Hydrotherapy Pools – New Guidance and the Impact on the Aquatic Physiotherapist

Sarah Wratten  MMT HT Aquatic Physiotherapy Clinical Specialist / Consultant
What is new in the new guidance?

• Definitions
• Governance especially in Healthcare Settings
  - Water Safety Group and Water Safety Plan
  - Role of Designated Aquatic Physiotherapist
  - Surveillance and Communication
  - Pool Safety Operating Procedure (PSOP)
• Health & Safety Recommendations
• Design
• Baby Swimming Groups
Definitions

• Aquatic physiotherapy vs hydrotherapy

“A therapy programme utilising the properties of water, designed by a suitably qualified physiotherapist specifically for an individual to maximise function, which can be physical, physiological or psychological.

Treatments should be carried out by appropriately trained personnel, ideally in a purpose built, and suitably heated hydrotherapy pool.” (ATACP 2007)

• Hydrotherapy Pool

“A warm water pool designed for aquatic physiotherapy treatment and rehabilitation. They are used to treat people post injury, surgery, or for medical condition management.”
Governance in healthcare settings

Water Safety Group and Water Safety Plan

- Advocates all water used in healthcare is managed by a Water Safety Group (WSG) with a Water Safety Plan (WSP)

- CQC (RQIA in NI) inspections will audit compliance

- The WSG is a multidisciplinary group with responsibility for all water used within the healthcare environment for patients, visitors and staff including hydrotherapy pools

- The WSG take overall responsibility for ensuring there is a suitable PSOP including training, competency, risk assessment
Role of the Designated Aquatic Physiotherapist

• **Point of contact** for all involved with the hydrotherapy pool

• **Needs sufficient training to understand:**
  - All potential microbial, chemical and physical hazards and the risks to health associated with them
  - Patient needs and risk factors
  - Pool plant flow dynamics and treatment
  - Monitoring requirements and what results mean
  - Appropriate remedial actions
  - Pool closing / reopening criteria
Surveillance and Communication

• Effective working relationships between the designated aquatic physiotherapist, trained pool operators/engineers and microbiologists to ensure:
  - smooth running and daily maintenance
  - an accurate daily log (medico-legal document) which contains details of:
    - chemical disinfection
    - pool water quality monitoring
    - water and air temperatures
    - humidity levels
    - backwashing
    - microbiological testing
The Pool Safety Operating Procedure (PSOP)

• What should be included in it?
  - Therapy versus Plant operation
  - Clear responsibilities for all involved with the pool to ensure smooth running
  - Stated procedures for all potential hazards that could occur
The PSOP continued

• Start with a statement of policy and description of the pool including size, depth, steps, gradient, handrails, type of hoist/s, pool volume, turnover period and bather load, type of disinfection and filtration

• How do you know what your bather load is?

  - **Instantaneous** is the number of bathers you can put in the pool at one time. Use 2m² per bather (ATACP space recommendation vs PWTAG water quality 2.7m² for 1-1.5m depth of water).

  - **Operational** is the number of bathers you can put in the pool in one day (12 hour period). To calculate this use 25-50% of 2.7m² per bather x 12
Bather load example calculations:

An example for a 5m x 10m pool = 50m² but exclude any steps therefore say 48m²:

- **Instantaneous** divide by 2m² therefore $48 \div 2 = 24$ bathers

- **Operational** divide by 2.7m² therefore $48 \div 2.7 = 18.5 \times 12 = 222$ at 50%

  $= 111$ bathers

*You cannot use the instantaneous bather load every session as you would exceed the operational and therefore put your water quality at risk.*

Be sensible if your water quality is suffering please reassess if your pool plant is coping with the bather load. These calculations are based on ideal turnover period (60mins or less) and filtration with coagulant so if your pool is older you may have to adjust your maximum bather loads.
The PSOP continued

• State the responsibilities of
  - Designated Aquatic Physiotherapist
  - Engineers / Pool operators
  - Microbiologist or laboratory
  - Cleaners

