Aquatic Physiotherapy Group

AUSTRALIAN PHYSIOTHERAPY ASSOCIATION

Australian guidelines for aquatic physiotherapists working in and/or managing hydrotherapy pools.

Second edition.

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INTRODUCTION

This document is the second edition of the "*Guidelines for Physiotherapists working in and/or managing Hydrotherapy Pools"*, first published in 2002. It is designed to provide information to physiotherapists and other aquatic professionals managing or working in hydrotherapy pools. The material is to serve as a guide to ensure that safety and professional standards are maintained and that water is used as an effective therapy and exercise medium. The aim of the Guidelines is to continually improve the quality of care offered to the public.

Recognition has been given to differing opinions on the therapeutic use of water. It is recognised that individual physiotherapists will work as sole practitioners in community pools and that physiotherapists will be involved in the management of hydrotherapy pools in the community, in private practice and in institutions. In many situations other professionals will work in the water or manage the facility used by the physiotherapist.

Hydrotherapy pool managers owe a duty of care to the service providers who use their facilities and to consider Federal, State and Council regulations.

They have a duty to provide a facility that meets criteria in safety and design, and infection control and cleanliness.

The Guidelines are designed to give the physiotherapist and the manager guidance as to what constitutes acceptable standards regarding safety, infection control and credentials needed by people using or managing hydrotherapy pools.

All possible types of water exercise and therapeutic aquatic activity including Aquatic Physiotherapy (Hydrotherapy) were considered including the utilisation of non-purpose built pools, the management of which is not always controlled by physiotherapists. The document outlines minimum standards that are achievable in all circumstances.

The Guidelines do not include detail on pool design. They should, however be read in conjunction with the existing Australian Standards for Hydrotherapy Pools (AS3979-2006).

Furthermore, it is recognised that there are additional standards at state and local government levels, which relate to infection control and pool sanitization, and these will need to be considered. Other professional associations may have standards for their members. Links to State Government bodies and Standards have been included in this document.

Aquatic professionals, including physiotherapists, must recognise that a duty of care is owed to clients regarding both the selection of appropriate facilities and the form of service offered. In offering a service, the aquatic professional takes responsibility for the client's safety.

These Guidelines have been designed utilising available knowledge, best practice and evidence in the areas of Aquatic Physiotherapy, water exercise and therapeutic swimming. They are recommended to professionals working in hydrotherapy pools or working with people with special needs and/or disabilities in a water environment, to physiotherapists including members of the Australian Physiotherapy Association (APA) and to members of the community who may be involved in managing hydrotherapy pools. They represent the minimum acceptable standard of professional practice.

DEVELOPMENT PROCESS, PEER REVIEW AND AGREE INTRUMENT TESTING

These Guidelines have been developed with a literature review (Appendix V) and where supporting literature could not be found via a Delphi process (Appendix VI). The Guidelines were peer reviewed by two physiotherapists working in the field of hydrotherapy but not involved in the working party or the Delphi process. The guidelines have additionally have been assessed with a tool called the Appraisal of Guidelines for Research and Evaluation (AGREE) Instrument to assess the methodological rigour and transparency in which the Guidelines were developed.

DISCLAIMER

The clinical guidelines have been prepared having regard to general circumstances, and it is the responsibility of the practitioner to have express regard to the particular circumstances, and the application of these guidelines in each case. In particular, clinical management must be responsive to the needs of individual patients, resources and limitations unique to the institutions or type of practice. The clinical guidelines have been prepared having regard to the information available at the time of their preparation, and the practitioner should therefore have regard to any information, research or material which may have been published or become available subsequently. While the APA endeavours to ensure that clinical guidelines are as current as possible at the time of their preparation, it takes no responsibility for matters arising from changed circumstances or information or material which may have become available subsequently.

DEFINITIONS OF ACTIVITIES CARRIED OUT IN A HYDROTHERAPY POOL

Hydrotherapy

Hydrotherapy has been used to describe a wide range of activities, of which most pertain to therapeutic and exercise activities carried out in heated pools. More recently, health funds and traditional medicine have recognised hydrotherapy as a physiotherapy treatment carried out in water where the properties of water are utilised to achieve specific, therapeutic goals. There is much confusion at a public level, however, with many different professionals using the term hydrotherapy. The word is also used to represent a range of alternative therapies including colonic washouts. It is recommended that "hydrotherapy" be used as the generic label for the many activities that occur in a hydrotherapy pool and that providers of aquatic services further define their specific roles. The most common activities coming under this banner and usually co-ordinated by hydrotherapy pool managers include:

- Aquatic Physiotherapy Services
    - Individual
    - Group
    - Classes
    - Physiotherapy prescribed exercise programs
- Water Exercise Services
    - Individual
    - Classes
    - Aquatic personal training
- Aquatic Fitness Activities
    - Aqua aerobics
    - Deep water activities
- Swimming activities
    - Learn to Swim
    - Swimming for people with disabilities
    - Therapeutic swimming

Aquatic Physiotherapy

To assist with defining the roles of aquatic professionals and to avoid confusion with compensable bodies, medical professionals and the general public, the Australian Physiotherapy Association has defined the specific practice of physiotherapy in water as "aquatic physiotherapy". It is carried out by a physiotherapist.

Aquatic physiotherapy treatment (individually or in groups) incorporates individual assessment, diagnosis and the use of clinical reasoning skills to formulate a treatment program appropriate to the client. Reassessment is undertaken at the appropriate time by the physiotherapist, with outcome measures recorded in keeping with evidence-based practice.

The aim of aquatic physiotherapy is to assist with the rehabilitation of neurological, musculoskeletal, cardiopulmonary and psychological function of the individual. In some cases it will also assist in maintaining the client's level of function or prevent deterioration (eg balance and falls prevention) or prevent injury (eg aid in recovery in a preventative sports medicine program). Aquatic physiotherapy may involve individual treatment in a one to one situation or may be undertaken in groups or classes. It may be used alone or in conjunction with other rehabilitation practices.

Individual Aquatic Physiotherapy: This form of treatment may utilise manual skills, demonstration and correction of exercise or facilitation of desired movement patterns and motor relearning.

Aquatic physiotherapy can also incorporate the development of independent movement in water and the prescription of modified swimming activities, taking into account pathological changes seen in neurological and orthopaedic/musculoskeletal conditions.

The level of disability or water competence of the client may necessitate individual treatment.

Water safety and independent movement in water may also be taught or assessed.

Fee structures for individual aquatic physiotherapy are similar to that for land physiotherapy.

If a physiotherapist does not offer aquatic physiotherapy, referral to a physiotherapist with skills in aquatic physiotherapy is recommended.

Aquatic Physiotherapy Group Programs: These may be individually tailored yet supervised in clinical groups where individuals follow specific exercise programs designed according to their own pathology, rehabilitation or recovery requirements.

The client may be supervised/assisted during the exercise component of their management by hydrotherapy/physiotherapy assistants. Minimum standards of training apply (refer to Guideline 2.2).

Aquatic Physiotherapy Classes: Clients may participate as part of a class designed to meet specific needs such as those associated with pregnancy, general fitness, mobility for the older adult and people with arthritis.

It is recommended that simple outcome measures be used to ensure that loss of function and deterioration in mobility is readily identified. When deteriorating outcomes are identified it is strongly recommended that the participant be referred for individual evaluation where the physiotherapist can perform a comprehensive assessment to identify future management requirements.

Independent and/or home programs may be prescribed. The client's water safety and ability to carry out aquatic exercises independently must be ascertained (refer to Guideline 1.1.9). The client should carry out these exercises (a physiotherapy prescribed exercise program) in a pool that is safe and accessible.

Physiotherapy Prescribed Exercise Programs: Following assessment, treatment and instruction in selected aquatic activities, the physiotherapist may advise clients on a program that the client can perform independently. Exercises should be reviewed at appropriate intervals while the client is being managed by the physiotherapist. This will depend on the client's condition and rate of progress, and the program should be modified and/or progressed as required with outcomes measured regularly.

In many cases, a client's aquatic physiotherapy management will be integrated with land physiotherapy management. It is the responsibility of all physiotherapists involved in the client's care to consider all appropriate modalities.

A physiotherapy prescribed exercise program may be selected as the appropriate mode of aquatic physiotherapy intervention for many reasons. It may be the best way of progressing rehabilitation and promoting independence, there may be limited access to an appropriate pool or pool sessions by both the client and the physiotherapist, or it may be more cost efficient for the client or compensable bodies.

In some situations, referral to other aquatic professionals will be appropriate, eg exercise physiologist, aquatic fitness instructor or swimming teacher/coach. Appropriate documentation detailing the reasons for clinical decisions is recommended.

Water Exercise Services

Water exercise is an exercise conducted in water to maintain and upgrade body strength, flexibility, conditioning and general fitness and to promote a sense of wellbeing, and is usually performed or instructed by exercise professionals (refer to Guideline 2.2). Water exercise can enhance the progress of many rehabilitation and recovery programs and can be offered independently or to complement existing therapies.

Individual Water Exercise: Clients are assessed and instructed in a program to suit individual needs. It is recommended that the instructor teach individuals from within the pool.

Water Exercise Classes: Water exercises may be offered in classes with each individual following a personally prescribed program that has been individually taught or with the class following a program of exercises designed with a general goal.

Aquatic Personal Training: Water exercise can enhance training and fitness regimens for many individuals.

Aquatic Fitness Activities

Aquatic fitness activities can be conducted under many titles (eg aqua fitness, aqua-aerobics, water workout, water callisthenics, deep water running) by a range of exercise professionals including exercise physiologists and aquatic fitness leaders who should have appropriate aquatic training (refer to Guideline 2.2).

Swimming Activities

There is a wide range of swimming activities that may be offered in a hydrotherapy pool, including:

Learn to Swim: Swimming lessons may be offered for all ages and abilities, (eg, infants, older adults and people with disabilities). Often the hydrotherapy pool is used with these populations because of pool design, temperature considerations and economic use of resources. Infection control and screening procedures must be implemented in this population, as with all hydrotherapy pool users, to minimise risk to others.

Therapeutic Swimming: This may be used by physiotherapists or other exercise professionals as part of rehabilitation programs for strength and conditioning, fitness, weight loss and pain management. Water safety/confidence is a component of any swimming program but will vary according to ability of client and may need to be taught.

Swimming for People with Disabilities: In many areas of disability, the teaching of formal strokes may not be appropriate but individuals can still be taught independent movement in water. Physiotherapists may be involved in swimming for people with disabilities and teaching independent movement in water to ensure a therapeutic benefit for the client. This can be done by the modification of strokes, positioning, tone reduction and facilitating appropriate patterns of movement to maximise function and movement in a population of people with disabilities. Physiotherapists may also prescribe appropriate equipment including flotation devices.

Communication between professionals is encouraged at all times, particularly when working with clients who have pathologies or physical impairments and who undertake swimming activities.

1: SAFETY

Hydrotherapy pool services (including aquatic physiotherapy, water exercise and swimming activities) shall be organised and administered in accordance with acceptable standards for clients, staff and the working environment to provide optimum quality of care.

1.1 Client and Staff Safety

During aquatic physiotherapy, water exercise programs and swimming activities, the safety of clients and service providers must be ensured at all times.

1.1.1 Staff/Service Provider/Client Ratio

When determining the ratio of clients to staff in the pool environment the following factors should be considered:

a) Pool features including pool access, type of client transfers and the type of hoists available.
b) The size of the pool.
c) Level of disability or impairment of the client including physical, vision, hearing, intellectual, cognitive and psychological problems.
d) The independent ability of the client/s in the water.
e) The type of therapeutic technique to be used.

An in-pool assistant or external supervisor or assistant is required in any circumstances where safety would be compromised if something were to happen to the physiotherapist.

If one or more clients require assistance exiting the pool an in-pool assistant or external pool assistant or supervisor is required.

With appropriate risk assessment, screening, pool orientation and education, volunteers and carers can assist clients during therapist-led or independent aquatic sessions.

When a physiotherapist is working in a pool environment where an external observer is provided by the facility it is appropriate for the external observer to observe a number of users or groups at the one time.

When a physiotherapist is working in a pool environment where no external observer is provided by the facility, staff members, volunteers, carers or support workers may be used as external observers.

When a physiotherapist is working on their own in a pool environment (with no external observer or in-pool assistant) clients should:

a) Have independent gait and mobility with or without a gait aid or with wheelchair mobility.
b) Be able to independently enter and exit the pool via ramp, stairs or hoist.
c) Be able to effectively communicate and follow instructions.
d) Have no significant cognitive or behavioural issues.
e) Have been screened for any precautions or contraindications before commencing aquatic physiotherapy.
f) Be able to independently evacuate themselves from the pool if something were to happen to the physiotherapist.
g) Be orientated to the safety and emergency evacuation procedures of the facility.

Staff and volunteers assisting aquatic physiotherapists must:

a) Be physically capable of taking and following instructions from the person in charge of an emergency situation and assist clients to evacuate the pool.

b) Should have adequate hearing, vision, concentration and reaction times to be able to understand and follow instructions and react in cases of emergency.

Carers or support workers assisting an aquatic physiotherapist in the water must be physically able to evacuate their client and themselves from the pool in an emergency involving another client in the pool complex, or as instructed by the supervising staff member, care and attend to their own client.

If independently responsible for a client in the pool, the carer or support worker should:

a) Have adequate hearing, vision concentration and reaction times to be able to understand and follow instructions and react in cases of emergency.
b) Demonstrate the ability to keep themselves and the client they are assisting safe in the water (eg, stay in the appropriate depth, use any equipment safely, and support the client appropriately for the clients' condition and safety).

Children of any age who are not competent swimmers, or who are less than five years of age, should be supervised by staff or a carer or support worker in the pool within arm's reach of the client and with face-to-face observation.

1.1.2 Safety – Screening

All clients should have a land based physiotherapy assessment prior to commencing aquatic physiotherapy.

As part of an aquatic physiotherapy assessment all clients should have a screening health assessment for potential precautions and/or contraindications for immersion. Screening should include assessment of:

a) Presence of infectious conditions and related risk for infection such as open skin, active skin conditions or wound areas.
b) The level of assistance required for transfers in and out of the pool, for mobility in and out of the pool environment, and for dressing and general mobility.
c) Medical history, current medications and health status with particular regard to the physiological effects of immersion and exercise.
d) Ability to communicate including adequate vision, hearing, language and verbal skills.
e) Risk related to cognition and behaviour.
f) Risk related to anxiety and fear of water.
g) Assessment of falls risk.
h) Past and current swimming ability or the ability to regain a safe breathing position in water if safe to do so.

On completion of the pre-aquatic screening assessment, a management plan should be developed based on the person's individual capacity and needs.

All clients should be advised that it is their responsibility to notify the physiotherapist of any changes in their health and/or physical status.

1.1.3 Immersion

Immersion time for staff depends on water temperature, water and air quality, personal medical status and individual differences in terms of physiological response to immersion and the environment.

Federal workplace laws regarding work breaks should be applied in the aquatic setting.

Staff immersed for extended periods need to ensure adequate hydration.

Immersion time for clients depends on water temperature, water and air chemistry and personal medical status and individual differences in terms of physiological response to immersion and the environment.

Immersion time for new, frail or debilitated clients must be based on the physiotherapists' assessment of the client and their knowledge of the pool and external environment in which they are working.

Immersion time and revision of immersion time for all clients, including frail and debilitated clients, will be based on the physiotherapists' assessment of the individual client's response to immersion and exercise.

Clients should be encouraged to rest if needed and re-hydrate after aquatic physiotherapy treatment.

1.1.4 Emergency Policies and Procedures

Each aquatic physiotherapy service must have clear policies and procedures that are reviewed annually related to:

a) Emergency procedures
b) Staff training and competencies
c) Staff orientation
d) Client screening, written information provided and pool safety explanation or orientation
e) Water quality and testing (if the service is responsible for this)
f) Handling, storage and addition of chemicals (if the service is responsible for this).

It is recommended that each aquatic physiotherapy service provides documented evidence of:

a) Pool rescue training
b) Client screening before commencement of an aquatic program
c) Provision of written information and explanation regarding pool safety to clients and/or their carer
d) Client and/or carer acknowledgement and understanding of the aquatic safety rules. If the client is unable to understand or clearly communicate their understanding of the pool rules/safety instructions, then the aquatic professional must assess the clients ability to be safely managed in the pool environment.

It is recommended that all aquatic professionals are water safe and able to demonstrate the ability to rescue someone from the deepest end of the pool in which they work.

1.1.5 Emergency Equipment

Resuscitation equipment appropriate to the client base should be available (eg, face shield, Air-Viva, Oxy-Viva). This should be in good working order and appropriate staff trained to use it. When the pool is in use at least one person present should be qualified to use resuscitation equipment.

There should be an adequate system for summoning assistance in an emergency (eg, alarm, mobile or cordless telephone, personal alarm or whistle). It is highly recommended that some form of device be reachable by workers in the pool so that a physiotherapist or pool worker can summon help without exiting the pool. All staff must be familiar with the system.

Where a pool alarm system is in place, this must signal in the pool area and the nearest place for assistance when activated. Pool alarms must be tested on a regular basis to ensure effective working order. Where no in-built alarm exists, a personal alert alarm or whistle may be used to summon assistance.

Equipment to assist in removing clients from the pool will be necessary. In cases of respiratory or cardiac emergency hoists are usually not recommended as a means of emergency exit due to their slowness. Dedicated rescue slings or spinal boards are recommended.

Protocols for resuscitation in a wet environment must be considered (eg, adequate towels to dry clients in case of defibrillation). A practice drill of the emergency procedures in a wet environment should be carried out with appropriately qualified staff, for example, ambulance staff, emergency department staff, or in private practice with an appropriately accredited instructor and documented in the relevant department or clinic registers.

1.1.6 Staff Knowledge of Safety and Emergency Techniques

It is generally agreed that annual CPR training should be mandatory for aquatic staff. However, if volunteers are in a position of responsibility, it strongly recommended that they have CPR training annually.

Pool rescue training must consider the specific needs and conditions of the client population and cover evacuating conscious, unconscious and spinal injured clients out of the pool, using the equipment available at their facility.

All CPR and pool rescue training must be documented in the relevant department or clinic registers.

If aquatic staff treat clients with significant cognitive or behavioural issues that may lead to risky behaviour (ie, running on the pool concourse or diving into the pool) a spinal board with support straps should be available to evacuate the client from the pool.

If aquatic staff treat clients at risk of complications from a spinal injury, a spinal board with support straps should be available to evacuate the person from the pool.

It is generally agreed that all aquatic physiotherapy staff should be water safe and able to demonstrate the ability to rescue someone from the deepest end of the pool in which they work.

1.1.7 Hygiene and Infection Control Procedures

Appropriate infection control/hygiene procedures shall be implemented for all persons entering the pool and/or pool environment. (Refer to APA position statement on infection control and Appendix III Hygiene and Infection Control).

Infection control/hygiene procedures will vary, depending on the client type. They may include the following:

- Client precautions and pre-screening (refer to Appendix I and II)
- Cleaning and disinfection of pool, pool environs and equipment (hosing of floors alone is not sufficient)
- Pool chemistry and pool testing (refer to Appendix V)
- Use of appropriate clothing
- Showering before and after pool session
- Toileting and bowel regime
- Environmental management (wet and dry zones, shoe and wheelchair free zones)
- Risk management protocols

1.1.8 Client Records

With the increasing ability of older people, people with pathologies and people with disabilities to access hydrotherapy pools, documentation of client information becomes even more important. There may be factors such as pool temperature that can have adverse effects on some clients. Important information includes:

- Name
- Address
- Telephone number
- Date of birth
- Contact person in case of emergency
- Medical practitioner
- Relevant screening criteria (eg, diabetes).

