies Infectious conditions Infectious diseases Airborne infections Herpes simplex Genitourinary tract Urinary incontinence Menstruation Eyes and ears Visual or hearing impairment Ear infections or grommets	Skin/Wounds Surgical wounds Open and infected wounds Tracking bone sinus External fixators Ilizarov Skin grafts/donor sites Altered sensation Tinea and plantar warts Skin rashes/lesions Chemical sensitivity, e.g. chlorine allergy Dermatological conditions Other Acute inflammatory conditions Plaster cast Heat sensitive conditions eg. MS, SFS, Lymphedema Radiotherapy Specific medications (clarify side effects) Morbidly obese Fear of water Significant behavioural/cognitive problems Psychiatric clients Intoxicated clients/drug abuse Cytotoxic / DMARD medication
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