• Risk Assessment should review controls to assess if they are effective at reducing risks
  - Consider microbial, chemical and physical hazards
### Activity/Process:
**CLINICAL RA**

**Water based therapy activities in the pools**

<table>
<thead>
<tr>
<th>Ref</th>
<th>Hazard</th>
<th>RA Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Slips, falls and collisions</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>Fainting and drowning</td>
<td>Yes</td>
</tr>
<tr>
<td>3</td>
<td>Infection</td>
<td>Yes</td>
</tr>
<tr>
<td>4</td>
<td>Manual handling injury</td>
<td>Yes</td>
</tr>
<tr>
<td>5</td>
<td>Chemical injury</td>
<td>Yes</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Who is at risk:
- All staff: Yes
- Operators and/or maintenance staff: Yes
- Visitors, vulnerable groups, public, etc.: Yes
<table>
<thead>
<tr>
<th>Hazard Ref</th>
<th>RISK Associated with Hazard (How people may be harmed – type of injury or ill health)</th>
<th>Existing Control Measures (Note 2)</th>
<th>Risk Rating</th>
<th>Additional Controls Required (Note 2)</th>
<th>Review Frequency (Note 3)</th>
</tr>
</thead>
</table>
| 1          | Physical injury due to slip, fall, or collision on pool concourses or changing rooms | Staff induction to safety requirements  
Patients briefed by supervising staff member on safety requirements  
Patient supervision maximum 1:15 patients  
Floor surfaces to be kept swept of excess water  
No running in the pool environments  
No use of walking sticks or elbow crutches on the pool concourses - zimmer frames provided  
Walkways and emergency exits to be kept clear of obstructions  
Designated equipment storage areas provided  
Lesson plans detailing activities and authorization for group sessions  
Strict control of access to pool areas, patients not permitted to enter paviors without a lifeguard or clinician present | 1x1 Low | Controls adequate | Yearly |
| 2          | fainting or drowning due to physical capability or effect of immersion in warm water | All patients screened prior use of pools including swimming capability and fear of water  
All staff supervising patients in the pools to have current basic life support training and in date hydrotherapy pool evacuation training  
All emergency alarm systems to be tested weekly by designated staff | 1x3 Medium | Controls adequate | Yearly |
<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Patients not permitted to enter the poolsides without staff supervision</strong></td>
<td>H4H swimming pool patient supervision 1:15 maximum with lifeguard present. Hydrotherapy pool poolside clinician patient supervision 1:15 maximum, patient treatment by clinician within the hydrotherapy pool requires two staff members present. Diving and jumping forbidden in the hydrotherapy pool and only at appropriately signed depths. H4H swimming pool. Deep ends indicated by signage. All staff to orientate patients to the pool environment. Staff immersion not to exceed 3 hours per day. Hydrotherapy pool water temperature not to exceed 36°C, air temperature 30°C and humidity 60%. Drinking water available in the near vicinity to the pools for staff and patient re-hydration. Doors to access the pools locked after use.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Infection through physical contact or ingestion of water</strong></td>
<td>All patients must be screened for precautions and contraindications. Each supervising staff member to be aware of any precautions for patients under their responsibility. Open wounds to be covered with appropriate waterproof cover. All staff and patients to shower pre and post immersion. No outdoor shoes to be worn on the pool concourses or hydrotherapy pool changing rooms. Optimal pool water chemistry maintained and tested a minimum of three times a day with the results documented and available to view. All equipment to be cleaned with chlorinated water weekly and stored in designated, drainable storage areas.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Physical injury due to incorrect manual handling</strong></td>
<td>All staff required to use pool hoists to be appropriately trained.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**ATACCP POOL WATER TREATMENT ADVISORY GROUP**
<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Precautionary Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical injury due to physical contact or ingestion</td>
<td>All hosts to be annually serviced and weekly checked by designated staff. All staff and patients to be orientated to the correct use of pool equipment. All staff responsible for patients in the hydrotherapy pool to have completed annual evacuation training. All HDH pool lifeguards to have current appropriate training. Pool water chemistry must be tested a minimum of three times a day. No staff or patient to enter the pools if water chemistry has not been tested for appropriate period. All pool water treatment chemicals to be stored in the plant rooms only. All cleaning products to be stored in lockable allocated cupboards with restricted access. Only pool water compatible cleaning products to be used on pool concourses.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Controls adequate</th>
<th>Yearly</th>
</tr>
</thead>
<tbody>
<tr>
<td>1x2 Low</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The PSOP continued