This information should be provided by all users including carers and aquatic professionals and it should be readily available while the client is in attendance.

1.1.9 Clients Performing Independent Exercise Programs

Before prescribing an independent exercise program all clients should be assessed for their ability to move:

a) Around all areas of the pool they would have access to during their independent exercise program.
b) From the centre of the pool to the edge of the pool at its deepest part.

Before prescribing an independent exercise program for a client who is unable to enter and exit the pool independently, the client's carer or support worker must be assessed for their capacity to safely assist the client.

Some in-pool exercises and hydrotherapy equipment can put clients at increased risk. The effects of buoyancy, density and resistance will affect exercises performed in the water. It is expected that the physiotherapist discuss safety risks with clients when prescribing independent exercise programmes. It is strongly recommended that exercises are demonstrated by the physiotherapist in the pool with the client.

1.1.10 Staff Screening/Personal Management

All staff and volunteers entering the pool should be screened annually for water safety, health and infection control issues. If any issues are identified when screening staff or volunteers a management plan should be developed based on the individual's needs.

All carers, support workers and external users entering the pool should be screened for water safety, health and infection control issues.

Health screening for carers, support workers and external users who assist in the pool should be performed on an annual basis or if their health or physical status changes. If any issues are identified then a management plan should be developed based on the individual's needs.

Physiotherapists should take responsibility for their own personal management incorporating self-screening. This will include the physiological effects of immersion, for example, the effect of a warm environment, problems of dehydration and skin care. Physiotherapists may also be responsible for those working for them (ie, assistants).

Staff should have an initial screening and be educated to the risks of a pool environment so they understand the importance of reporting physical changes which may affect working in the pool environment.

1.1.11 Use of Hydrotherapy Pool by External Hirers

There are many scenarios where an institution may decide to use their hydrotherapy pool for other purposes but it is beyond the scope of these guidelines to go into detail about each one. If an

institution allows their hydrotherapy pool to be used for other purposes there are many legal and safety issues that would have to be considered in each situation.

- The institution must very clearly delineate the times for different purposes.
- Legal and insurance implications should be investigated.
- The local Council and State regulations for public pools must be followed.
- Infection control measures must remain stringent to allow the pool standards to be maintained at the appropriate levels for clients.
- If the institution allows their pool to be used by staff members with or without supervision, then it is strongly recommended that they have guidelines in place.
- Copies of qualifications, insurance policies, proof of CPR and rescue training should be provided by external hirers and kept in department or clinic registers.

1.2 Safety of Facilities

It is understood that there is a large variation in design and standards in existing hydrotherapy pools and that in some cases, ordinary pools are used for clinical practices. Best practice in terms of facility standards is something that can always be a goal but may not be reasonably achievable with facilities available. Documentation of processes to ensure client safety and facility standards are encouraged where these standards cannot reasonably be met.

The aquatic physiotherapy service should consider all Australian Standards, State and Local Government Acts and Regulations relevant to the running of a hydrotherapy service in the appropriate State or Territory.

1.2.1 Pool and Environment Maintenance

Relevant State Health Department Regulations shall be adhered to at all times (refer to Appendix V).

These include

- Water Purification Standards for Public Swimming Pools
- Storage and Handling of Chemicals.

It is the physiotherapists' responsibility to familiarise themselves with the standards relevant to their State.

Physiotherapists/organisations with purpose built hydrotherapy pools shall also consider Australian Standards for Hydrotherapy Pools AS3979-2006 and assess local Council/State requirements.

Physiotherapists utilising public pools for aquatic physiotherapy are not ultimately responsible for pool chemistry. However, they owe a duty of care to their clients when recommending or using a particular facility for ongoing treatment or management, and therefore must ensure that the pool they are utilising maintains a standard within their State Health Department guidelines.

Any adverse effects of immersion should be documented and pool managers notified. Most pool managers are obliged to have a logbook that is accessible to pool hirers. This logbook documents chemistry and microbiology readings.

1.2.2 Access to Hydrotherapy Area and Pool

Adequate assessment of the client's abilities and the facilities of the pool will ensure that the pool and facilities meet client needs and that the necessary assistance is available if required.

1.2.3 Facilities

Change, shower and toilet facilities shall be appropriate for the client base. The facilities should conform to Australian Standard for Design for Access and Mobility AS1428.1-2009 where access is required for wheelchair users and other people with disabilities.

Adequate lighting levels must be maintained at all times, to allow client safety and adequate supervision. The aquatic professional should be able to see all participants at all times.

1.2.4 Design Standards

The physiotherapist in charge of pool programs shall ensure that the design of the pool and the equipment being utilised is safe for use by the target population and for the proposed activities to be undertaken. Equipment should be checked regularly.

Consideration should be given to the following:

- Non-slip surfaces of pool floor surrounds.
- Temperature of pool and surrounds appropriate for population and activity. The temperature of hydrotherapy pools may vary according to use and funding. Ideal temperatures will vary. For example, clients with acute pain, arthritic or some neurological conditions will benefit from a pool at 34-35ºC while clients involved in work-hardening and aerobic programs may prefer a slightly cooler pool. Physiology literature suggests that a thermo-neutral pool (in which the body neither gains nor loses temperature) may be the most appropriate for aquatic physiotherapy techniques. Thermo-neutral is usually recognised as a “window” of temperature (based on skin temperature) from 33.5-34.5ºC. This temperature range can be recommended as therapeutically useful for a wide range of conditions treated by physiotherapists in the pool.
- Humidity control.
- Access to pool and environs.
- Change facilities.
- Size and shape of pool.
- Depth.
- Water purification methods.
- In-pool equipment (eg, jets, walking rails, ramps).
- Lighting.
- Flotation and exercise equipment.
- Emergency equipment.

New purpose built hydrotherapy facilities should take into consideration Australian Standard for Hydrotherapy Pools AS3979-2006 and Australian Standard for Design for Access and Mobility AS1428.1-2009. Local councils will have their own building requirements and in some places these standards must be followed.

Documentation of variations from the standards is recommended.

Physiotherapists involved in pool design should ensure these standards are brought to the attention of appropriate personnel. Individual pool design will depend on a variety of factors including target population and budget.

1.2.5 Slips and Falls Management in Hydrotherapy Pool Facilities

Pool environments with wet and dry areas can pose an increased falls risk to many clients. Aquatic physiotherapy services require multiple strategies to reduce the risk of slips and falls. Hydrotherapy pools have wet areas around the pool deck and in the shower and change room facilities. These areas may be accessed by people with impaired mobility and balance. Falls minimisation policies should be venue specific and include risk assessments and management plans, documented records

of falls and slip/falls audits. Policies and procedures should be updated at accepted defined intervals and as new procedures are developed.

Each client requires a risk assessment of their level of independence in and around the pool area any identified risks need to be mitigated through the implementation of appropriate prevention strategies.

Assessment should include

- Weight bearing status
- Gait aids used
- Assistance or supervision required with transfers, including mode of pool entry
- Assistance or supervision required with dressing. Where assistance with dressing is necessary further consultation with the client/family/carers to define exact needs or an outward referral for an Occupational Therapy dressing assessment may be warranted.
- Where used, assessment and advice on appropriate footwear
- Falls history in clients with impaired sensation, compromised visual or vestibular function, balance deficits and limited strength which may impact on transfers or mobility.

All clients should be orientated to the pool areas including:

- Walkways
- Pool access
- Ramps
- Steps
- Hoist
- Change rooms
- Showers
- Handrails
- Pool depth.

No clients should enter the pool area until instructed by staff.

Pool rules should include no running, jumping or diving into the pool.

Flooring should be reviewed for areas that may require anti-slip flooring, non-slip tape or floor mats. Check mats for trip hazards.

Clients should avoid using talcum powder, shampoo and conditioner in the change rooms as they can make the floors slippery.

Clients should be advised to take extra care with walking aids on wet surfaces.

Clients should be advised to use handrails when entering or exiting using the steps or ramps.

Clients can be supervised with showering briefly on the pool concourse if possible or showering at home if the appropriate level of supervision or assistance is not available in the change/ rooms.

1.2.6 Equipment Aids

For clients with impaired balance or a history of falls a shower chair may be used when showering and dressing.

Rubber stoppers on walking aids should be checked and replaced if required.

For clients that use single point sticks or crutches, it may be useful to have a walking frame available for them to use in the pool area if required.

1.2.7 Signage

Signage should be used in change rooms as well as the pool deck. Appropriate signage may include:

- Caution wet floors
- Do not enter the pool area without staff present

Further information and guidance on pool signage can be accessed through the Royal Life Saving Society or equivalent organisation.

1.2.8 Footwear

Pool hygiene literature and various government codes of practice encourage patrons to wear footwear at pool facilities. This is as an infection control measure to help prevent tinea and plantar warts. Clients with some specific conditions are at increased risk of infection and complications from these infections (refer to Appendix III - Tinea Pedis and Plantar Warts*).* The literature also suggests that for older people, barefoot walking has been shown to increase their falls risk.

The use of footwear is a common strategy used in aquatic facilities to minimise the risk of falls events. When used, footwear should improve gait dynamics and be well managed by the client. The types of footwear may include plastic shoes or sandals, aqua shoes, grip socks and thongs/flip-flops. When providing advice on footwear the physiotherapist should consider factors such as:

- Footwear age, cleanliness and fit
- Slips resistance of footwear on the pool concourse and change area floors
- Capability of the client to get their footwear on/off, possibly at the pool edge
- Patient past history eg, bunions, peripheral neuropathy, hemiparesis, etc.
- Subjective comfort and preference

An individual risk assessment and advice on footwear for each client should be completed. If footwear is worn, they are to be placed tidily away from the entrance to the pool to prevent the possibility of other clients tripping over them.

Other Footwear

For some high falls risk clients their usual footwear may be the most appropriate option (eg, low heels, soles with grip). They should be encouraged to use these shoes in the pool facility and only remove them just prior to entering the pool.

References

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2: ACCEPTABLE TRAINING LEVELS OF PEOPLE WHO WORK IN HYDROTHERAPY POOLS

All pool workers shall have adequate education and training to ensure implementation of high standards and safety of the client at all times.

The following list of pool workers and suggested minimum standards/training is designed to assist physiotherapists and other professionals who are pool managers to develop acceptable accreditation and credentialing procedures

2.1 Physiotherapists: Aquatic Physiotherapy/Hydrotherapy

Aquatic physiotherapy is physiotherapy in a specific environment with knowledge of physics, physiology, assessment or screening and safety, clinical reasoning, evidence based practice and specific legislative requirements particularly related to water quality and infection control. The key areas of knowledge relate to managing risks for safe practice and knowledge and skills for effective practice.

2.1.1 Entry-level education in Universities for Physiotherapists courses at Bachelor, Honours and Graduate Entry Masters level

The APA Aquatic Physiotherapy group recognises very widely varying entry-level education of direct teaching in aquatic physiotherapy. Some courses offer up to six hours of theory and some offer up to 14 hours of practical sessions. Some courses offer little or no direct teaching in aquatic physiotherapy. Graduate physiotherapists are required to work unsupervised in both hospital, community and private settings in aquatic physiotherapy in Australia. It is, therefore important that entry-level courses provide the key areas of knowledge and skills for their students.

It is suggested that the following learning outcomes should be included in entry-level physiotherapy courses to cover safe and effective practice

1. To be able to describe the hydrostatic and hydrodynamic principles related to buoyancy and drag and give an example of how these influence:
    a. weight bearing with standing, closed chain exercise and walking at different depths
    b. floating
    c. load with open and closed chain exercise in water
2. To outline the major physiological effects of thermo-neutral immersion on the cardio-vascular, respiratory, thermoregulatory and autonomic nervous systems:
3. To summarise the key principles for reducing risk to the client including
    a. screening for co-morbidities
    b. infection control
    c. falls prevention in the hydrotherapy environment including change rooms and pool concourse
    d. pool rescue and dealing with an emergency
4. Modifying an aquatic physiotherapy session for a person with cardiac and respiratory co-morbidities to reduce the physiological load or stress of the session
5. To outline the evidence for aquatic exercise
6. To design an aquatic physiotherapy treatment plan for a musculoskeletal or neurological case study

Ideally this training should include both theory and practical sessions.

2.1.2 Graduate level skills and knowledge

The Australian Standards for Physiotherapy outline safe and effective practice for physiotherapy interventions. The Hydrotherapy pool is recognised as a high risk environment. There are many additional considerations related to client or staff safety.

For staff new to working in aquatic physiotherapy, consideration related to their level of skills and knowledge should be assessed and an appropriate level of support should be provided to ensure they are able to practice safely, effectively and independently. This can be provided through professional development courses, mentoring and supervision or in-service training.

All aquatic physiotherapists should be able to identify risks and understand how to manage them. Risk management considerations relate to the environment or the client and can include:

- Pool water quality and chemical testing, chemical storage and additions
- Infection control and screening of clients
- Orientation of clients
- Monitoring and supervision of clients poolside and in the water
- Intensity of exercise in a heated pool, fatigue and dehydration
- Load with exercise in the pool
- Access to the pool
- Wet environments, showers and changing rooms, slips and falls
- Dealing with a medical emergency
- Equipment
- Skin care
- Security of the pool area

In addition to risk management, key areas of skills and knowledge in aquatic physiotherapy include:

1. Hydrostatics and hydrodynamics relative density
    - Buoyancy
    - Drag
    - Closed chain exercise and weight-bearing load
    - Open chain forces on limbs and trunk
    - Metacentre
    - Rotational movement in water
2. Physiology of immersion
    - Cardiovascular, respiratory, thermoregulatory and autonomic implications
    - Cardiovascular fitness
3. Handling skills and manual techniques
    - Safe support of patient in the water
    - Understanding of breathing control
    - Effective application of manual techniques in the water
4. Aquatic physiotherapy and exercise
5. Evidence based practice and clinical reasoning
6. Screening, risk management and emergency procedures
    - Precautions, contraindications and screening process
    - Identification and management of risk in the environment
    - Observation and planning
    - Pool rescue and emergency situations
7. Pool management

In addition to the previously outlined knowledge and skills, physiotherapists who manage hydrotherapy pools must also have knowledge of:

- Safety in the pool environment.
- Water balance and sanitisation.

- Pool cleaning and maintenance.
- Pool plant operations.
- Safe storage and handling of chemicals.
- Occupational health and safety requirements
- Completing and managing risks
- The ability to teach and supervise ancillary staff, volunteers and others

In some workplaces it may be appropriate to identify competencies in aquatic physiotherapy that are included in a more structured orientation and professional development program including reading, discussion, in-service training and supervision.

An example of an orientation checklist may include the following:

- Orientation to the area
    - Pool alarms, telephones, oxygen and evacuation equipment
    - Office, folders, documentation, exercise programs, resources, types of groups and local pool information
    - Staff change room
    - Location of equipment room, plant room, MSDS, sick bags, mops, flooring, patient change rooms, pool chemistry testing kit
- Occupational Health and Safety and Policy and Procedures
    - Pool rescue
    - Assessment and documentation (forms and recording)
    - Screening and Infection control
    - Other (including security of the area and key to hydrotherapy area)
- Awareness and understanding of patient orientation to aquatic physiotherapy including:
    - Unwell/dizziness, rehydration, skin care, foot care, anxiety / fear of water
- Awareness and understanding of checking (as appropriate) pain, Blood Glucose Levels, wound dressings, footwear poolside prior to every session
- Awareness and understanding of level of supervision in the pool, staff: patient ratio
- Awareness and understanding of own skin care, rehydration, monitoring fatigue etc.
- Completed pool rescue session
- Completed CPR training in the last 12 months
- Awareness and understanding of pool chemistry
- Awareness and understanding of the manual handling and risks in the Hydrotherapy area
    - use of the hoist for transfer of a person in and out of pool
    - moving a dependent patient in the pool including higher load treatment techniques
    - putting water plinth in and out of pool
- Communication – with other treating staff, progressions, planning discharge, leave cover

An example of a list of competencies may include the following:

- Skills and knowledge
    - To be able to list and describe the major physiological principles that influence the human body on immersion.
    - To be able to list and describe the physics related to buoyancy, drag, metacentre, relative density and hydrostatic pressure.
- Risk management
    - To be able to outline procedures relating to screening, precautions, safety of clients and infection control.
    - To be able to demonstrate their understanding of duty of care and be able to list the safety issues that will directly affect their clinical practice and the safety of their patient in the aquatic environment.

    - To be able to demonstrate the concepts of varied weight bearing at different depths and the effect of walking in the pool and closed chain exercises related to restricted weight bearing
    - To be able to describe the importance of breath control and movement control related to water safety (and when a client is independent in changing position in the water and with water safety)
- Load and physics
    - To be able to demonstrate the concepts of movement facilitation or strengthening related to the technique or exercise being buoyancy assisted, buoyancy counter-balanced or buoyancy resisted.
    - To be able to demonstrate the concepts of varied weight bearing at different depths and the effect of walking in the pool and closed chain exercises for strengthening, endurance or control
    - To be able to relate physics/hydrodynamic principles to common stretching techniques and thus to utilise the properties of water to assist these techniques.
    - To be able to practice a number of specific aquatic physiotherapy techniques including manual strengthening techniques, rotation control and passive joint mobilisation
- Communication
    - Identifying and demonstrating appropriate frequency of communication with treating land physiotherapist and with leave cover or handovers
- Provision of Care
    - To be able to formulate a treatment plan, use appropriate assessment measures and discharge plan for a variety of patient types.
    - To be able to analyse movement and use objective measures in the pool.
    - To be able to define movement in the water related to sagittal, transverse, longitudinal and combined rotations

2.1.4 Continuing Professional Development

All physiotherapists working in any area of hydrotherapy shall take responsibility for their own postgraduate education and training consistent with the Physiotherapy Board of Australia requirement on mandatory continuing professional development and be aware of new developments in the area.

2.2 Standards of training for other hydrotherapy pool workers

Accreditation or credentialing process

Physiotherapists (and other professionals) who manage hydrotherapy pools have a responsibility to ensure that all pool workers have appropriate qualifications and credentials to minimize risks and legal implications.

Hospitals, institutions and private physiotherapy practices may participate in an accreditation process. It is recommended that all clinical staff, whether that be aquatic physiotherapists, assistants, carers and volunteers or exercise physiologists swim teachers and aquatic fitness instructors, become involved in this process.

Protocols are encouraged that monitor pool workers, ensuring basic training and ongoing professional development as well as yearly renewable of CPR qualifications, insurance and annual attendance at appropriate pool rescue in-services.

It is also essential that any person who works in a hydrotherapy pool has adequate insurance cover.

2.2.1 Hydrotherapy Assistants

Hydrotherapy assistants will often be responsible for supervising clients in a pool during independent exercise sessions and therefore may be responsible for recognising risk situations and infection control problems. Knowledge in these areas and in the screening data (refer to Appendix I) is essential. In some states, training is available for physiotherapy assistants and this training or similar (eg, AUSTSWIM disabled extension course or equivalent) is recommended if they have no previous medical or aquatic background. Training in Allied Health Assistant Courses (Certificate 4) may also be available at some institutions including units on how to deliver and monitor a hydrotherapy program. In-service training for institution specific needs is recommended (eg, lifting, manual handling, risk management and screening). The APA has a position statement on working with a physiotherapy assistant or other support workers. CPR qualification (yearly renewable) and institution specific pool rescue courses are essential, if working in water. Separate professional indemnity insurance is usually not necessary if they are employed by the institution.

2.2.2 Individual Carers

It is recommended that when a client requires a carer, each carer should be trained in handling their own client, have current CPR and be at least a moderate swimmer. It is not adequate for one carer to teach another carer when they are looking after a totally dependent client. Each new carer should be taught about their specific client by an appropriately qualified aquatic professional. With many disabilities, training in client handling and carrying out a prescribed exercise program is ideally provided by a physiotherapist who can assess the individual, design a program for their therapeutic and safety needs and teach the program to the carer. The program should be reviewed at intervals and upgraded appropriately by the physiotherapist. Where inappropriate handling is observed in the pool environment, it could be recommended that the carer have further training.

Carers or their organisations would need appropriate insurance.

2.2.3 Volunteers

It is recognised that in some states, systems of volunteer leaders for water exercise classes have been established (particularly in the areas of arthritis, lymphoedema and asthma). The APA does not recommend this, as most volunteers do not meet the minimal training standards expected of other pool professionals. It is recommended that volunteer leader training progress towards participants having a basic (water) exercise qualification. It is advisable that volunteer leaders should also have CPR qualifications and attend pool rescue training. Parents and others may work as volunteer carers in special school programs.

Volunteers may also be involved as pool supervisors and external observers. In this situation institution specific pool rescue training and a current CPR qualification is strongly recommended. As volunteers are not exempt from litigation, insurance would need to be reviewed (refer to 1.1).

3: RESPONSIBILITIES OF THE PHYSIOTHERAPIST

Physiotherapists conducting aquatic physiotherapy/water exercise/therapeutic swimming shall comply with all APA ethical principles, policies and standards, and the relevant regulations and requirements of statutory authorities.

3.1 Professional Conduct

All physiotherapists shall abide by the Physiotherapy Board of Australia Code of Conduct and be aware of the legal and ethical responsibilities relating to working in a hydrotherapy pool.

3.2 Clinical Management

3.2.1 Assessment and reassessment for aquatic physiotherapy

In addition to basic screening, all potential clients must have a land based physiotherapy assessment prior to entering the water. Some referring agencies/persons may not be familiar with the benefits of, and precautions for, activities in a hydrotherapy pool. It is therefore the physiotherapist's responsibility to ascertain client suitability. For some clients, it will be necessary to assess water safety and the ability to regain a safe breathing position. This can only be carried out in the water *(*refer to Guideline 1.1.9*).* It is not sufficient that a client tell the physiotherapist that they are water safe, and practical observation of this minimises possible risks. Both land and water assessments are necessary to ensure appropriate decisions are made regarding:

- Diagnosis
- Treatment
- Outcome measures
- Reassessment/program review
- Exercise prescription/swimming
- Suitability for independent water exercise.

Some reassessment will occur every session but the type and frequency of measures will be dependent on the client's condition and progress and will include both land and water assessment techniques. All assessment, reassessment and screening data must be recorded.

3.2.2 Aquatic Physiotherapy records

Documentation should include

- Contact details
- Next of kin
- Source of referral
- Screening data *(*refer to Appendix I*)* and initial assessment
- Specific intervention, treatment and outcomes
- Swimmer, non-swimmer, water confidence
- Special precautions (eg, flaccidity, painful joints, weight- bearing status)
- Assistance required on land including transfers, dressing and general mobility
- Selected mode of entry/exit to and from pool.

Client confidentiality is essential, including specifics of medical condition and intervention. Completion of a client record for pool management contains only information relevant to safety of the client. *(*refer to Guidelines 1.1.2 and 1.1.8 and Appendix I*).*

3.3 Quality Management Activities

Quality management activities should be implemented in accordance with accepted clinical practice.

APPENDIX I: SCREENING PRIOR TO ENTERING HYDROTHERAPY POOL

With the continuing advancement of knowledge in hydrotherapy, infection control and specific benefits of aquatic physiotherapy and water exercise, some persons previously considered contraindicated to pool therapy can now be treated safely. The following areas should be reviewed if appropriate to the client group:

Cardiovascular System

- Cardiac conditions
- Blood pressure
- Peripheral vascular disease.

Respiratory System

- Chronic and acute diseases
- Shortness of breath at rest or on exertion
- Vital capacity
- Tracheostomy
- Respiratory tract infections
- Pseudomonas aeruginosa.

Central Nervous System

- Epilepsy/fitting/history of seizures
- Swallowing defects, abnormal movements
- Fluctuating tone
- High dependency clients.

Gastro-Intestinal Tract

- Faecal incontinence
- Diarrhoea, gastroenteritis
- Cryptosporidium
- Colostomies
- Noroviruses.

Genito-Urinary Tract

- Urinary incontinence
- Infection
- Discharges
- Menstruation
- Pregnancy.

Infectious Conditions

- Airborne infections
- Herpes simplex
- AIDS, Hepatitis
- Methicillin-resistant Staphylococcus aureus
- Vancomycin-resistant Enterococcus
- Hepatitis A
- Blood Borne infections:
    - Hepatitis B
    - Hepatitis C
    - HIV/AIDS/

Skin

- Surgical wounds, open wounds
- Tracking bone sinus
- External fixators
- Altered sensation
- Rashes
- Chemical sensitivity.

Feet

- Tinea
- Plantar warts.

Eyes and Ears

- Visual impairment
- Contact lenses
- Hearing impairment
- Infections
- Tubal implants/Grommets

Other Conditions

- Acute inflammatory conditions
- Heat sensitive conditions (multiple sclerosis, lymphoedema)
- Radiotherapy
- Morbid obesity
- Fear of water
- Clients who are intoxicated
- Clients who have psychiatric problems
- Behavioural/cognitive problems
- Spinal cord injury (especially T6 and above).

Other information not covered elsewhere in assessment

- Swimmer, non-swimmer, water confidence
- Special precautions (eg, painful joints, weight bearing status)
- General mobility on land, assistance required for dressing or transfers
- Mode of entry to pool
- Diabetes
- Lymphoedema.

However, each potential client must be individually assessed. Then, taking the person's condition and the physiological effects of immersion into consideration, an informed decision can be made as to whether hydrotherapy treatment/activity is contraindicated or whether adequate precautions can be taken to allow the client to be safely and effectively managed in the aquatic environment.

Where a high risk for the client and/or other pool users exists, consultation with other informed professionals may be required. In particular, regarding infection control, staff and medical practitioners/specialists may be consulted. Consultation with peers working with similar clients can also be of value where uncertainty exists. If unsure, never put yourself or the client at risk.

Email info@physiotherapy.asn.au for a copy of the Aquatic Physiotherapy Assessment and Aquatic Physiotherapy Screen Forms.

APPENDIX II: RISK MANAGEMENT

All aquatic physiotherapists should be able to identify risks and understand how to manage them. Risk management considerations relate to the environment, staff or the client and can include:

- Pool water quality and chemical testing, chemical storage and additions
- Infection control and screening of clients
- Orientation of clients
- Monitoring and supervision of clients poolside and in the water
- Intensity of exercise in a heated pool, fatigue and dehydration
- Load with exercise in the pool
- Access to the pool
- Wet environments, showers and changing rooms, slips and falls
- Dealing with a medical emergency
- Equipment
- Skin care
- Security of the pool area

Each workplace will require different risk identification and management. The risk management process starts with a structured format of risk or hazard identification, consideration of how the risk could be eliminated, managed or controlled implementation of these strategies and then reassessment to see how successful these strategies have been. Reporting and review of incidents in the Hydrotherapy environment forms part of managing risk as does the annual review of policy and procedures.

Useful References

Australian Government, National Health and Medical Research Council. Australian Guidelines for the Prevention and Control of Infection in the Healthcare Setting (2010). Overview of risk management in infection prevention and control

The Australian/New Zealand Standard on Risk Management AS/NZS ISO 31000:2009

APPENDIX III: HYGIENE AND INFECTION CONTROL

All physiotherapists should take stringent precautions against infection, to protect their clients, their staff and themselves. It is important that physiotherapists keep up to date with national infection control guidelines and implement them in their practice.

Infection control procedures should be developed using the Australian Guidelines for the Prevention and Control of Infection in Healthcare (National Health and Medical Research Council, 2010). The information in this document has been developed based on these guidelines, as well as other relevant guidelines including the World Health Organisation-Guidelines for Safe Recreational Waters (2006) and information from the Centres for Disease Control and Prevention (CDC). Australian State Government pool management codes of practice have also been included. Where possible, literature that supports the recommendations has been used. Where there is a lack of evidence, peer advice and consensus by expert aquatic physiotherapists and other health practitioners has been sought.

Appropriate infection control procedures should be implemented for all persons entering the pool and/or pool environment. Infection control procedures include:

- Standard and transmission-based infection prevention and control strategies as part of day-to-day practice such as following basic hand hygiene, respiratory hygiene and cough etiquette
- Pre-screening of pool participants and implementation of any precautions or special strategies relevant to their conditions
- Regular cleaning of pool, pool environs and equipment
- Management of pool chemistry and pool testing
- Microbiological testing
- Adequate water filtration
- Adequate air ventilation
- Policies for faecal accidents and blood or body fluid spills
- Use of appropriate equipment and clothing
- Showering before pool sessions
- Environmental management
- Training of staff and accurate documentation
- Education of people entering the pool and/or pool environment
- Relevant signage
- Risk management protocols.

(also refer to Appendix V)

References

Australian Government, National Health and Medical Research Council. Australian Guidelines for the Prevention and Control of Infection in the Healthcare Setting

World Health Organisation. Water Sanitation and Health (WSH) - Guidelines for safe recreational waters. Volume 2 - Swimming pools and other similar recreational water environments (2006)

Centres for Disease Control and Prevention

Infectious Conditions

Pseudomonas Aeruginosa

Pseudomonas Aeruginosa (PA) is an important opportunistic pathogen. It is found in water, soil and other places that contain moisture and also in hospital and medical environments (eg in respiratory devices/equipment, oxygen masks, catheters and dialysis tubing). It can cause a wide variety of infections. PA tends to accumulate in biofilms which is more difficult for chlorine to act on due to its protective outer layer. This is often identified as a scum line on the pool sides or slimy feel of equipment. (refer to Appendix V: Pool equipment used in treatment).

Symptoms

PA can affect any part of the body. Common infections include:

- Folliculitis (Pustular rash), Otitis Externa (Swimmers Ear), urinary and respiratory tract infections, wound and cornea (eye) infections, burning eyes and fever
- In immunosuppressed patients and Cystic Fibrosis patients it can cause much more serious illnesses.

Transmission

- Contact or droplet transmission
- Biofilms created by infected persons skin shedding and sweat secretions
- Staff and clients may carry organisms on their hands and feet
- Warm/damp environments i.e. decks, drains, floors, pool walls
- May develop in biofilms in equipment (ie, in filters that are inadequately maintained)
- High bather loads can reduce the level of residual pool disinfectant and increase the risk of organism infection and growth.

Recommendations

- Shower prior to pool entry
- Maintain appropriate levels of pool disinfection
- Frequently monitor and adjust for varying bather loads
- Ensure regular, thorough cleaning of pool equipment and environment including pool surfaces, surrounds, railings and drains and pipework (refer to Appendix V: Pool and Environmental Cleaning and Maintenance and Pool Equipment use in Treatment).
- Dry out pool equipment after use and store in a dry environment.

Discussion

The international literature shows variations in the rates of PA found in different pools. This probably reflects different standards and practices in relation to pool chemistry, environmental management, client pre-screening and monitoring and adjustment to bather loads. Well operated pools should normally not contain *Pseudomonas aeruginosa*,

References

Barben J, Hafen G, Schmid J; Swiss Paediatric Respiratory Research Group (2005) Pseudomonas aeruginosa in public swimming pools and bathroom water of patients with cystic fibrosis. *Journal of Cystic Fibrosis*. December; 4(4):227-31

Government of Western Australia, Department of Health. Facts about Pseudomonas aeruginosa in Swimming and Spa Pools (2006)

Lutz J, Lee J (2011) Prevalence and Antimicrobial-Resistance of Pseudomonas aeruginosa in Swimming Pools and Hot Tubs. *International Journal of Environmental Research and Public Health* v8(2): 554-564

Moore J, Heaney N, Millar B, Crowe M, Elborn J (2002) Incidence of Pseudomonas aeruginosa in recreational and hydrotherapy pools. *Communicable Disease and Public Health*. 5(1): 23-6

Tirodimos I, Arvanitidou M, Dardavessis T, Bisiklis A, Alexiou-Daniil (2010) Prevalence and antibiotic resistance of Pseudomonas aeruginosa isolated from swimming pools in northern Greece. *Eastern Mediterranean Health Journal*. 16 (7):783-88

World Health Organisation. Water Sanitation and Health (WSH) - Guidelines for safe recreational waters. Volume 2 - Swimming pools and other similar recreational water environments (2006). Chapter 3, Microbial Hazards. 3.4.2 Pseudomonas aeruginosa

Ear Infections

Otitis Externa - Swimmer's Ear

Otitis Externa (OE) is an infection or inflammation of the canal between the ear drum and the outer ear. The inflammation can be secondary to eczema with no infection, or can be caused by an active bacterial or fungal infection. Acute OE is predominantly a microbiological infection that occurs suddenly, rapidly worsens and becomes very painful. The most common bacterial pathogens that cause OE are pseudomonas aeruginosa and Staphylococcus Aureus (SA).

Symptoms

- Pain which may be worsened by tugging the ear or turning the head, itchiness of the external canal, redness and swelling of the ear, discharge from the ear, reduced hearing or a buzzing or humming sensation.

Potential Complications

- Chronic OE, narrowing of the ear canal, reduced hearing or facial infection
- Malignant Otitis Externa (MOE) – this uncommon condition should be regarded as a medical emergency. It is most likely to occur in elderly diabetic or immunosuppressed patients. MOE is the spread of infection to the bones of the ear canal and lower part of the skull. Without treatment it may reach the brain or the cranial nerves. Patients may complain of symptoms such as dizziness, muscle facial weakness, hoarseness, swelling around the ear.

Transmission

- Water can carry bacteria and fungi into the ear canal. Water remaining in the ear can create an ideal environment for organism growth. Infection can also be introduced by putting fingers/cotton buds in the ear.

Causes

- Eczema of the ear canal can cause splits or cracks and that may allow organisms to enter
- Mechanical damage can be created by ear cleaning with cotton buds and finger nails, causing damage to the delicate ear canal tissue
- Chemical irritation of the ear canal can occur with hairsprays, shampoos and hair dyes
- Middle ear infections can trigger inflammation/infection in the ear canal

- Diabetic patients are more prone to OE due to more alkaline conditions in their ear canals
- Those with narrow ear canals are more prone to OE as it is harder for their ears to dry out
- Swimming, hair washing, perspiration and high humidity can lead to excessive moisture that elevates the pH and removes the cerumen (ear wax). Once the protective cerumen is removed, keratin debris absorbs the water creating a medium for bacterial or fungal growth
- Individuals that spend a lot of time in the water (ie, competitive swimmers, regular pool users, surfers) are prone to OE.

Recommendations

- Dry ears thoroughly after swimming or bathing-small battery ear dryers are available, alternatively use a hair dryer set on cool/low
- For clients with current or recurrent problems, earplugs, ear bands, swimming caps may be used if immersing the head eg swimming, although evidence suggests that wearing head apparel may be no more protective than wearing no apparel. With head out of water activities simple measures to stop splash, such as a head band, shower cap or scarf may be appropriate
- Avoid inserting anything in the ear canal
- Ensure pools have adequate disinfectant and PH levels.

Commercial ear drying agents may be useful but advice should be sought from a medical professional to ensure a solution of the correct PH is used. Some studies suggest drops may make the situation worse.

- Use appropriately prescribed medications/preparations
- Once over the acute stage hydrotherapy need not be avoided if a client has OE. The majority of hydrotherapy is head out of water and even in children with disabilities very effective treatment can be performed without immersion of the ears. Swimming and diving may be avoided for longer. Documented risks are associated with head under water swimming and other activities involving water entering the ear (eg, showering and hair washing). In the majority of cases hydrotherapy is a head out of water activity and as such appears to pose little or no risk
- Any clients including those with diabetes or immunosuppressed clients who complain of earache or swelling in the ear canal should immediately seek medical advice.

Serous Otitis Media – Glue Ear

Serous Otitis Media (SOM) usually develops after an infection in the middle ear which leads to a build-up of fluid and pus in the middle ear. Children are particularly prone to these ear infections due to recurrent colds and blocked Eustachian tubes.

Recommendations

- Exclude from pool while unwell, febrile or if any discharge.
- There are varying opinions on whether a child with grommets can swim, but there is evidence to support swimming as an option, if the correct protective apparel is worn (eg, ear plugs, swimming cap or ear bands) though evidence for the benefit of headwear varies also. Liaise with the treating doctor for appropriate management.
- Swimming would not usually be recommended until after the first week post operatively. This should be discussed with the treating doctor. Diving is usually not allowed after the insertion of grommets.
- For aquatic physiotherapy treatment it is usually unnecessary to immerse the head so treatment can continue but it may still be prudent to wear protective splash resistant apparel.

Additional Information

- State Government Victoria. Better Health Channel. Ear Infections.
- State Government Victoria. Better Health Channel. Swimmer's Ear
- The Children's Hospital at Westmead. Glue Ear and Grommets

References

Giannoni C (2000) Swimming With Tympanostomy Tubes. *Arch Otolaryngol Head Neck Surg.*126(12):1507-1508

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Centers for Disease Control and Prevention. Swimmer's Ear (Otitis Externa)

State Government Victoria. Better Health Channel. Ear Infections

Gastrointestinal Illnesses

Cryptosporidium

Cryptosporidium is a gastrointestinal illness caused by parasites. Unlike bacterial pathogens cryptosporidium oocysts are resistant to chlorine disinfection and can survive for days in appropriately maintained swimming pools. In immunosuppressed patients such as HIV/AIDS, cryptosporidium can lead to prolonged illness and can be life threatening.

Symptoms

- Watery diarrhoea, cramping abdominal pain, bloating, vomiting, fever.

Transmission

- Transmission occurs via faecal-oral route (ie, person-to-person contact or via ingestion of contaminated foods and water). Oocysts excretion may persist for several weeks after symptoms have resolved.

Environmental Treatment

- The Environmental Health Department of the Victorian Government has produced a useful document for the prevention and management of cryptosporidium outbreaks (2010). It includes definitions, prevention strategies, outbreak measures and managing pools with non-toilet trained infants
- Cryptosporidium and Cryptosporidiosis-Information for swimming pool managers.

Infants and Toddlers

- Non-toilet trained infants pose an increased risk of pool contamination. There is limited evidence that shows swimming nappies can prevent faeces from entering the pool. The Pool Operators Handbook, Health and Hygiene chapter has specific recommendations on management of non-toilet trained infants and children's pool design and filtration.

Recommendations

- A multifaceted approach for prevention of Cryptosporidium must include pre-swim showering for all persons entering the pool, client screening, adequate pool disinfection, maintenance of pool operations, behavioural factors, faecal accident policies, infants to wear tight fitting swim nappies, exclusion period of two weeks after diarrhoea ceases and appropriate signage. If watery diarrhoea lasts for more than a few days advise patients to contact their doctor.