• Referral sources

• Patient screening

• Staff knowledge and training
  
  - If a member of staff has not completed the Foundation Aquatic Therapy Course or its equivalent training to meet the syllabus then they should not treat patients in a hydrotherapy pool unsupervised
  
  - Could you evidence you are working within your scope of practice?
The PSOP continued

• Cleaning schedules / regimes
  
  - For healthcare clinical standards are required
  - Designated cleaning equipment for toilets, changing rooms and pool concourse
  - Transfer channels and grilles (including their undersides)
  - Pool floors and scum line
  - Pool covers
  - Therapy equipment
The PSOP continued

- Pool chemistry testing, recording and what to do if out of parameter

<table>
<thead>
<tr>
<th>Test</th>
<th>Acceptable Levels</th>
<th>Test period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water temperature</td>
<td>NOP 34°C – 35°C</td>
<td>3x per day</td>
</tr>
<tr>
<td></td>
<td>EAP 32°C – 35.5°C</td>
<td></td>
</tr>
<tr>
<td>Ambient air temperature in pool area</td>
<td>5°C below water temperature (max. 30°C and min. 25°C)</td>
<td>3x per day</td>
</tr>
<tr>
<td>Ambient air temperature in changing rooms</td>
<td>25-28°C</td>
<td>3x per day</td>
</tr>
<tr>
<td>Atmospheric humidity</td>
<td>50-60% (max. 60%)</td>
<td>3x per day</td>
</tr>
<tr>
<td>pH</td>
<td>NOP 7.2 - 7.4</td>
<td>3x per day</td>
</tr>
<tr>
<td></td>
<td>EAP 7.0 - 7.6</td>
<td></td>
</tr>
<tr>
<td>Free chlorine</td>
<td>NOP 1-2ppm</td>
<td>3x per day</td>
</tr>
<tr>
<td></td>
<td>EAP 0.5-3ppm</td>
<td></td>
</tr>
<tr>
<td>Total chlorine</td>
<td>1-4ppm</td>
<td>3x per day</td>
</tr>
<tr>
<td>Combined chlorine</td>
<td>The level of combined chlorine residuals should be as low as possible.</td>
<td>3x per day</td>
</tr>
<tr>
<td></td>
<td>They should never be more than half the free chlorine, and never more than 1mg/l no matter what the level of free chlorine.</td>
<td></td>
</tr>
<tr>
<td>Water clarity</td>
<td>0-10</td>
<td>3x per day</td>
</tr>
<tr>
<td>Calcium hardness</td>
<td>75-150mg/l</td>
<td>1x per week</td>
</tr>
<tr>
<td>Total alkalinity</td>
<td>80-200mg/l</td>
<td>1x per week</td>
</tr>
<tr>
<td>TDS</td>
<td>Not &gt; 1000mg/l above source water</td>
<td>1x per week</td>
</tr>
<tr>
<td>Water balance</td>
<td>Langelier saturation 12.1 ± 0.5</td>
<td>1x per week</td>
</tr>
</tbody>
</table>
The PSOP continued

- Microbiology sampling and what to do if a positive result

| Colony count (TVC) at 37°C for 24hrs | Not > 10cfu |
| Colliforms | Absent in 100ml (<10 per 100ml if not consecutive samples or E.Coli or colony count <10cfu) |
| Escherichia coli | Absent in 100ml (<10 per 100ml if not consecutive samples or colony count <10cfu) |
| Pseudomonas aeruginosa | Absent in 100ml (<10 per 100ml if not consecutive samples and no E.Coli or colony count <10cfu) |