Additional Information

- Victorian Department of Health. Infectious Diseases Epidemiology and Surveillance. Blue book – Guidelines for the control of infectious diseases

References

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Department of Health, Victoria. Cryptosporidium and Cryptosporidiosis - Information for swimming pool managers

Department of Health, Victoria. Pool operators' handbook

Department of Health, Victoria. Infectious Diseases Epidemiology and Surveillance. Blue book – Guidelines for the control of infectious diseases (Cryptosporidiosis)

World Health Organisation. Water Sanitation and Health (WSH) - Guidelines for safe recreational waters. Volume 2 - Swimming pools and other similar recreational water environments (2006). Chapter 3 Microbial Hazards. 3.3 Faecally-derived protozoa

Noroviruses

Noroviruses are a group of highly contagious viruses that cause gastroenteritis, an inflammation of the lining of the stomach and intestines. Illness is often characterised by sudden onset of vomiting and/or diarrhoea and can lead to dehydration. The acute phase usually lasts 1-3 days. Young children, the elderly and people who have other medical problems are most at risk for more severe infection. Diarrhoea is more common in children and vomiting is more common in adults. Noroviruses are more resistant to chlorine than bacteria.

Transmission

- Contaminated food
- Person-to-person contact
- Contaminated environmental surfaces
- Airborne droplets of vomitus
- Contaminated recreational water – bathers may continue to shed infectious pathogens (in skin, sweat and saliva) for days or weeks after their symptoms have ceased.

Recommendations

- A person with diarrhoea should be excluded from the pool for at least two weeks after their symptoms have ceased
- Ensure thorough showering with soap/skin wash prior to entering the pool
- During outbreaks of gastrointestinal illness in the community, extra signage may be required to offer advice to pool users including exclusion period, pre-swim showering using soap/skin wash, hand washing after using the toilet and using appropriate nappy changing facilities. Nappies are not to be changed beside the pool.
- Ensure well maintained and cleaned environment and pool chemistry.

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World Health Organisation. Water Sanitation and Health (WSH) - Guidelines for safe recreational waters. Volume 2 - Swimming pools and other similar recreational water environments (2006). Chapter 3 Microbial Hazards (Faecally-derived viruses)

Blood Borne Infections

Hepatitis B

Hepatitis B is caused by the HBV virus. Severity of symptoms can vary significantly with each individual. Hepatitis B is a major cause of chronic hepatitis, cirrhosis and hepatocellular cancer.

Transmission

- Hepatitis B can be found in blood and almost all body secretions and fluids. Hepatitis B is most commonly spread by; sexual contact, sharing needles, needle stick injury, reuse of unsterilized equipment, sharing personal items such as razors.
- Hepatitis B is NOT spread by contaminated food and water and cannot be spread through casual or social contact such as sneezing or coughing.
- These patients are infective for the period of the acute infection and during the chronic carrier state which may persist for life (chronic hepatitis B).

Symptoms

- For some individuals there are very few symptoms and many individuals are unaware that they have Hepatitis B. For others with Hepatitis B they can become seriously ill. Children tend to have milder symptoms.

Recommendations

- Monitor and manage any side effects from Hepatitis B treatment.
- Completely cover all wounds with a water proof dressing.
- Encourage staff and others (see additional information below) to be vaccinated against Hepatitis B
- All females utilising the pool, irrespective of known blood borne virus status, should use internal protection (ie, tampons) during menstruation.
- Develop and implement *blood and body fluid spill* policies.
- Maintain appropriate pool chemistry.

References

Centers for Disease Control and Prevention. Hepatitis in Healthcare Settings

Alfred Health. HIV, Hepatitis and STI Education and Resource Centre

Hepatitis Australia. About the Hep B Virus

Department of Health, Victoria. Infectious Diseases Epidemiology and Surveillance. Blue book – Guidelines for the control of infectious diseases (Hepatitis B)

Department of Health, Victoria. Infectious Diseases Epidemiology and Surveillance. (Hepatitis B – the facts)

Hepatitis C

Hepatitis C is caused by the HCV virus which causes inflammation of the liver and liver disease. Most infections of HCV are asymptomatic. If symptoms are present they are usually mild such as dark urine, jaundice, flu-like illness. After six months if HCV is still present the condition is referred to as chronic hepatitis C.

Transmission

- Hepatitis C is transmitted by blood-to-blood contact (ie, IV drug users, tattooing, ear and body piercing with non-sterile equipment, needle stick injuries).

Symptoms

- Symptoms of chronic Hepatitis C may include; lethargy, nausea and vomiting, flu-like symptoms, pain in joints.

Recommendations

- Monitor and manage any side effects from Hepatitis C treatment
- Completely cover all wounds with a water proof dressing (refer to Appendix III: Wounds)
- All females utilizing the pool, irrespective of known blood borne virus status, should use internal protection (ie, tampons) during menstruation.
- Develop and implement *blood and body fluid spill* policies.
- Maintain appropriate pool chemistry.
- At present there is no vaccine available for Hepatitis C

Additional Information

- Department of Health, Victoria. Infectious Diseases Epidemiology and Surveillance. Blue book – Guidelines for the control of infectious diseases (Hepatitis C – the facts).
- Department of Health, Victoria. Infectious Diseases Epidemiology and Surveillance. Blue book – Guidelines for the control of infectious diseases (Hepatitis C)

References

Centers for Disease Control and Prevention. Hepatitis in Healthcare Settings

Alfred Health. HIV, Hepatitis and STI Education and Resource Centre

Hepatitis Australia. About Hepatitis C

Department of Health, Victoria. Infectious Diseases Epidemiology and Surveillance. Blue book – Guidelines for the control of infectious diseases (Human immunodeficiency virus or acquired immunodeficiency syndrome)

HIV/AIDS

Human immunodeficiency virus (HIV) is the chronic virus that can lead to acquired immune deficiency syndrome (AIDS). HIV destroys the blood cells that help the body fight disease, adversely affecting the immune system. Persons with HIV/AIDS are therefore at risk from many types of infections and illnesses. AIDS is a severe life-threatening disorder that represents the late clinical stage of infection with HIV. Diseases that can occur in the AIDS stage include; cryptosporidiosis, chronic herpes simplex infection, Kaposi's sarcoma, pneumocystis jiroveci pneumonia.

Mode of Transmission

Blood-to-blood contact and via infected body fluids such as:

- Sexual exposure via infected body fluids, infected blood products, breastfeeding by HIV positive mother, sharps injury
- HIV is not transmitted via swimming pools.

Symptoms

- Symptoms of HIV are similar to a variety of other illnesses and infections. Individuals that have been put at risk of getting HIV should consult with their doctor.

  Further information: AIDS*info* fact sheets and the Alfred Health, HIV, Hepatitis and STI Education and Resource Centre.

Recommendations

- In a well maintained pool with usual precautions for wounds and infection control, the literature indicates that there is no restriction for HIV clients utilizing pools.
- People with HIV/AIDS are highly vulnerable to infection. Consideration should be given to the most appropriate treatment options for these clients. If aquatic physiotherapy is deemed suitable, then a number of strategies can be used to maximise the benefits.
- Liaise with the treating specialist to check that the client's current health status is appropriate for aquatic therapy treatment.
- Advise patients with severe immunosuppression (CD4 lymphocyte counts less than 100/mm3) of the risk of contracting water-borne parasites in pools.
- Closely monitor and manage health status i.e. condition of skin, episodes of diarrhoea/nausea. Patients with gastrointestinal symptoms, open wounds or infective skin conditions are encouraged to obtain a medical clearance on resolution of their symptoms before re-commencing pool treatment.
- Ensure all wounds are covered with a waterproof dressing (refer to Appendix III: Wounds)
- Ensure pool chemistry is at its optimum level.
- All females utilizing the pool, irrespective of known blood borne virus status, should use internal protection (ie, tampons) during menstruation.
- Some patients may develop chronic cryptosporidiosis and herpes simplex infection and exclusion from the pool will be required.
- Develop and implement *Blood and Body Fluids Spill* policies (There is no evidence found in the literature of any HIV/AIDS infection occurring in any pool water environment).

Additional Information

- State Government Victoria. Better Health Channel:
  - HIV and AIDS
  - HIV, hepatitis and sport
- Department of Health, Victoria. Infectious Diseases Epidemiology and Surveillance. Blue book – Guidelines for the control of infectious diseases (Human immunodeficiency virus or acquired immunodeficiency syndrome)

References

Australian Society for HIV Medicine. HIV Guidelines, Policy and Strategies

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Centers for Disease Control and Prevention. (2009) Guidelines for Prevention and Treatment of Opportunistic Infections in HIV-Infected Adults and Adolescents. 58 (No. RR-4) 14-19, 61

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Centers for Disease Control and Prevention. Human Immunodeficiency Virus (HIV) in Healthcare Settings

Centres for Disease Control and Prevention. Vomit and Blood Contamination of Pool Water. (Blood in Pool Water)

Alfred Health. HIV, Hepatitis and STI Education and Resource Centre

Hivpolicy.org. Ministerial Advisory Committee on AIDS, Sexual Health and Hepatitis (MACASHH)

South Australian Health Commission Code. Standard for the Operation of Swimming Pools and Spa Pools in South Australia. Supplement B Hydrotherapy Pools. The Use of Hydrotherapy Pools by HIV/AIDS Patients

Victorian AIDS Council

Acknowledgement

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Multi-Resistant Organisms

Methicillin Resistant Staphylococcus Aureus (MRSA)

Staphylococcus Aureus (S.Aureus) is a common bacterium. One in three people in the community will be colonized with these bacteria. Usually it does not cause significant infections, however occasionally it can cause serious health problems.

MRSA is a type of S.Aureus that has become resistant to some Antibiotics (AB'S). The symptoms of MRSA infection will vary depending on where in the body the infection is.

Colonisation refers to a microbe that establishes itself in a particular environment, such as a body surface, however does not produce disease. Colonisation with MRSA is often found in the nose, throat, groin and axilla.

Infection refers to a microbe that enters the body and multiplies within the tissues resulting in disease. Infection with MRSA can occur anywhere in the body. Most commonly it occurs in skin and soft tissue, wounds, the urinary tract, the respiratory tract or less commonly in the bloodstream.

Transmission

- Contact with colonised or infected patients or residents.
- Contact with colonised body sites of the staff themselves.
- Contact with devices, items or environmental surfaces contaminated with MRSA.
- Airborne transmission of MRSA may occur, but usually only when infected persons are large disseminators of the organism e.g. pneumonia, large infected burns, infective exfoliative dermatitis.

Pool Environment

- S. Aureus can occur in pool environments. It is particularly found on the surface of the water in skin flakes and nasal secretions. These particles can stay on the surface of the water for extended periods due to the surface tension, preventing oxidizers from immediately acting on these particles. Surface water removal by skimmers, spill gutters, filtration and chemical treatment helps remove S.Aureus from the pool environment.

Recommendations

- Contact the infection control officer of your facility and discuss management options for each client.
- Clients with MRSA colonisation may be permitted to attend the pool using standard and transmission based precautions providing they comply with cough etiquette and hand hygiene and do not have wounds that cannot be contained by a waterproof dressing.
- Prior to pool session the patient should wash their hands thoroughly with soap and water or apply alcohol-based hand rub.
- Patients should not share towels.
- All equipment used by the patient (including the hoist) should be cleaned immediately post treatment by 10% bleach solution or facility specific cleaning product. Some facilities may prefer to isolate equipment used by individuals with MRSA and apply terminal cleaning to the equipment after discharge of the patient (refer to Appendix V: Pool equipment used in treatment).
- Personal protective equipment (PPE) (ie, gloves, gown) should be used by staff performing the cleaning. Cleaning must be thorough. Saturate cleaning cloths with solution and ensure all surfaces are wiped thoroughly.

- Patients with MRSA are often treated in the last pool session of the day to allow for the extra time required for additional cleaning.
- For pools without a wet deck ensure regular scrubbing of pool walls at and above surface water level.
- Staff with active exfoliative skin conditions such as eczema, dermatitis and psoriasis should not be allocated to care for MRSA patients.

Additional Information

- Department of Health, Victoria. Infectious Diseases Epidemiology and Surveillance. Blue book – Guidelines for the control of infectious diseases (Staphylococcal infections)
- Centers for Disease Control and Prevention. Prevention of MRSA Infections in Athletic Facilities
- Centers for Disease Control and Prevention. FAQ's about MRSA
- Australian Government, National Health and Medical Research Council. Methicillin Resistant Staphylococcus aureus (MRSA) Consumer factsheet (2010)
- Department of Health, Victoria. Pool operators' handbook

References

Centers for Disease Control and Prevention. Management of Multidrug-Resistant Organisms in Non-Hospital Healthcare Settings (2010)

Centers for Disease Control and Prevention. Guidelines for Environmental Infection Control in Healthcare Facilities

Gregg M, Lacroix RL (2010) Survival of community-associated methicillin-resistant Staphylococcus aureus in 3 different swimming pool environments (chlorinated, saltwater, and biguanide nonchlorinated). *Clinical Pediatrics* Vol. 49 (7), pp.635-7

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Tolba O, Loughrey A, Goldsmith CE, Millar BC, Rooney PJ, Moore JE (2008) Survival of epidemic strains of healthcare (HA-MRSA) and community-associated (CA-MRSA) methicillin-resistant Staphylococcus aureus (MRSA) in river, sea and swimming pool water. *International Journal of Hygiene and Environmental Health* 211(3-4):398-402

Tasmanian Government, Department of Health and Human Services (2010) Methicillin Resistant Staphylococcus aureus (MRSA) in Tasmanian Rural hospitals and non-acute health settings. Guidance for the management of patients with MRSA in Tasmanian rural hospitals and non-acute settings V1.1

Victorian Rural Infection Control Practice Group (RICPRAC.) Infection Prevention and Control Manual (2008). 4.1 Methicillin Resistant Staphylococcus aureus (MRSA)

World Health Organisation. Water Sanitation and Health (WSH) - Guidelines for safe recreational waters. Volume 2 - Swimming pools and other similar recreational water environments (2006). Chapter 3 Microbial Hazards 3.4.4 Staphylococcus aureus

Vancomycin Resistant Enterococci (VRE)

VRE are specific types of antimicrobial resistant bacteria that are resistant to the antibiotic (AB) Vancomycin, the drug often used to treat infections caused by enterococci. Enterococci are bacteria that are normally present in the human intestine and female genital tract. Enterococci can sometimes invade other parts of the body and cause infection.

Most people with VRE in Australia are colonized not infected. Once colonized or infected, the person may harbour VRE for years.

Colonisation refers to a microbe that establishes itself in a particular environment, such as a body surface, however does not produce disease.

Infection refers to a microbe that enters the body and multiplies within the tissues resulting in disease.

Transmission

- Direct contact – contaminated hands of healthcare workers, colonised clients (via faeces, urine or blood).
- Indirect contact – by contact with contaminated medical and patient care equipment or environmental surfaces.
- VRE does not usually have airborne transmission.

Pool Environment

- There was no current research found on VRE patients and the pool environment.

Recommendations

- Contact the infection control officer of your facility and discuss management options for each client.
- Clients with VRE colonisation may be permitted to attend the pool using standard and transmission based precautions providing they have no diarrhoea, uncontrolled faecal incontinence, or wounds that cannot be contained by a waterproof dressing.
- Prior to pool session the client should wash their hands thoroughly with soap and water (if visibly soiled) or apply alcohol-based hand rub.
- All equipment used by the client (including the hoist) should be cleaned immediately post treatment by 10% bleach solution or facility specific cleaning product. Some facilities may prefer to isolate equipment used by individuals with VRE and apply terminal cleaning to the equipment after discharge of the patient (refer to Appendix V: Pool Equipment used in treatment).
- Personal protective equipment (PPE) (ie, gloves, gown) should be used by staff performing the cleaning. Cleaning must be thorough. Saturate cleaning cloths with solution and ensure all surfaces are wiped thoroughly.
- Clients with VRE are often treated in the last pool session of the day to allow for the extra time required for additional cleaning.
- Clients should inform the facility if they have had loose bowel motions or been unwell. A period of exclusion may be required.
- Staff with active exfoliative skin conditions such as eczema, dermatitis and psoriasis should not be allocated to care for VRE clients.

Additional Information

- Australian Government, National Health and Medical Research Council. Vancomycin Resistant Enterococci (VRE) Consumer factsheet (2010)

References

Centers for Disease Control and Prevention. Multidrug-Resistant Organisms in Non-Hospital Healthcare Settings (2010)

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Australian Government, National Health and Medical Research Council. Australian Guidelines for the Prevention and Control of Infection in the Healthcare Setting (2010). Management of Multi-Resistant organisms and Outbreak Situations

Queensland Government, Department of Health. Protocol for the Management of Patients with Vancomycin Resistant Enterococcus (VRE) 2011

Government of South Australia, Health Department. Management of Multi-Resistant Organisms. Guidelines for the Management of Patients with Vancomycin –resistant Enterococcus (VRE) Colonisation/Infection (2011)

Tasmania Government, Department of Health and Human Services. Vancomycin- resistant Enterococci (VRE) in Tasmanian rural hospitals and non-acute settings (2010). Guidance for the management of patients with VRE in Tasmanian rural hospitals and non-acute settings V1.0

Victorian Rural Infection Control Practice Group (RICPRAC.) Infection Prevention and Control Manual (2008). 4.2 Vancomycin-resistant Enterococci (VRE)

Government of Western Australia, Department of Health. Guidelines for the Management of Residents with Vancomycin-resistant Enterococci (VRE) in Residential Care Facilities (2004)

Infectious Skin Conditions

Tinea Pedis

Tinea is a highly contagious fungal infection of the skin. It can be spread by skin-to-skin contact, shared towels and wet floors. Tinea pedis is the condition which specifically affects the foot. Tinea can be found throughout the general population.

Population studies show tinea pedis prevalence in general populations varies, with some studies showing rates as high as 20% and 37%. Studies have reported increased prevalence of tinea pedis in athletes compared with the general population. It is also more common in males than females. It is estimated that 70% of the population will be affected by tinea pedis at some stage.

Symptoms

- Can include itching, blisters, cracking, splitting and peeling in the toe web spaces and under the foot.
- There can also be yellow or white discolouration of the nails.

Treatment

- Anti-fungal preparations.
- It is recommended that patients seek advice from a doctor or pharmacist as to the most appropriate treatment for their condition. Prompt diagnosis, education and treatment helps to minimise the spread of infection.
- Patients should immediately commence treatment once tinea pedis is detected.
- They should continue treatment until all symptoms have resolved to prevent recurrence of the condition.
- Studies in athletes have shown that the recurrence rate is high (59% in swimmers, 61% in soccer players, 60.7% in runners) when treatment is ceased prematurely. Some infections can prove difficult to treat.
- Encourage clients to seek further advice if required.

Precautions

- Clients should seek advice from a doctor or pharmacist if they are taking any other medications as some anti-fungal preparations may affect the way these medicines work.

Risk Factors

- Patients with some specific conditions are at increased risk of infection and complications from these infections. They include; diabetes, lymphoedema, recurrent cellulitis, immunosuppression, obesity, eczema, dermatitis, dermatitis, the elderly.

Recommendations

- Wearing appropriate footwear in the pool area, change rooms and showers may reduce transmission, particularly for those with tinea and those at risk.
- Athletes may be encouraged to wear footwear such as thongs due to the higher incidence of tinea pedis in this population.
- Those patients with tinea pedis should be advised to wear some form of foot covering (thongs, slip on shoes, overshoes).
- For those clients with increased risk of tinea pedis and complications, advice should be provided as to the most appropriate form of footwear and management for each client.

- The wearing of thongs, slip-on shoes and overshoes may increase the falls risk in some individuals, particularly the frail aged, orthopaedic and disabled population. These risks must be considered when deciding on appropriate footwear (refer to Guideline 1.2.5 Slips and Falls Management in Hydrotherapy Pool Facilities).
- Dry skin thoroughly, particularly between the toes.
- Ensure hand washing after touching the affected area.
- Do not share towels. Encourage clients to bring a bathmat to use in the change rooms.
- Expose the skin to air.
- When wearing socks change them frequently (new brands of synthetic socks are made of hydrophilic fibres which wick moisture away from the feet).
- Ensure regular cleaning of floors on the pool deck, change rooms and showers.
- At home clean the shower or bath after use to avoid re-infection or infecting family members.

Exclusion Period

- Unless an open wound is present, exclusion from the pool is not required, but active management strategies should be implemented (see above)

Additional Information

- State Government Victoria. Better Health Channel. Tinea

References

Al Hasan M, Fitzgerald S, Saoudian M, Krishnaswamy G (2004) Dermatology for the practicing allergist: Tinea Pedis and its complications. *Clinical and Molecular Allergy* 2: 5

Centers for Disease Control and Prevention. Hygiene-related Diseases. Athletes Foot (tinea pedis).

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Mayo Clinic. Athletes Foot

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New South Wales Government, Department of Health. Public Swimming Pool and Spa Code of Practice (May 2010). 2.2.4 Fungal Pathogens

Tiffany L MD, MA; Adams, Brian B MD, MPH (2007) Prevalence of Tinea Pedis in Professional and College Soccer Players versus Non-Athletes. Clinical Journal of Sport Medicine; January 17(1), pp 52-54

World Health Organisation. Water Sanitation and Health (WSH) - Guidelines for safe recreational waters. Volume 2 - Swimming pools and other similar recreational water environments (2006). Chapter 3 Microbial Hazards 3.7.1. Trichophyton spp. and Epidermophyton floccosum (Tinea)

Plantar Warts

A plantar wart, also known as a verruca plantaris, occurs on the sole or toes of the foot. It is a wart caused by the human papillomavirus. They are usually self-limiting, but treatment is generally recommended to lessen symptoms and reduce transmission.

Transmission

- Transmission is usually via moist floor surfaces such as showers, change rooms or swimming pool decks.
- Warts may not become visible for weeks or months and are highly contagious.

Prevention

- Ensure regular cleaning of the floors on the pool deck, change rooms and showers.
- Wearing appropriate foot covering in showers and change rooms can prevent infection. For those clients with plantar warts, appropriate foot covering should be worn while warts are present.
- Cover plantar warts with occlusive dressing.

Additional Information

- US National Library of Medicine. National Institutes of Health. MedlinePlus. Warts and Verrucas

References

Bacelieri R, Johnson SM (2005). Cutaneous warts: an evidence-based approach to therapy. *American Family Physician* 72 (4): 647-52.

World Health Organisation. Water Sanitation and Health (WSH) - Guidelines for safe recreational waters. Volume 2 - Swimming pools and other similar recreational water environments (2006). Chapter 3 Microbial Hazards 3.5.2. Papillomavirus

Herpes Simplex

Cold sores are the most common type of herpetic infection. They are characterised by a localised primary lesion which can often weep and can become a recurring condition. In some instances children with atopic dermatitis and immunosuppressed patients may require hospitalization for treatment. It may become a chronic condition in patients with HIV infection.

Transmission

- The saliva of carriers is the most significant mode of transmission. The secretion of the virus in the saliva may occur up to seven weeks after the lesion has healed. Those with recurrent disease are infectious for 4-7 days with each episode.

Prevention

- Exclude from the pool while lesion present.
- Encourage good personal hygiene.
- Encourage hand washing.

Additional Information

Department of Health, Victoria. Infectious Diseases Epidemiology and Surveillance. Blue book – Guidelines for the control of infectious diseases (Herpes Simplex Infections)

Other Infections

Hepatitis A

Hepatitis A is a viral infection of the liver.

Transmission

- Transmission is via the faecal-oral route i.e. ingestion via contaminated food or water.
- After contracting the virus it takes approximately 28 days (range 15-50 days) to become ill.
- People with Hepatitis A are infectious to others from two weeks before they show symptoms to one week after they become jaundiced.

Symptoms

- Acute fever, nausea, abdominal pain, lethargy, weight loss.
- Infants and young children infected with Hepatitis A will rarely show symptoms of infection.

Recommendations

- Exclude patients from pool until they are recovered. A medical certificate of recovery should be obtained before recommencing pool activities.
- Encourage good hand hygiene practices.
- A Hepatitis A vaccination is available.

Additional Information

- Department of Health, Victoria. Infectious Diseases Epidemiology and Surveillance. Blue book – Guidelines for the control of infectious diseases (Hepatitis A)

References

Centers for Disease Control and Prevention. Hepatitis in Healthcare Settings

Hepatitis Australia. Hepatitis A

Urinary Tract Infections

Urinary tract infections (UTI's) include infections of the urethra (urethritis), bladder (cystitis), or kidneys (pyelonephritis). UTI's are most common in women, babies and the elderly. People with diabetes, prostate conditions and urinary catheters are also at increased risk of developing a UTI.

Recurrent UTI's (RUTI) in healthy non-pregnant women is defined as three or more episodes of UTI during a twelve month period. Long term antibiotics (6-12 months) are sometimes prescribed as a prevention strategy for non-pregnant healthy women with RUTI's.

Symptoms

- Symptoms include; vomiting, fever and tiredness, urgency, burning pain when urinating, blood in the urine, the sensation that the bladder is still full after urinating.

Transmission

- Usually E. coli that is spread to the urethra from the anus.
- Sexually transmitted micro-organisms.

Recommendations

- Exclude from pool until symptoms have resolved.
- Empty bladder before entering pool.
- For women on long term prophylactic antibiotics for RUTI's, side effects can include skin rashes and gastrointestinal symptoms which will require management.
- Women on long term prophylactic antibiotics, whose side effects are managed and are otherwise well, can attend the pool.

Additional Information

- Kidney Health Australia
- State Government Victoria. Better Health Channel. Urinary Tract Infections

References

Albert X, Huertas I, Pereiro II, Sanfelix J, Gosalbes V, Perrota C (2004). Antibiotics for preventing recurring urinary tract infection in non-pregnant women. *Cochrane Database of Systemic Reviews* (3):CD001209. DOI:10:1002/14651858.CD001209.pub2

World Health Organisation. Water Sanitation and Health (WSH) - Guidelines for safe recreational waters. Volume 2 - Swimming pools and other similar recreational water environments (2006). Chapter 3 Microbial Hazards 3.4.4. Page 47

Respiratory Infections

Respiratory infections involve the respiratory tract including lungs, throat and sinuses. There can be production of mucus and inflammation of the airways and sinuses.

Transmission

- Airborne spread in aerosols.
- Droplet contact.
- Direct contact (hand-to-hand, hand-to-nose).

Recommendations

- Exclusion from pool environment until well.
- Encourage flu vaccinations, particularly in at risk individuals (young children, the elderly, individuals with medical problems and smokers).
- Encourage hand washing.

References

The Australian Lung Foundation

Department of Health, Victoria. Infectious Diseases Epidemiology and Surveillance. Blue book – Guidelines for the control of infectious diseases (Influenza)

Wounds

All wounds including surgical, open and infected wounds and tracking bone sinus should have an occlusive dressing which can keep the area totally waterproof. Watertight sleeves can also be used over a dressing. Some dressings require time for maximum effectiveness of the adhesive, so should be applied well before immersion. Skin should be dry before applying dressing which may be difficult in a warm humid climate or in a humid pool environment. Skin can be dried with a cool setting hair dryer/fan.

Skin Grafts/Donor Sites

Check graft and donor sites for healing. If healing is incomplete or skin remains fragile a waterproof sleeve can be used. Ensure application and use of equipment does not cause friction or trauma to the site. Use protective clothing (eg, non-slip socks, leggings) to protect grafts from abrasive contact with the pool surfaces.

Stomas

A stoma is a surgically created opening of the bowel or urinary tract to a body surface. They include colostomies, gastrostomies (PEG feeding tubes) and supra pubic catheters. After the stoma wound has healed (usually around six weeks) they are regarded as closed circuits when the bag is attached.

Recommendations

- Liaise with the client's stoma therapist if required.
- Empty bags prior to entry to the pool.
- Ensure circuit is intact and closed.
- Secure the bag to the client body using tubigrip or strapping.

External Fixators/Leg Lengthening Devices

External fixation allows for alignment and fixed positioning of bones with minimal internal fixation, to obtain bony union including after traumatic fracture, leg lengthening and after corrective surgery.

Recommendations

- Liaise with the surgeon as required.
- Ensure correct pool chemistry and infection control protocols are adhered to.
- Continually monitor pin sites. Refer to medical staff if there is any sign of redness, swelling or pain.
- Patients and carers should follow the pin care protocols to ensure optimal pin site management.
- Patients can enter the pool with or without protective dressings unless there is an area of compromised skin which will require occlusive covering.

Additional Information

- Australian Council of Stoma Associations Inc
- Bladder and Bowel Foundation. Bladder Treatments – Suprapubic Catheter
- Queensland Government, Department of Health. Queensland Spinal Cord Injuries Service. Queensland Health. Caring and Changing your Supra-Pubic Catheter (SPC) Fact sheet
- Scope. Gastrostomy Information and Support Service (GISS)

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Infants

In Australia there is a comprehensive immunization program offered from birth. There are currently no recommendations as to what age infants are advised to commence pool activities. However children who have had health complications such as premature birth, low birth weight, or have had medical or surgical problems are sometimes advised to delay any pool activities until their naïve immune systems have matured.

Many physiotherapists do however see infants and toddlers in the hydrotherapy pool for global developmental delay issues and functional training in early intervention. Neonatal units will often include hydrotherapy as part of the physiotherapy intervention. It should be noted that these treatments would generally be head out of water immersion therapy (refer to Appendix IV: Asthma)

Recommendations

- When required liaise with the relevant medical practitioner in regards to management.
- Document and implement any special precautions.
- Encourage parents to keep children's immunizations up to date.

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Staff Hygiene and Infection Control

Strategies for staff infection prevention and control should include:

- A health screening policy
- Re-assessment on a regular basis
- Vaccination programs
- Risk management
- Documentation of staff health and safety procedures
- Appropriate exclusion periods for illness.

Health Screening

Prior to working in the pool environment all workers should be informed of the requirement for health screening. This includes students, volunteers and carers. Depending on the results appropriate advice and counselling should be offered. Specific strategies or precautions will need to be taken if required. The same screening tool used for clients can be used for staff.

Re-assessment

- Re-assessment should occur on a regular basis (ie, yearly and/or if a staff members health status changes). Staff members are responsible for informing the appropriate supervisor of a change in health status.

Skin Conditions

Often pool-staff spend much longer periods of time in the pool compared with clients therefore the risk of skin problems may be increased. For those staff with pre-existing skin conditions careful management is required. Skin irritations are often related to pool chemistry and/or length of time spent in the pool. Many variables including sanitiser levels, pH, and total dissolved solids can affect the pool chemistry and therefore skin. Staff should have access to pool chemistry readings, be made aware of the role of pool chemistry in skin management and implement pre and post immersion management if required.

Recommendations

- For staff with persistent skin conditions a specific management plan should be implemented and include risk management activities such as increased moisturising and possibly limiting pool time. Any increase in symptoms should be immediately addressed. Well managed pool chemistry and appropriate environmental cleaning will minimise problems.
- Staff with active exfoliative skin conditions such as eczema, dermatitis and psoriasis should not be allocated to care for VRE or MRSA patients.

Effects of Chloramines and Other Disinfectant By-products

Chlorine-based disinfectants react with nitrogenous compounds originating from sweat, saliva, urine and other waste from swimmers. These may cause combined chlorine by-products including chloramines in the water and air. The irritants may cause stinging eyes, nasal irritation or respiratory symptoms. These may be an indication of poor water quality or inadequate ventilation. Regular exposure to these irritants may cause sensitivity to fungi and bacteria and aggravate asthmatic symptoms.

Recommendations

- Ensure adequate disinfectant levels and constantly monitor water quality especially during periods of high use.
- Perform regular super chlorination.

- Encourage good swimmer hygiene-toileting and showering before swimming.
- Ensure adequate ventilation, particularly during periods of high use.
- Ensure fresh water is regularly added to the pool.

Risk Management

- If any adverse effects occur to staff they should be assessed, documented and strategies implemented to prevent a recurrence.

Documentation

- Records of screening, vaccinations, and any adverse effects of immersion need to be documented. Privacy and security of these documents must be ensured.

Exclusion Periods

- The Australian Guidelines for the Prevention and Control of Infection in Healthcare (2010) has a helpful table outlining exclusion periods for different conditions. (p 209 Table C.2.3 Staff Exclusion Periods)

Discussion

- Angenent et al
  The reference by Angenent et al is cited in the NHMRC Australian Guidelines for the Prevention and Control of Infection in Healthcare (2010). The article demonstrates the significant differences between Australian Standards for Hydrotherapy Pools (ASHP) and standards found overseas, in this instance the USA .

  In this article a pool was temporarily closed after members of staff were diagnosed with non-tuberculosis pulmonary hypersensitive pneumonitis and mycobacterium avium infections. On investigation these organisms were found on the pool walls, water surface (biofilm) and in the pool air. The results suggested aerosol partitioning (bioaerosols) as a mechanism for disease transfer in this environment.

  There are a number of issues in the way this pool was managed that would not meet the current Australian Standards for Hydrotherapy Pools.

  Ventilation
  The air circulation was inadequate as stated in the articles discussion: “The specific enrichment of the mycobacteria in the pool air suggested that increased air circulation could reduce the risk of exposure due to inhalation, and since this investigation, the rate of air exchange has been increased”.
  Many cold climate countries use air recycling devices to control heating costs. This can also lead to poor air turnover as they take in a limited amount of fresh air. Chlorination by-products in the air can accumulate and reach high levels. It was not stated in the article if these devices were used at this facility.

  Turnover rate
  In this study the pool water was cycled only four times daily (six hourly) through the filtration system. Under the Australian Standards AS 3979-2006 3.1.3 Turnover Rate a turnover rate of more than two hours would be regarded as inadequate water filtration.

Water Sanitizers
The treatment system used in this particular pool was a UV-peroxide disinfection system. In the discussion the article states: “the pool samples show inadequacies in the disinfection system”. This is not the recommended system for UV management systems in Australia (AS 3979-2006 3.2.2 Supplementary Treatments).
Screening and Infection Control

There is no information provided in this article about any patient/staff screening or infection control guidelines that were in place at this facility.

- Fantuzzi et al

The article by Fantuzzi et al reports pool free chlorine levels between 0.7 to 2.0 mg/L. This is below the recommended levels under the Australian Standards. There was no description of the ventilation system used.

Summary
These articles provide a good example of the problems that can arise if a pool is inadequately maintained and managed. In Australia hydrotherapy management practices include client screening and infection control strategies and pool and water management based on the Australian Standards Hydrotherapy Pools (AS 3979-2006). These management practices are often at a higher standard than those described in overseas articles.

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APPENDIX IV: MANAGEMENT OF SPECIFIC CONDITIONS

With the continuing advancement of knowledge in hydrotherapy, infection control and specific benefits of aquatic physiotherapy and water exercise, some persons previously considered contraindicated to pool therapy can now be treated safely. The following areas should be reviewed if appropriate to the client group.

Cardiac Conditions

Cardiac Physiology of Immersion for Healthy Subjects

During head out of water (HOW) immersion, hydrostatic pressure compresses the superficial veins of the lower extremities, pelvis and abdomen, resulting in a shift of blood volume to the thorax and heart. On immersion up to the neck the central blood volume increases by approximately 700mls. On average, heart size increases to 30% and stroke volume increases 35-45%.

HOW immersion in thermo-neutral water (34-35 degrees) has also been shown to be accompanied by stimulation of the cardiopulmonary arterial baroreceptors. Sympathetic nervous system activation, systemic vascular resistance and pulmonary vascular resistance are all decreased.

As the depth of the water decreases, these effects decrease. When water depth is below the iliac crests the blood volume shift is minimal.

During swimming, the horizontal body position, hydrostatic pressure and muscular activity, can produce a higher cardiovascular load than that experienced when exercising in an upright vertical position.

Historically, aquatic exercise has been recommended with caution for clients with cardiac disease. Whilst these physiological changes are well tolerated by healthy individuals, early investigators hypothesised that increasing cardiac preload would significantly compromise cardiac function in those with pre-existing disease. This was particularly of concern for those with chronic heart failure, with the assumption that the haemodynamic changes would worsen symptoms and progress the disease. More recently however, studies have demonstrated aquatic exercise to be well tolerated in appropriately selected patients. Current theories hypothesise that the reduction in afterload that occurs with peripheral vasodilation, likely offsets the potentially detrimental effects of increased preload.

Physiological changes observed in cardiac patients vary depending upon depth of immersion and the temperature of the water. Responses that occur in thermo-neutral water when immersed to the level of the xiphisternum are depicted in the table below.

Physiological parameter	Physiological Response
HR	Decreases
Diastolic BP	Decreases
Stroke volume	Increases
Cardiac output	Increases
Ejection Fraction	Increases
Peripheral vascular resistance	Decreases
SpO2	Unchanged
ECG changes	Unchanged

When cardiac patients are immersed in cold water, peripheral vascular resistance does not decrease as occurs with warm water immersion, and the potential for cardiac compromise is increased. Increased ventricular ectopic beats are also observed on ECG in these patients.

Despite the recent evidence, literature in this field remains sparse and the sample sizes studied have been small. Of the studies that have been conducted, patients have predominantly been middle aged men with very stable disease. The frail elderly and in particularly women, who represent a more realistic heart failure population, have been under-represented.

Assessment

Assessment of cardiac clients should include:

- Cardiac diagnosis
- Relevant investigations (eg, cardiac echo, angiogram, ECG)
- Current symptoms and recent change of symptoms
- Chest pain, SOB, dizziness, peripheral oedema, weight gain (fluid retention)
- Recent changes in medication (eg, increased beta blocker medication may lead to symptomatic dizziness)
- History of hypertension/hypotension
- History of dizziness/fainting/falls
- Clinical observations
    - BP, HR, SpO2
    - Weight (for heart failure patients).

Equipment

For facilities that treat higher risk clients, equipment that may be used includes:

- Sphygmomanometer and blood pressure cuffs (small and large)
- Stethoscope
- Weighing scales
- Oxygen therapy
- Defibrillator
- Glucometer.

Recommendations

- Liaise closely with the treating doctor if there are any concerns about the stability or severity of the clients Cardio Vascular (CV) condition.
- Any relevant medications should be available poolside.
- Utilize positioning to minimise CV effects of immersion (depth, body position).
- Initially clients may commence treatment in shallower water and progress to deeper water.
- Exercise intensity levels should be monitored using tools such as the Borg Scale.
- Ensure adequate rest periods throughout treatment.
- Supervise clients on exiting the pool and during showering if they are at risk of hypotensive episodes.
- Advise clients to inform staff if they feel unwell or have any new or changing symptoms (eg, chest pain, dizziness, shortness of breath, nausea, cold sweats).