- A record of all microbiology reports must be kept
The PSOP continued

• If any of the results are positive then a 2nd sample must be taken immediately and wait to act on the 24hr interim report unless gross contamination

• Gross contamination means either:
  • Escherichia coli >10 per 100ml with either a colony count over 10cfu per ml or/and Pseudomonas aeruginosa >10 per 100ml
  • Pseudomonas aeruginosa >50 per 100ml

• In the event of gross contamination the pool must be immediately closed contacting the relevant staff members and run for 6 turnover periods maintaining optimal pool water chemistry and coagulant dosing. After this period the pool water should be re-sampled and await the 24hr interim report. All equipment used within the pool, including the pool cover, must be cleaned with a 10mg/l chlorine solution before using in the pool to prevent re-contaminating the water.
The PSOP continued

- **Procedure in event of Faecal Contamination**
  - All patients should leave the pool.
  - **For solid faeces**: the stools should be immediately removed using a scoop or fine mesh net and **flushed down the toilet** (not put in any pool drains). If there is any doubt that all the faeces have been captured and disposed of and there is possible widespread distribution of the faeces in the pool, then the pool should be closed and follow **runny faeces** instructions.
  - All equipment that has been used in this process should be disinfected using a 1% solution of hypochlorite (1:10 dilution of commercially available sodium hypochlorite).
  - If the pool is **operating with NOP disinfectant residuals and pH values**, **no further action** is necessary and the pool can continue to be used.
  - Faeces that are smeared on tiling or other surfaces in contact with pool water should be cleaned off without contaminating the pool water and the surface disinfected with a 1% solution of hypochlorite.
The PSOP continued

- **Procedure in event of Faecal Contamination**
  - *For loose/runny faeces:* assume that the diarrhoea is caused by Cryptosporidium, a chlorine-resistant Protozoan. Close the pool immediately. Inform the pool engineers/ operator to engage to ensure free chlorine at top of range and pH bottom of range and that coagulant is being dosed correctly. Vacuum pool then after six turnover periods backwash the filters. Allow the filter media to settle by running water to drain for a few minutes before reconnecting the filter to the pool.
  - Check disinfection levels and pH. If they are within NOP re-open the pool.
The PSOP continued

- **Procedure in event of blood or vomit**
  - Pool disinfectants kill any pathogenic microorganisms in blood or vomit, provided disinfectant residuals and pH values are within NOP.
  
  - Small amounts of blood, eg. nose bleed, will be quickly dispersed and any pathogens killed by the disinfectant in the water.
  
  - Significant amounts of blood in the pool require the pool to be temporarily cleared of bathers to allow the blood to disperse and any infective particles to be neutralised by the residual disinfectant. This should be within one turnover period.
  
  - If poolside blood spill follow blood spill procedure as if anywhere in the building but ensure no products are washed into the pool. Following the removal of products the floor can be washed down with pool water, the washings are not allowed to re-enter the pool water, then leave to dry.
  
- **PWTAG recommends that vomit in the pool or poolside should be treated as if it were blood as above.**
The PSOP continued

- Emergency situations
  - Medical (minor and major)
  - Fire
  - Building failure
Health & Safety Recommendations
Microbiology Monitoring

• Microbiology sampling for hydrotherapy pools should be minimum of weekly

• Initial use sampling should be carried out prior to patient use to validate the treatment regime is effective

• For new baby group use additional microbiological samples should be taken to verify the disinfection regime is effective for this type of use

• Sampler must be trained to prevent sample contamination

• Analysis must be performed in a laboratory accredited by UKAS for testing pool waters for the parameters to be determined – aerobic colony count, coliforms, *Escherichia coli*, *Pseudomonas aeruginosa*
Chlorine Management