Management of adverse events

Angina may present in numerous ways including:

- Central chest pain (often described as heaviness, crushing, or tightness)
- Neck pain
- Jaw pain, tooth ache
- Interscapular pain
- Shoulder pain or radiation of pain/ heaviness down one or both arms.

If the client experiences any adverse symptoms, cease the activity immediately. In the event of angina, the patient should be encouraged to take their usual medication (GTN spray or tablet) and monitor symptoms (BP, HR, SpO2). If pain persists, medication should be repeated at five mins and again at 10 minutes if still continues. An ambulance should be called if symptoms persist at 10 minutes. The Heart Foundation has Heart Attack Action Plans.

Clients with cardiac conditions are often prescribed beta blocker medication to decrease the work of the heart. These clients will traditionally present with low blood pressure and a slow HR. Provided the patient is asymptomatic, there is usually no cause for concern. If the client experiences dizziness during the exercise session, this may be secondary to a drop in cardiac output (particularly heart failure patients), dehydration or other causes. The client should be removed from the pool and positioned in sitting or lying. Blood pressure should be monitored. If the blood pressure does not return to pre-exercise levels, medical management should be sought.

Specific conditions

Consideration of cardiac disease and accompanying co-morbidities (ie, insulin dependent diabetes, morbid obesity, severe pulmonary disease, pregnancy) must be given in formulating a management plan and determining the level of supervision for each client.

Heart Failure

For clients with heart failure, early decompensation may present as:

- Worsening exercise tolerance or dyspnoea at rest over the previous 1-3 days
- Increased in weight by more than 2kg in the previous 1-3 days.

If either of these symptoms occurs, the client should not exercise and should be referred to their medical practitioner.

Permanent pacemakers (PPM) and implantable defibrillators (AICD)

PPMs and AICDs do not exclude clients from attending aquatic exercise programmes. It is important however to determine the specific reason for insertion of the device. This may include management of specific arrhythmias (usually PPMs), prevention of adverse events in clients at risk of fatal arrhythmias (AICDs) or resynchronisation therapy to increase cardiac output in patients with heart failure (biventricular AICDs). The reason for the device will determine the risk of undertaking an aquatic exercise programme and should be discussed with the treating medical specialist. Other considerations include:

- Avoid aquatic exercise following device insertion until the wound site is fully healed
- Clients should be referred to a medical specialist if the wound at any time appears infected
- Avoid vigorous upper limb activity at extremes of range on the side of the device
- Clients should always seek medical attention if the device fires at any time (during exercise or external to the exercise programme).

Atrial fibrillation (AF)

AF is associated with heart failure, valvular disease, coronary artery disease, hypertension and hyperthyroidism. AF (especially AF with rapid ventricular rate) often reduces exercise tolerance and results in fatigue. Haemodynamic compromise may also predispose the individual to thromboembolic events. AF may be intermittent. Clients with new AF may report palpitations; worsening SOB and HR may be irregular. The following considerations should be made for those supervising patients with AF:

- Clients with new symptoms (eg, irregular HR compared to previously regular HR, palpitations) should seek medical advice
- Ensure AF clients are compliant with all medications, especially those that help control heart rate
- Heart rate at rest should be adequately controlled (<100 bpm)
- Pulse oximetry will be inaccurate in patients with AF. HR should be assessed manually in these patients.

Contraindications for aquatic exercise in patients with cardiac disease

- 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 systolic blood pressure above 200mmHg
- Resting diastolic blood pressure above 110 mmHg
- Resting heart rate above 100 bpm.

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Acknowledgment

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Diabetes

Diabetes has become a widespread epidemic with the increased prevalence and incidence of Type 2 diabetes mellitus (T2DM). T2DM is a metabolic disorder caused by defective insulin secretion and / or defective insulin action. T2DM clients may be prescribed insulin and / or oral medications to improve glycaemic control. Type 1 diabetics require insulin due to an absolute deficiency. Absolute or relative deficiency of insulin results in elevated blood glucose levels and affects the metabolism of fat, protein and carbohydrate.

Hyperglycaemia is associated with microvascular dysfunction, macro vascular disease, neuropathy, glycosylation of collagen and impaired immunity. These factors contribute to systemic complications the physiotherapist should be aware of.

Clients with diabetes should be screened for:

- Cardiac conditions
    - Cardiovascular autonomic neuropathy (CAN) Clients with CAN should have physician approval prior to commencing exercise. Stress testing is recommended due to the likelihood of silent ischaemia, heart rate and blood pressure abnormalities

- Renal Disease

- Retinopathy
    - Physician approval for exercise is recommended prior to starting an aquatic program. Activities that greatly increase intraocular pressure are contraindicated when proliferative retinopathy is active. Jarring activities increase haemorrhage and risk

- Peripheral sensory and motor neuropathy
    - Sensation testing of feet is recommended to determine risk of diabetic foot ulcers (DFU)

- Musculoskeletal conditions
    - Charcot's foot presents with impaired architecture and pressure loading of the foot. Cheiroarthropathy may decrease ability to independently manage foot care.

- The diabetic foot
    - Ulceration of the high risk diabetic foot is the most common diabetes-related cause of hospitalization and amputations. Peripheral sensory and autonomic neuropathy, vascular impairment, impaired immunity and alterations in foot structure are risk factors. Comprehensive foot care is recommended for prevention and early detection of sores and ulcers.
    - Feet should be checked prior to entering the pool, with particular attention paid to between the toes. If redness, cracks, swelling, bruising or blisters are evident immediate help should be sort from a doctor or podiatrist.
    - Feet should be washed and dried gently and thoroughly after immersion.
    - Patients should avoid going bare footed. The wearing of thick socks and / or well-fitting shoes in the pool may be beneficial.

- Wound management guidelines should be followed if the integrity of the skin is compromised.

Clients with Hypoglycaemia

- Individuals should self-monitor their BGLs before, occasionally during and following exercise to inform modifications of medication and diet to enable good glycaemic control and prevent hypoglycaemia.
- Clients with Type 1 on insulin or T2DM on insulin or oral medications may need to alter their dosage and diet dependent on their response to exercise.

- Physiotherapists should ensure the client has a hypoglycaemia action plan, testing kit and fast release glucose available.
- Practitioners should have hypo kits and first aid strategies available.

Clients with Hyperglycaemia

- Clients with Type 1 diabetes with a BGL higher than 15 mmol/L should check their urine for ketones. Moderate physical activity is safe if no ketones are present and the BGL is trending down.
- BGLs should be tested every 30 minutes of physical activity. If BGLs are climbing or ketones present physical activity should be stopped. Clients should initiate their hyperglycaemia plan. This may be administration of short acting insulin, low calorie fluids and rest.
- Clients with T2DM and a BGL above 16.7 mmol/L can engage in physical activity if ketosis is not present, they are adequately hydrated and they feel well.

Recommendations:

- Specific screening for Diabetics as listed above
- Any patient with poorly controlled hypoglycaemia, recent /frequent periods of drowsiness, unconsciousness, slurred speech or similar signs of a severe hypoglycaemic event should not exercise alone in the aquatic environment. One-on-one supervision with a physiotherapist or suitable responsible person is required.
- All patients at risk of hypoglycaemia should have a personal action plan. A personal hypo kit is central to this action plan.
- Where appropriate facilities should have a hypo-kit available.
- A health service should monitor the need to have on site BGL testing equipment.
- All patients at risk of hyperglycaemia should have a personal hyperglycaemia action plan.
- Suggest appropriate footwear to protect skin.

Additional information:

- Diabetes Australia
- National Evidence-Based Guideline - Prevention, Identification and Management of Foot Complications in Diabetes (Part of the Guidelines on Management of Type 2 Diabetes)
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Acknowledgment

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Respiratory Conditions

Physiological effects of immersion in neck deep water in healthy subjects

Hydrostatic Pressure increases with increasing depth and;

- Causes increased work of inspiratory muscle contraction in chest expansion
- Causes compression of the abdomen, resulting in cephalad movement of the diaphragm, reducing space in the thoracic cavity
- Causes re-distribution of the blood flow from peripheries to the cardiothoracic space, resulting in relative central hypervolaemia
- All these factors can have an effect on increasing the work of breathing as well as decreasing lung volumes such as; vital capacity, total lung capacity, functional residual capacity and expiratory reserve volume.

Chronic Obstructive Pulmonary Disease (COPD)

Definition

COPD is a long term lung condition commonly known as emphysema and chronic bronchitis. It is characterised by airway narrowing, leading to limitation of airflow in and out of the lungs, causing shortness of breath (SOB).

Equipment

- Relevant medications and equipment should be available pool side (bronchodilators, spacers, nebulizers).
- Nasal prongs and oxygen therapy could be made available pool side in the acute setting.
- For patients with a productive cough, tissues and a disposable cup should be available poolside.

Oxygen Dependent Clients

- Ensure oxygen cylinders are appropriately secured (i.e. on a portable trolley or crate) so that they cannot tip over on the pool deck or fall into the pool.
- Oxygen tubing needs to be of sufficient length for the patient to be able to move about the pool (up to 20 metres).
- Staff should inspect oxygen tubing for cracking and the regulator function on a weekly basis.
- As oxygen tubing can be difficult to see in water, ensure there is sufficient space around the patient so that another swimmer does not pull the tubing.
- Pulse oximeters can be used to measure oxygen saturation (heart rate is not a reliable measure of exercise intensity-(refer to Appendix IV – cardiac conditions). Dry the clients finger prior to placing it in the finger probe.

Clients with Tracheostomies

- Ensure that adequate floatation equipment is available to keep the tracheostomy site out of the water.

Recommendations

- If clients feel unwell, have a fever, increased SOB or change in the colour of their sputum, they should immediately contact their care manager (ie, Nurse Practitioner, Doctor) and should not attend the pool.
- If required, clients' should use their bronchodilator medication prior to exertion and entering the pool and have it available poolside.

- Advise clients that SOB may initially increase when entering the pool as their chest becomes submerged and this can be relieved by elevating their chest out of the water.
- Clients may initially commence treatment at the shallow end of the pool and slowly progress in depth or level/type of exercise (eg, where variations in depth are not available, squatting to immerse will increase respiratory load, as will progressively adding in upper/lower limb exercise).
- Treatment sessions may initially be of a short duration. The amount of time required needs to be assessed on an individual basis (may be as limited as a few minutes).
- Ensure adequate rest periods for shortness of breath management.
- Allow clients to choose the position most comfortable for them to recover their breath i.e. elevating their chest out of water, leaning on the poolside, sitting on the steps, sitting on the hoist in the water.
- Assessment of COPD clients should include the level of SOB at rest and on exertion. Scales for rating the level of breathlessness can be useful in checking that these individuals are working at an appropriate and safe level of exercise intensity. Subjective rating scales which can be used include; the Modified BORG Dyspnoea Scale or the Modified Research Council Dyspnoea Scale.

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The Australian Lung Foundation

Acknowledgment

Renae McNamara, Prince of Wales Hospital, Sydney Australia.

Asthma

A respiratory disorder characterised by recurring episodes of paroxysmal dyspnoea, wheezing on expiration and/or inspiration, caused by inflammation and constriction of the bronchi, coughing and viscous mucoid bronchial secretions. Individuals with asthma will often have skin conditions such as atopic dermatitis or eczema.

Recommendations

Assess whether the clients asthma is well controlled. Refer them to their Medical Practitioner if they complain of:

- Waking up at night wheezing, short of breath or coughing
- Having difficulty with normal activities
- Using their reliever medication more than three times per week
- Being unsure about their medication use

(Note that some clients will have asthma and COPD and they will need management plans to reflect this)

Assessment should also include the client's triggers for asthma which may include:

- Inhalation of allergens, pollutants and irritants (in some poorly managed pools, pool chemistry and air management systems may be factors)
- Infections (colds and flu)
- Cold air (Some pool change rooms can be unheated and cold. Changing on the poolside with a curtained off area may overcome this issue.)
- Changes in air temperature and humidity (such as when moving from the moist, heated pool area to the external environment)
- Vigorous exercise
- Emotional stress

If indicated, monitor asthma symptoms using a peak flow meter or an asthma assessment tool such as Asthma Score.

All clients with asthma should have an asthma plan from their doctor which may include:

- How to manage their asthma symptoms
- How to use their medications
- What to do if their asthma gets worse
- Trigger avoidance strategies
- What to do before exercise (ie, slow warm up, medication)
- When to seek medical help
- When to implement emergency first aid

If during the pool session the patient reports or displays worsening symptoms of asthma (cough, wheeze, breathlessness, blue lips), cease activity and immediately implement their first aid plan. Do not wait until their symptoms are severe.

Asthma Australia has advice on management, medications and first aid response.

Exclusions

If a client is having an acute asthma attack they should not be permitted in the pool and their first aid response should be implemented.

If a client is undergoing a modification of their asthma management plan to help stabilise their asthma, it may be preferable to delay treatment until their new plan has been agreed and implemented.

Equipment Recommendations

The client's Asthma Management Plan should be available in the pool area.

Relevant medications and equipment should be available pool side (bronchodilators, spacers, nebulizers).

For clients with a productive cough, tissues and a disposable cup should be available poolside.

Asthma and Swimming Pools

In the last ten years there have been some mixed reports in the literature as to the effect of disinfectant by-products (DBP) of chlorine and a correlation with the development of asthma. A meta-analysis by Goodman and Hays (2008) concluded there is no consistent link in the research between childhood swimming pool use and asthma prevalence.

Many cold climate countries use air recycling devices to control heating costs. This increases the amount of DBP that can be built up in the pool environment. Pool water turnover rates and pool chemical levels can vary greatly in European countries which can also lead to higher rates of DBP. (refer to Guideline 1.1.7)

In Australia pool environments usually have sources of natural ventilation (doors, windows) as well as extraction systems. Standards Australia has recommendations on ventilation, dis-infection and turnover rates and each state has their own guidelines for pool management. Appropriate management of the pool environment should minimise the amount of DBP in the pool atmosphere.

It should also be noted that by far the majority of the studies are related to swimming (assuming head immersion) and not head out of water exercise as occurs in many hydrotherapy pools where asthma may be a co-morbidity of a client and not the condition being treated.

For further information go to Asthma Australia.

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Cystic Fibrosis

Cystic fibrosis is an autosomal recessive disorder that can affect the lungs, pancreas, liver kidneys and intestines. Respiratory issues are often the primary problem with frequent chest infections causing lung damage and a shortened life span.

Bacterial colonisation can occur and are often resistant to antibiotics and other pharmaceutical management.

Cross infection of resistant strains of bacteria can occur between clients with cystic fibrosis. Whereas once group activities of children with similar conditions (land or water) may have been encouraged for social and support purposes, such groups are now generally discouraged.

In the past low level evidence existed that poorly designed, filtered and managed pools may have been a source of infection. Modern designed pools that meet regulations have not been linked to cross infections.

Recommendations

- Children /adults with cystic fibrosis should not attend the same group session in a hydrotherapy pool, or attend the pool at the same time to perform independent exercise
- Pools should be monitored according to state, council and health regulatory bodies to ensure adequate disinfection and water quality.
- In some children diving should be avoided as it may increase the risk of pneumothorax especially in patients with more severe disease.

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Cystic Fibrosis Australia

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Renal Conditions

Renal Physiology for Healthy Subjects

In head-out-of-water immersion (HOWI) to the neck there is an increase in central blood volume induced by hydrostatic pressure (refer to Appendix IV - Cardiac Conditions). HOWI in thermo-neutral (34.5-35 degrees) water stimulates the cardiopulmonary and arterial baroreceptors.

High pressure baroreceptors detect the pressure of blood flowing through them, and via the central nervous system, can increase or decrease total peripheral resistance and cardiac output. Low pressure baroreceptors are involved in regulation of blood volume. They have a circulatory and renal effect. They produce changes in hormone secretion which effects retention of salt and water.

With immersion in thermo neutral water, sympathetic nervous system activity and systemic peripheral resistance are decreased and arginine vasopressin (AVP) and the renin-angiotensin-aldosterone axis are *suppressed*. This causes a reduction in anti-diuretic hormone (ADH) thereby increasing diuresis (urine output) and a release of Atrial Natriuretic Peptide (ANP), which is a vasodilator hormone and helps elicit natriuresis (excretion of sodium). Some studies have also shown a reduction in proteinuria as a result of normalisation in blood pressure.

These effects may be beneficial to clients with renal disease. With immersion there is stimulation of renal blood flow. The decrease in plasma renin activity causes a decrease in renal sympathetic activity which in turn decreases renal vascular pressure and increases urine, sodium and potassium excretion. These effects increase with increased depth and immersion time. It should be noted that in thermo-neutral water glomerular filtration rate (GFR) is altered very little. However in cooler water temperatures the GFR increases, further increasing diuresis, placing greater strain on the kidneys and increasing the risk of dehydration.

Recommendations

Encourage clients to comply with medications and dietary requirements including those clients on fluid restrictions.

Initially treat in shallower depths and limit immersion time. Gradually increase depth and immersion time as tolerated.

Clients should inform the physiotherapist if they:

- Feel too tired to maintain the level of activity
- Have unusual shortness of breath
- Have chest pain or pressure
- Feel nauseated
- Experience irregular or rapid heartbeat during or after treatment
- Leg cramps
- Dizziness or faintness

If a client reports any of these symptoms, activity should be ceased and if they do not resolve immediate medical assistance should be sought. For milder symptoms, clients should be referred to their medical practitioner for review.

Renal Dialysis Patients

Dialysis is a process for removing waste and excess water from the blood and is used primarily to provide an artificial replacement for lost kidney function in people with renal failure.

In haemodialysis, the client's blood is pumped through a dialyzer and returned to the body via venous lines.

Recommendations

- Renal clients may prefer to be treated in pools with thermo-neutral water temperatures due to difficulties with thermoregulation.
- For dialysis clients treatment sessions are ideally organised for the day after dialysis.
- Stable clients who adhere to diet and fluid regimes can exercise at moderate intensity on dialysis days.
- It is preferable to avoid exercise immediately before dialysis.
- Cover all dialysis sites with a waterproof dressing.
- Day-to-day variations in endurance are normal for dialysis clients and the schedule of treatment activity may need to be adjusted accordingly.
- Liaise with the client's medical practitioner particularly if they are having changes in:
  - Their dialysis schedule
  - Medication management
  - They are feeling unwell

Contraindications to treatment

- The client is acutely unwell.
- The client has missed more than one dialysis session.

Continuous Ambulatory Peritoneal Dialysis (CAPD)

In peritoneal dialysis wastes and water are removed from the blood inside the body using the peritoneal membrane of the peritoneum. A sterile solution containing glucose is run through a catheter into the peritoneal cavity. After a period of time the fluid is drained out through the catheter and discarded.

Recommendations

- Preferably drain fluid prior to exercise.
- The catheter site should be sealed with an appropriate waterproof dressing and cleaned post treatment.

Additional Information

- Kidney Health Australia
- Renal Resource Centre. Rehabilitation and Exercise for Renal Patients
- Kidney Research UK. Continuous Ambulatory Peritoneal Dialysis (CAPD) Factsheet

References

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Urinary Incontinence

Urinary incontinence is an accidental or involuntary loss of urine from the bladder. There is an increased risk of urinary incontinence with:

- Increasing age
- Residents of aged care facilities
- Pregnancy, childbirth, parity, menopause
- Obesity
- After some types of surgery

And a wide range of chronic conditions such as:

- Respiratory conditions
- Diabetes
- Arthritis
- Neurological conditions
- Heart Conditions
- Prostate conditions
- Osteoporosis

Recommendations

- Clients should empty their bladder prior to treatment sessions.
- In those at risk of incontinence, they may be encouraged to hydrate after immersion rather than before or during immersion.
- Catheter bags should be emptied prior to treatment and secured firmly to the leg i.e. via a strap, tubigrip, short leggings.
- Catheters may be spigotted if appropriate (refer to Appendix V).
- Delay treatment if client has a urinary tract infection (UTI). (refer to Appendix V)

References

Continence Foundation of Australia

Royal Australian College of General Practitioners. Guidelines for preventative activities in general practice (Urinary incontinence)

Australian Government. The Australian Institute of Health and Welfare. Australian incontinence data analysis and development.

Autonomic Dysreflexia

Autonomic Dysreflexia (AD) is a **medical emergency** that can lead to death. It is a condition that commonly affects people with spinal cord injury (SCI) at or above T6. It is a reaction of the involuntary (autonomic) nervous system to stimulation.

Screening of patients for aquatic physiotherapy should highlight those at risk. Aquatic physiotherapists should be familiar with common causes, symptoms and management of the condition. This information can be found in the references below.

Any patient who is deemed at risk of AD should have a self-management plan.

Prior to aquatic physiotherapy it should be ensured that all the necessary resources are available to carry out the self-management should an episode of AD occur. Some self-management plans will require a carer to assist, and thus, a carer will be required during the therapy session.

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SpinalHub. Autonomic Dysreflexia

Independence Australia

The National Spinal Cord Injury Association (USA)

Rural Spinal Cord Injury Project. Treatment of Autonomic Dysreflexia for adults with spinal cord injuries

Spinal Cord Injuries Australia

Acknowledgement

Ms Mel Gregory, Senior Clinician (Physiotherapist), Victorian Spinal Cord Service, Austin Health

Epilepsy

Epilepsy is a health condition characterised by recurrent seizures and effects 3-4% of the Australian population at some point in their life. Although often recognised as a childhood condition, recent research suggests that the over 65 year age group is most at risk of epilepsy, as it can occur secondary to a stroke, respiratory or cardiac events. Up to 25% of people with cerebral palsy have epilepsy, and this increases to 48% in those with cerebral palsy and an intellectual impairment. In clients with a traumatic brain injury (TBI), epilepsy statistics range from 4.4% (mild TBI) up to 13.6% following a severe TBI. Compared to no brain injury, the risk of epilepsy can be two times higher after a skull fracture. Epilepsy also impacts 10 – 22% of people with Alzheimer's disease.

Medication is used to control or reduce the seizures of epilepsy – leaving some 80% of patients seizure free while on the medication. The further 20% continue to experience seizures despite medication. In some people, the epilepsy may completely resolve over time. Epilepsy can be considered resolved if a person is seizure free for 10 years, and for 5 of those years with no antiepileptic medications.

Physiotherapists will consider aquatic physiotherapy for clients with a range of neurological problems and other conditions which have significant risk factor for epilepsy. Whilst epilepsy poses risk in Aquatic Physiotherapy settings, a variety of management strategies can be implemented to effectively mitigate risk, allowing people with epilepsy to benefit from recreational water activities, hydrotherapy and swimming.

Recommendations

- If routine screening identifies epilepsy further questions should define the usual seizure symptoms including the type and frequency, the treatment required (medication, hospitalisation, etc), the usual duration and possible post seizure issues (e.g. fatigue, sleep, low temperature)
- An appropriate management plan outlining the risks and their mitigation strategies should be negotiated with the client / family and documented.
- The level of client supervision should directly reflect the previous seizure risk with high frequency, recent seizure activity necessitating close "standby" supervision or assistance by suitably trained staff, family, disability carers or volunteers throughout the entirety of the session.
- Levels of supervision may be progressively stepped down where there is a stability of symptoms and no seizure activity. Recommendations should align where possible with those given in other activities / environments eg, driving restrictions.
- Conversely, where there is uncontrolled frequent seizure activity but no significant risk to the client due to having effective handling and management strategies in place, it is possible for hydrotherapy to continue even after a seizure.
- Avoiding underwater activity is generally recommended in uncontrolled epilepsy (status epilepticus).
- Breath holding should be avoided (hypoventilation may be a trigger for seizures)
- Maintain hydration; dehydration may be a risk factor for seizure activity in some individuals.
- Be aware that some medications for epilepsy may cause drowsiness and diminish attention span, adding to risk factor in a pool situation.

Management of a seizure in the Hydrotherapy Pool:

If a client has a seizure in the pool

- Get the client quickly to a safe breathing position (generally supine) with their mouth out of the water

- Firmly support the head; in some cases a person having a seizure will extend their head backward. Hydrotherapy collars may not be enough to prevent immersion of the head in this circumstance. Resting the client's head on the therapist's or carers shoulder in a modified head lock position, as used in pool rescue, will prevent immersion of the mouth
- If the client has not breathed in or aspirated water, there is no immediate urgency to get them out of the pool
- The client should be assisted to exit the pool, in the safest way, as soon as feasible after a seizure
- Follow the individual's seizure management plan once the event is over

References

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Oncology / Cancer

People diagnosed with cancer are a growing population in Australia with a five year survival rate of 65% for men and 67% for women. Cancer has been identified as a National Health Priority and is considered a chronic disease.

Clients may attend aquatic physiotherapy at any point in their cancer journey. Some will be managing pain, mobility issues or terminal illness, others are needing rehabilitation including building strength and fitness, improving balance, perhaps while managing other complications (eg osteoporosis). Exercise may also decrease cancer recurrence and decrease the risk of developing a secondary cancer.

There are some broad guidelines that can be considered before accepting a client for hydrotherapy.

Some cancer treatments may have a negative health effect as a result of occupational contact, other treatments may put the individual at risk due to irritation (eg, skin in radiation therapy) or infection due to reduced immune response.

It is reasonable that each individual institution will have their own guidelines for oncology patients. However there are now many more clients being treated for their cancer at a community level and living at home. Each individual presenting for aquatic physiotherapy management should be screened appropriately and any exclusion should be based on risk assessment on a case by case basis

Radiation

Radiation therapy for cancer may lead to various side effects including localised skin irritation, fatigue, lung related issues (including pulmonary emboli), mouth ulcers and localised pain. Radiation therapy can also cause decreased white blood cell count. There are other side effects depending on the site of the cancer and therefore the site of irradiation.

Exercise, when possible is generally considered beneficial.

Making a decision about Aquatic physiotherapy during /after radiation will depend on the oncologist, the type of cancer and site of radiation, the side effects for the type of cancer and the quality of the pool being considered for treatment. Some people will have chemotherapy in conjunction with radiation therapy.

Heat may irritate the site irradiated. Hydrotherapy pools are generally thermo-neutral so should not cause excessive heating. Spas are generally warmer so care should be taken.

Where there is no open, erythemic (red), or irritated rashy skin areas aquatic therapy may be possible. Many people have attended aquatic therapy sessions soon after radiation, and in some cases during, but general consensus is that a radiation oncologist should approve this intervention.

Where skin is dry and easily irritated it is possible to apply the lotion/emollient/moisturiser (if any) recommended by the radiation oncologist just prior to aquatic therapy to act as a protective layer. It need only be applied to the area treated.

Recommendations

- Seek advice from a radiation oncologist.
- If the skin has broken areas hydrotherapy would be contraindicated.
- Chlorine can be drying to the skin. Some pools will be better managed than others and new pool disinfection systems help minimise skin effects for all users. Avoid poorly managed pools and those that are excessively chlorinated (some learn to swim pools).
- Rinse the area well after immersion.

- Pat dry after rinsing. Avoid towelling vigorously to protect the skin
- If the client is immuno-compromised also refer to chemotherapy and cytotoxics

Chemotherapy

Side effects from chemotherapy can include fatigue, skin sensitivity, mouth sores/ulcers, compromised immune system (low white cell count/neutropenia), vomiting and diarrhoea.

Aquatic physiotherapy may be recommended in the management of a range of cancers and other conditions that may be treated with cytotoxic agents.

Exercise is generally considered beneficial.

No clear guidelines could be found for white cell/neutropenia levels at which hydrotherapy should be avoided. “Public” pools and “learn to swim” pools who don’t routinely screen users and act accordingly to prevent infection control issues may provide a greater risk to the immuno-compromised than a well-managed hydrotherapy pool with careful screening and monitoring in place. Explaining that difference between a hydrotherapy pool and other pools may assist a doctor in his decision to refer to aquatic physiotherapy.

Cytotoxic agents may be teratogenic, mutagenic and/or carcinogenic when used for humans. When in a swimming pool other users (including staff and clients) may be at risk of exposure through the cytoxic agent’s metabolites that may be present in the patient’s body fluids (urine, faeces and vomit, and to a lesser extent blood and other body fluids) for a period of time after cytotoxic therapy. If the patient is continent and does not have urgency they may be able to use a hydrotherapy pool.

Level of risk can be gauged by screening clients who present for aquatic physiotherapy. If cytotoxics or Disease Modifying Anti Rheumatic Drugs (DMARD’s) (see section on cytotoxic medications) are being used by a client further questioning is required. In particular the name of the drug being used and the dosage as well as more detailed questioning relating to co-morbidities including incontinence, diarrhoea, nausea and vomiting are required.

Once this information is established, precautions for each medication may be considered. If co-morbidities exist, these can be risk managed separately, and then in conjunction with excretion times for the drug being taken. The excretion time for most drugs can be found by viewing a drug database or product information sheet. The Australian Government Therapeutic Goods Administration website at www.ebs.tga.gov.au has readily accessible consumer information for each drug as do other online pharmaceutical databases.

Within an organisation an aquatic physiotherapist can also consider how a client is managed in other circumstances (for example in the ward if an inpatient) and follow those guidelines through to the hydrotherapy department.

Major cancer treating centres with aquatic physiotherapy departments may have developed aquatic physiotherapy precautions around clients in this area. It is important to realise that an overall exclusion for all patients on these medications will exclude many people who would otherwise benefit from aquatic physiotherapy.

Recommendations

- A decision to include or exclude a patient from aquatic physiotherapy should be based on a risk assessment on a case-by-case basis.
- Where possible establish links with major allied health oncological services with aquatic physiotherapy services that have investigated this issue and developed protocols for possible inclusion, rather than complete exclusion policies.

- Consulting the oncologist involved may be part of the process of screening in some cases but in many areas this will not necessarily be practical.
- Screen carefully for all medications and co-morbidities.
- If the patient has urinary or faecal urgency or incontinence, or vomiting or diarrhoea the patient should be excluded for a period defined by standard precautions and the excretion time for specific cytotoxic agents.
- Seek advice or consult material safety data sheets for specific medication issues, side effects and specific excretion times.
- Screen the client at each visit as to any current symptoms of diarrhoea or vomiting.

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Cytotoxic Agents and Disease Modifying Anti Rheumatic Drugs (DMARD's)

There are many patients who are referred for Aquatic physiotherapy who may be being treated with cytotoxic agents including some Disease Modifying Anti-Rheumatic Drugs (DMARDS). Many cancers, rheumatoid arthritis and multiple sclerosis are some of the conditions that fit into this category.

The dosage of medication will vary between conditions. For example the dosage of Methotrexate (a DMARD) may be 10-30 mg once per week compared to a dosage of 1000mg per treatment cycle in cancer management. Risk in terms of aquatic physiotherapy will vary also.

A decision to exclude a patient from aquatic physiotherapy should be based on a risk assessment on a case-by-case basis.

The risk is based on occupational exposure of staff and other clients in the pool to the cytotoxic agents' metabolites contained in patient body fluids (urine, faeces and vomit). In many cases where the patient is not incontinent and does not have nausea or diarrhoea the risk is minimal or non-existent and so aquatic physiotherapy can be safely recommended.

Refer to the oncology section of this document for more information on chemotherapy, cytotoxics and DMARDS

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Acknowledgment

Rosalind Deacon. Physiotherapist/Registered Lymphoedema Practitioner. Bendigo Health

Lymphoedema

Lymphoedema commonly presents as severe swelling of the arm or the leg often as a result of cancer, treatment of cancer (including surgery and radiation), surgical trauma, other trauma or infection.

Physiotherapy and lymphatic massage are well established as management strategies for control of swelling in lymphoedema.

Physiotherapy prescribed aquatic exercise has gained support with growing evidence supporting its role in the management of swelling and other positive evidence based outcomes. Hydrostatic pressure provides a consistent compression gradient that also assists in returning lymph fluid into the vascular system.

Water temperature may play a role in the best outcome for aquatic based lymphoedema exercise. Various articles suggest that water temperature should not exceed 34.5 degrees, other suggest 32-33 degrees as an optimum temperature. Some articles also suggest that too cool a pool may have a detrimental effect on limb volume by increasing muscle tone. In considering water temperature the ambient air temperature and humidity should also be considered, as these will influence the effect the water temperature has on the temperature regulation of the immersed client.

Recommendations

- Monitor skin integrity to minimise risk of infection.
- Monitor pool temperature and patient specific outcomes to ensure positive results.
- Encourage careful drying of the limb and where appropriate refit compression garment immediately after aquatic therapy
- If lower limb lymphoedema socks or pool specific shoes are recommended to avoid abrasion.
- In upper limb lymphoedema water depth should be at least to the clavicle to optimize lymphatic flow.

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Acknowledgment

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Pregnancy

Water based aquatic physiotherapy exercise and treatment offers several advantages for pregnant women including; decreased loading on soft tissue and joints, reduced lower limb oedema and improvement in cardiovascular fitness. Pregnant women may find it more difficult to dissipate heat, though other mechanisms come into play to help regulate temperature in pregnancy, including increased blood volume and increased surface area. As a precaution temperature guidelines are set lower for pregnant women to allow for the possibility of increasing body temperature with activity. The major concern is that of increased core temperature having a possible effect on the developing spinal cord of the foetus or other developmental abnormalities during the first trimester (based on animal studies). However no adverse effects on the human foetus have ever been reported to occur during land or water exercise in pregnancy. Extra care with temperature control should be taken in the first trimester when the foetus is at risk. Pregnant women are advised not to take spas or saunas and to exercise with care in very hot and humid environments (land or water).

Recommendations

- Liaise if necessary with the patient's obstetrician if there are complications with the pregnancy or co-morbidities including:
    - Hypertension
    - Blood pressure related medications
    - Multiple pregnancies
    - Heart problems or vascular disease
    - Renal Disease
    - Diabetes
- The Royal College of Obstetricians and Gynaecologists UK, have a more extensive list for conditions requiring medical supervision while undertaking exercise in pregnancy and also warning signs for terminating exercise.
- If a patient experiences any bleeding they should not attend for their pool session and immediately be referred to their doctor for review.
- Water temperature for moderate intensity exercise is recommended at no more than 32 degrees Celsius.
- Water temperature for gentle exercises or aquatic physiotherapy treatment is recommended at no more than 35 degrees Celsius.
- Ambient pool environment will affect temperature gain. The use of fans and ventilation (eg, opening doors and windows) may assist temperature control.
- Ensure adequate hydration before during and after an exercise session.
- Women should be encouraged to stop exercising (land or water) if they feel uncomfortably hot, they should hydrate and take appropriate action to allow cooling (eg, move shallower, decrease exercise intensity, remove themselves from the environment).
- Women should be encouraged to self-pace intensity of their own exercise. The Borg scale is commonly used to limit intensity and women should be directed to work somewhere between 12 -14 (somewhat hard) on the 6-20 Borg scale, or use the "talk test" allowing the women to maintain a conversation during exercise.
- Women who are overweight may need to be more aware of temperature and their personal comfort as they may not regulate temperature as well.
- Pregnant staff members need to consider these simple guidelines in determining how long they spend in the pool and what level of activity they perform in the pool. By definition a thermo-neutral pool is unlikely to create a large temperature increase, even in pregnant women, without significant levels of exercise. Unfortunately the biggest risk of temperature related issues to the foetus is in the first trimester when woman may not know if they are pregnant. Any staff / women working in a heated pool should be aware that self-regulation of

temperature is a very effective means of controlling any possible rise in core temperature. If a woman feels uncomfortably hot she should hydrate, remove herself from the environment or use other appropriate measures to regulate her temperature. More regular breaks and modification of the level of activity may be required. There is no suggestion that foetal problems related to temperature occur outside the first trimester, or as a result of exercise (land or water) though pregnant women are always advised to monitor temperature carefully throughout pregnancy.

References

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APPENDIX V: HYDROTHERAPY POOL WATER MAINTENANCE

Pool and Environmental Cleaning and Maintenance

Hydrotherapy pool water that is incorrectly maintained can result in a:

- Health risk to users including the spread of infection
- Discomfort to users including respiratory, skin and eye irritations
- Damage to equipment and fittings
- Inefficient and costly operations

Water quality is dependent on:

- Filtration
- Water balance
- Disinfection

The Australian Standards Hydrotherapy Pools AS 3979-2006 contains information on Operating Requirements (Section 3). This includes recommendations on circulation, filtration and sanitization of pool water, as well as water balance and frequency of pool water testing.

Each State and/or Municipal Council has minimum guidelines for pools and spas available for public use. These may vary from State to State. They will include routine tests with recommendations for frequency of testing. Many local Council's run Pool Plant Operator's courses for those responsible for the maintenance of the pool water quality.

Hydrotherapy pools are not spas. There usually are separate guidelines for the maintenance and chemistry of spas.

Pool operators are advised to regularly consult and implement all relevant acts, regulations, legislation, codes of practice and guidelines as they are reviewed and updated.

Additional Information

- Centers for Disease Control and Prevention. Twelve (12) Steps for Prevention of Recreational Water Illnesses (RWI'S) (for Pool and Aquatics Staff)
- World Health Organisation. Water Sanitation and Health (WSH) - Guidelines for safe recreational waters. Volume 2 - Swimming pools and other similar recreational water environments (2006). Chapter 5 Managing Water and Air Quality
- Australian Capital Territory Government Health Directorate. Swimming/Spa Pools Code of Practice 1999
- New South Wales Government, Department of Health. Swimming Pools and Spa Pools (Public)
- Queensland Government, Department of Health. Communicable Diseases Unit, Public Health Services. Queensland Health Swimming and Spa Pool Water Quality and Operational Guidelines (2004)
- Government of South Australia, Department of Health. Standard for the Inspection and Maintenance of Swimming Pools and Spa Pools in South Australia
- Government of South Australia, Department of Health. Standard for the Operation of Swimming Pools and Spa Pools in South Australia
- Government of South Australia, Department of Health. Standard for the operation of Swimming Pools and Spa Pools in South Australia - Supplement B Hydrotherapy Pools
- Tasmanian Government, Department of Health and Human Services. Public Health Act 1997. Recreational Water Quality Guidelines 2007

- Department of Health, Victoria. Public Health and Well Being Regulations (2009). Swimming Pools and Spas
- Government of Western Australian, Department of Health. Code of Practice for the Design, Construction, Operation, Management and Maintenance of Aquatic Facilities
- Standards Australia. AS 3979-2006 Hydrotherapy Pools

Pool Equipment used in Treatment

A variety of equipment is used in the treatment of clients in water. These are made up of different materials (ie, plastics, rubber, foam). Equipment should be stored in a way that allows it to dry out to prevent creating an environment which may be susceptible to the growth of organisms. Damaged equipment can be a potential source of microbial colonization. Extended use of equipment in pools can lead to deterioration due to the effect of pool chemicals.

Inflatables

- Various inflatable floats are commonly used in treatment. The amount of air in these devices is often modified dependent on the needs of each client. To inflate the floats a mouth piece is required. The mouth piece could be a potential source of infection.

Snorkels

- The mouth piece and tubing of snorkels and other blowing/breathing devices used in treatment can be a potential infection risk.

Recommendations

- It is suggested a small hand or electric pump or large syringe is used to inflate/deflate floats to prevent the risk of cross infection. Clients should be discouraged from altering their own inflatables.
- Snorkels and other breathing/blowing devices require dis-infection between uses. Alternatively clients can supply their own snorkel.
- Equipment should be regularly checked for any splits, cracks or faults.
- Hard plastic/rubber devices should be wiped over regularly after use.
- Foam/mesh/rubber/plastics should be stored in a way that the equipment can completely dry out.
- It is preferable to have equipment that is being used throughout the day, to be on a trolley or stand to avoid it sitting on the pool deck.
- Each facility should have a documented check and clean equipment schedule, including responsibilities of staff and frequency of cleaning.

Cleaning

- Commercial disinfectants (ie, Milton may be used to disinfect snorkels and other breathing/blowing devices).
- If any equipment develops a scum line, sliminess or other signs of ineffective hygiene then it will require cleaning (refer to Appendix III: Pseudomonas Aeruginosa). Use a hypochlorite and water solution up to 10mg/l with appropriate personal protective equipment. Wipe over by (gloved) hand ensuring any biofilms are removed. Give smaller equipment a weekly soak in a 10mg/l solution.

MRSA and VRE Patients

- For patients colonized with VRE or MRSA all equipment used in treatment and transfers requires immediate cleaning post –treatment as above. Some facilities may prefer to isolate equipment used by individuals with MRSA or VRE and apply terminal cleaning to the equipment after discharge of the patient (refer to Appendix III: MRSA and. VRE).

References

Government of South Australia, Department of Health. Infection Control Service. (Fact Sheet – Dilutions of Sodium Hypochlorite)

Australian Government, National Health and Medical Research Council. Australian Guidelines for the Prevention and Control of Infection in the Healthcare Setting. B1.4.2. Routine Environmental Cleaning

Pool chemical management: Occupational Health and Safety considerations.

Pool chemicals are frequently classed as Dangerous Goods or Hazardous substances and demand the respect of pool operators and its visiting clinical staff. Standardised procedures should exist where chemical handling is practiced and when clinical staff are expected to assist in, or manage a response to, a chemical emergency event.

Material Safety Data Sheets and Personal Protective Equipment

Material Safety Data Sheets (MSDS) have information about a substance's properties, ingredients, hazards, precautions for use and contacts for further information. The MSDS for each substance used must be readily available and known, and the preparation date of the MSDS must be no older than 5 years from the current day's date. MSDS may outline the use of specific Personal Protective Equipment (PPE). Instructions for the use of PPE are supported, where practicable and necessary, by other specific procedures that facilitate the correct selection and use of PPE.

Categories of PPE common in Pool chemical handling include (but are not limited to)

- Eye protection -- goggles, glasses, shields, visors
- Respiratory protection -- respirators, disposable face masks, breathing apparatus
- Foot protection -- safety boots
- Body protection -- water proof aprons, overalls
- Hand protection – gloves

Where it is necessary to use PPE it must be appropriately selected, used and maintained. Managers should have processes in place that monitor PPE selection, use, condition, cleanliness, storage and stock replenishment. PPE must conform to an Australian Standard (AS) and /or industry standard requirements or guidelines.

Chemical Handling

Best practice considers a "cradle to the grave" chemical pathway e.g. chemical ordering, delivery, handling, storage, staff training and disposal. Ideally, ordering, handling, storage and disposal protocols are developed and documented in Safe work procedures prior to any new chemical being admitted on to the site. Strategies should be documented that prevent the cross contamination of different chemicals.

Chemicals are diluted where practicable prior to their introduction to the pool. Dilution of chemicals improves the effectiveness of the chemicals whilst reducing the potential for chemical related pool damage or splash injury. Only fresh water should be used during any chemical dilution process NOT pool water. Chemicals are carefully added to water; water is not added to undiluted chemical to minimise splash injury risk. Add chemicals at prescribed rates; under dose the pool when in doubt. Chemicals are delivered to the pool in a way that nullifies risk to attending clients.

Staff training

Staff who handle chemicals as part of their position should be funded to complete a commercial pool and spa water quality maintenance training course. Only trained staff should handle chemicals; this includes delivery and disposal considerations.

Chemical delivery and storage

Where chemicals are stored, appropriate security is in place and cleanliness is practiced to minimise the amount of fuel that could enhance a fire in the event it occurred. Chemicals are stored only in their original containers and effectively segregated as per safe working procedures for each chemical. Chemicals are delivered directly to their clearly marked bunding where possible.

Chemical spills

Reference to the local MSDS should be made to ensure the spill is cleaned up safely with the appropriate personal protective clothing and equipment in use. Spills shall be cleaned up immediately if practicable. Alternately, the spill shall be contained until such time as the spill can be cleaned so as not to create a hazard to those in the vicinity or to contaminate the environment. If the spill is assessed to be a significant spill and greater resources are required, the appropriate health authority must be called by dialling 000.

Chemical disposal

Chemical waste must be segregated as far as possible to reduce the risk of a dangerous reaction. The requirements for the storage of chemical waste are similar to the requirements for the storage of hazardous substances and dangerous goods. The chemicals are to be packaged ready for collection by an Environmental Protection Authority (EPA) licensed transport contractor. This waste is then transported for EPA approved treatment or disposal.

References

Dangerous goods Act 1985. Retrieved Tuesday, 30 December 2014 from Victorian Consolidated Legislation:

Dangerous Goods (Storage and Handling) Interim Regulations 2011 (SR NO 134 OF 2011). (VIC). Retrieved Tuesday, 30 December 2014 Subdivision 4--Plant and structures; Reg.419: Containers for bulk dangerous goods

Standards Australia. (2006). *Hydrotherapy Pools Section 2.5 Storage Areas (AS3979:2006)*. Sydney

WorkSafe Victoria. (2013). Material safety data sheets Retrieved Tuesday, 30 December 2014

Faecal Accidents and Blood or Body Fluid Spills

Faecal Accidents

Faecal accidents can occur in any pool for a variety of reasons. Toddlers, babies, other incontinent clients, people with disabilities, older frail clients and clients who may have had surgery, are in pain or have altered bowel routines may all be at a higher risk of having a faecal accident.

All pool facilities should have a documented faecal accident policy and blood or body fluids spill policy. All staff should be trained with these policies and know how to implement them when required. Management will vary depending on the nature of the accident.

Each facility should review their state guidelines and further if necessary.

It is recommended that pools document faecal accidents as part of their pool log, including whether solid or loose matter is released, actions taken and problem solving required. In pools where incidents may occur more regularly, this can assist in problem solving risk strategies to avoid further incidence.

Recommendations

- No client should attend if they have used a laxative/enema within the previous 24-48 hours or if they have used a laxative /enema with no outcome (bowel movement).
- When clients are identified as having a higher risk of faecal accident, appropriate clothing will often be worn to contain /minimise any possible incident. In toddlers, babies and small children this will involve water specific nappies and generally firm fitting leggings over the top. In bigger children and adults some nappies may be appropriate, but firm fitting leggings offer a second layer of protection. Commercial incontinence pants are also available but usually a second firm fitting outer layer (eg, bike pants) are worn as well.
- Anal plugs and buttock-taping can be used in some situations/conditions (eg, spina bifida, spinal cord injury).

Exclusions

There are many ways of problem solving/managing faecal incontinence for hydrotherapy pool clients. In some situations however it may be appropriate to exclude a client with unmanageable faecal incontinence who has repeated episodes of incontinence in the pool and does not respond to management strategies.

Some pools may have incontinence as exclusion criteria and exclude all babies, toddlers and other incontinent clients. However, it may be inappropriate (and discriminatory) to exclude only older children and adults with incontinence when allowing non-toilet trained infants into the pool.

Many pools are inclusive and with good risk management strategies and staff and client education meet all health and safety guidelines.

References

New South Wales Government, Department of Health. Swimming Pools and Spa Pools (Public):

- Faecal Incident Loose Stool Response Plan
- Faecal Incident Solid Stool Response Plan
- Vomit Incident Response Plan
- Hard Surface Incident Response Plan (vomit, blood or faeces)

Department of Health, Victoria. Pool Operators Handbook (Operational Control and Management)

Queensland Government, Department of Health. Queensland Health Swimming and Spa Pool Water Quality and Operational Guidelines (2004) (Patron Behaviour and faecal accident policy)

Government of Western Australia, Department of Health. Environmental Health Guideline. (Response to a faecal incident in a public swimming pool in Western Australia)

Centers for Disease Control and Prevention. Vomit and Blood Contamination of Pool Water

Centers for Disease Control and Prevention. Fecal Incident Response Recommendations for Pool Staff

Chrostowski PC, Foster SA (2004) Swimming pool shock treatment. *Journal of Environmental Health* May 66(9), 26-7

Australian Government, National Health and Medical Research Council. Australian Guidelines for the Prevention and Control of Infection in the Healthcare Setting (2010). (Management of blood and body substance spills)

Australian Government, National Health and Medical Research Council. Australian Guidelines for the Prevention and Control of Infection in the Healthcare Setting (2010). (Management of Multi-Resistant organisms and Outbreak Situations)

Continence Management and Spina Bifida

- Continence Management Checklist
- Medical treatment of constipation and diarrhoea

Mortensen N, Humphreys MS (1991) The anal continence plug: a disposable device for patients with anorectal incontinence. *Lancet* Aug 3;338(8762):295-7

APPENDIX VI: LITERATURE REVIEW PROCESS

Each area of these guidelines has undergone a literature review. Documents researched included articles from peer reviewed journals and documents produced by governments and peak bodies. Journals were sourced using Medline and CINAHL as they were recognised as the largest and most likely source of relevant aquatic physiotherapy information. Due to resource constraints there was no attempt to categorise the level of evidence. Ensuring information came from these reliable and reputable sources assisted in maintaining quality of the information.

Due to changing practices in swimming pools and hydrotherapy pools such as, automated dosing systems, pool chemical monitoring, air ventilation systems, pool design and management of water quality and environment, only articles and guidelines from the year 2000 onwards were included, to best reflect current practice.

It should be noted that a number of the peer reviewed articles were sourced from other countries. Their practices and regulations may vary from those in Australia.

Aquatic physiotherapists work in hydrotherapy pools, nursing home pools, special school pools, private-practice pools, private and public pools. Therefore information related to all these areas was sourced to complete this document.

Literature Review Process-Safety

A systematic literature review was performed by the aquatic physiotherapy guidelines project officer (Maureen MacMahon). The electronic databases of PEDro, Cochrane Library, Medline, CINAHL and Google were searched from 2000 May 2012. Only websites from governments, registered peak bodies and professional organisations were utilised when searching via Google.

The search was not limited by type of publication or study method, but only articles in English were included. Authors were not contacted.

Main heading terms used were: swimming, swimming pools, hydrotherapy, hydrotherapy pools, aquatic physiotherapy. These were searched with “AND” medical referrals, staff/client ratios, emergencies, safety, drowning, rescues, rescue training, safety, safety equipment, resuscitation equipment, pool orientation, pool security, slips and falls, bather screening, record keeping, storage and handling of pool chemicals, pool policies and procedures, pool risk management, pool responsibilities, occupational health and safety, pool hire agreements. (See Table 2A for search results).

It should be noted that a number of the peer reviewed articles were sourced from other countries. Their practices and regulations may vary from those in Australia.

Inclusion and Exclusion Criteria

Aquatic physiotherapists work in hydrotherapy pools, nursing home pools, special -school pools, private practice pools, private and public pools. Therefore, information related to all these areas was sourced to complete this document.

Due to the limited research available all articles found relevant to these areas were included.

Due to changing practices in swimming pools and hydrotherapy pools such as, resuscitation and rescue equipment and training, automated dosing systems, pool chemical monitoring, pool design and management of water quality and environment, only articles and guidelines from the year 2000 to May 2012 were included, to best reflect current practice.

Only articles in English were included. (See Table 2A for search results)

Table 2A Search Results for Safety Literature Review.

Topics-Literature search of Cochrane Collaboration (CC), PEDro(P), Medline(M), CINAHL (C)	**Main Headings-Swimming/Swimming Pools, Hydrotherapy/Hydrotherapy Pools, Aquatic Physiotherapy**	**Results**
2.1 Medical Referrals	CC0(0), P0(0), M0(0), C0(0)	0
2.2 Staff/Client Ratios	CC0(0), P0(0), M0(0), C1(1)	Pelletier AR, Gilchrist J. Fatalities in swimming pools with lifeguards: USA, 2000-2008. *Injury Prevention: Journal Of The International Society For Child And Adolescent Injury Prevention.* 2011 Aug; Vol. 17 (4), pp 250-321270060. PMID:
2.3 Emergencies/Safety/Drowning	CC0(0), P0(0), M0(14), C2(21)	Schwebel DC, Jones HN, Holder E, Marciani F. Lifeguards: a forgotten aspect of drowning prevention. *Journal of Injury & Violence Research.* 2010 Jan; Vol. 2 (1), pp1-3. PMID: 21483192. *Wykle MO. Safety First. *Rehab Management*. 2003 Jul; Vol. 16 (6), pp24-7, 50. PMID: 12861773.
2.4 Rescues/Rescue Training	CC0(0), P0(0), M0(0), C0(3)	0
2.5 Safety Equipment/Resuscitation Equipment	CC0(0), P0(0), M1(94), C0(94)	Dworkin G. Responding to Aquatic Facilities. *Emergency Medical Services*. 2001 Jul; Vol. 30 (7), pp 78-81, 88. PMID: 11458739
2.6 Pool Orientation	CC0(0), P0(0), M0(1), C0(0)	0

2.7 Pool Security	CC1(1), P0(0), M0(0), C1(7)	Pearn JH, Nixon JW, Franklin RC, Wallis B. Safety legislation, public health policy and drowning prevention. International Journal of Injury Control and Safety Promotion. 2008 Jun; Vol. 15 (2), pp 122-3. PMID: 18642170. Thompson D, Rivara F. Pool Fencing for Preventing Drowning of Children. *The Cochrane Library.* June 2010.
2.8 Slips and falls	CC0(0), P0(0), M0(1), C0(0)	0
2.9 Bather Screening	CC0(0), P0(0), M0(0), C1(1)	Franklin R, Scarr J, Pearn J. Reducing drowning deaths: the continued challenge of immersion fatalities in Australia. *The Medical Journal of Australia* 2010; 192 (3): 123-126
2.10 Record Keeping	CC0(0), P0(0), M0(4), C0(0)	0
2.11 Storage and Handling of Pool Chemicals	CC0(0), P0(0), M1(1), C3(5)	Shippert B. Pool Chemical Blast Injury. *Annals of Emergency Medicine,* April 2010; Vol 55 (4): 370-72. Thomas L. Review of acute chemical incidents involving exposure to chlorine associated with swimming pools in England and Wales, June-October 2007. *Journal of Public Health* 2008; 30 (4): 391-397. Acute Illness and Injury from Swimming Pool Disinfectants and Other Chemicals-United States, 2002-2008. Centres for Disease Control and Prevention. *Morbidity and Mortality Weekly Report*. MMWR October 7, 2011/ Vol. 60 / No.39. Pool Chemicals-Associated Health Events in Public and Residential Settings-United States, 1983-2007. Centres for Disease Control and Prevention. *Morbidity and Mortality Weekly Report*. MMWR May 15, 2009/ Vol. 58 / No.18; 489-493.
2.12 Policies and Procedures	CC0(0), P0(0), M0(0), C0(1)	0

2.13 Risk Management	CC0(0), P0(0), M0(15), C0(0)	0
2.14 Pool Responsibilities	CC0(0), P0(0), M1(2), C0(0)	Dworkin et al
2.15 Occupational Health and Safety	CC0(0), P0(0), M1(3), C0(0)	Barss P, Djerrari H, Leduc BE, Lepage Y, Dionne CE. Risk factors and prevention for spinal cord injury from diving in swimming pools and natural sites in Quebec, Canada: a 44-year study. *Accident; Analysis and Prevention.* 2008 Mar: Vol 40 (2), pp787-97; PMID: 18329434.
2.16 Pool Hire Agreements	CC0(0), P0(0), M0(0), C0(0)	0

Google Searches

Standards Australia. AS 3979-2006 Hydrotherapy Pools

Department of Health, Victoria. Pool Operators Handbook

Centers for Disease Control and Prevention. Recommendations for Preventing Pool Chemical-Associated Injuries

World Health Organisation. Water Sanitation and Health (WSH) - Guidelines for safe recreational waters. Volume 2 - Swimming pools and other similar recreational water environments (2006)

State Government Bodies

Australian Capital Territory Government Health Directorate. Swimming/Spa Pools Code of Practice 1999

Northern Territory Government, Department of Health. Public Health Guidelines for Aquatic Facilities (2006)

New South Wales Government, Department of Health. Swimming Pools and Spa Pools (Public)

Queensland Government, Department of Health. Communicable Diseases Unit, Public Health Services. Queensland Health Swimming and Spa Pool Water Quality and Operational Guidelines (2004)

Government of South Australia, Department of Health. Standard for the Inspection and Maintenance of Swimming Pools and Spa Pools in South Australia (1998)

Government of South Australia, Department of Health. Standard for the Operation of Swimming Pools and Spa Pools in South Australia (1998)

Government of South Australia, Department of Health. Standard for the operation of Swimming Pools and Spa Pools in South Australia - Supplement B Hydrotherapy Pools

Tasmanian Government, Department of Health and Human Services. Public Health Act 1997. Recreational Water Quality Guidelines 2007

Department of Health, Victoria. Public Health and Well Being Regulations (2009). Swimming Pools and Spas

Government of Western Australian, Department of Health. Code of Practice for the Design, Construction, Operation, Management and Maintenance of Aquatic Facilities

Professional Bodies

Chartered Society of Physiotherapy (UK). Guidance on good practice in hydrotherapy

Australian Physiotherapy Association. Hydrotherapy Rescue Award (Royal Life Saving Society Australia) Course

Royal Life Saving Society Australia. Guidelines for Safe Pool Operations 2006

Aquatic Therapy and Rehab Institute (USA). Safety Standards for Aquatic Therapy and Rehabilitation Practitioners

Standards Australia. AS 3979-2006 Hydrotherapy Pools

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Jimenez C, Regnard J, Robinet C, Mourot L, Gomez-Merino D, Chennaoui M, Jammes Y, Dumoulin G, Desruelle A, Melin B (2010) Whole body immersion and hydromineral homeostasis: effect of water temperature. *European Journal of Applied Physiology* 108:49-55

APPENDIX VII: RESULTS OF DELPHI PROCESS

Email info@physiotherapy.asn.au to receive the results of the Delphi process