- Chlorine is the only recommended disinfectant for use in Hydrotherapy pools

- Reaction with organics in pool water can lead to:
  - Chloramines and nitrogen trichloride – irritants
  - Trihalomethanes (including chloroform) – carcinogens

- Good design and treatment aims to minimise their production by continual removal using combination of:
  - Filtration with coagulation
  - Controlling bather load
  - Pre immersion toileting and showering
  - Water replacement 30L/bather per day

- Use lowest chlorine level that gives satisfactory microbiological quality but no more than 1.5-2.0mg/L
Coagulation

- Coagulation such as alum, poly-aluminium chloride, PAC removes >90% cryptosporidium on a single pass versus around 50% removal with no coagulation

Secondary Disinfection with UV

- Recommended by CDC MAHC 2014
- Not essential if filtration is to PWTAG standards with coagulation
- Provides additional extra barrier protection especially where filtration standards are poor
- Kills Cryptosporidium
- Breaks down chloramines and other organic pollutants by photo-oxidation and so reduces chlorination by-products

MAHC= Model Aquatic Health Code
http://www.cdc.gov/mahc/index.html
Poor Maintenance and Cleaning Regimes

- Backwashing at wrong frequency or wrong time
- Clinical cleaning standards required ensuring no cross contamination from equipment used in other areas. Separate buckets/ mops/mechanical cleaners for ‘clean’ poolside versus ‘dirty’ areas such as changing rooms and toilets.
- Overflow channels and grids (including their undersides) should be cleaned at least monthly with 10mg/l chlorinated water and damp scourer with sodium bicarbonate
- Pool floor and scum lines need cleaning at least weekly (deck level pools need the floor suctioned cleaned daily)
- Avoid use of non-slip matting

- All equipment used within the pool including floatation aids, hoists, evacuation board, removable plinth and steps must be cleaned at least weekly in chlorinated water, dried and stored off the floor in **drainable designated storage areas**. PWTAG recommend that from time to time the equipment should be cleaned with a 10mg/l chlorinated water and air dried.

  *Important not to leave foam floats, goggles or neoprene gloves damp or in air tight containers which can easily become colonised with Pseudomonas aeruginosa or moulds and be a source of infection if then used within the pool water*
User Education (staff and patients)

• Advice sheets / signs
  - *If diarrhoea in preceding 48h not to use the pool (14 days if cryptosporidium)*

• Patient medical screening

• Pre immersion toileting and showering

• Limit the risk of contamination from outside sources e.g.
  - Wearing of overshoes around the pool
  - Not allowing wheelchairs / crutches / walking sticks used outside on poolside
Clinical Emergency Procedures

• Staff must be trained in rescue procedures (medical and non-medical)

• Emergency pool rescue drills should be conducted annually or for any new staff and involve personnel other than those working directly in the pool eg. nursing/medical staff, porters and switchboard/reception operators

• There must be two emergency evacuation trained staff within the pool area when a therapist treats patients within the pool

• Emergency equipment must be within the pool area including a rescue board, pocket mask, towels and scissors. Be aware of weight limits for emergency evacuation equipment, patients exceeding the weight limit will require specialist equipment to permit their treatment within the pool
Design
Design Summary

• **Deck level** pool for optimum pool water quality, ease of emergency evacuation and cleaning

• **No single depth** can meet the treatment requirements of all patients. The Aquatic Therapy Association for Chartered Physiotherapists (ATACP) recommends a therapist depth for safe patient handling at mid position between chest and waist height.
  - Pools for adult use should include areas 1-1.35m and for adults and children 0.85-1.25m depth. Consider user group eg. if spinal cord injuries deep end required

• Steps, gradient, moveable floors. **Ladders are not recommended** for hydrotherapy pools.

• The concourse should be a **minimum of 2m²** on at least two sides to allow for stretchers and wheelchairs with 1.5m² on the other sides.
• Changing facility; size, provision of showers pre and post, disability access, and separate staff
• Ventilation, lighting and visibility
• Hoists
  - fixed, mobile, tracking
  - positioning; a depth the therapist can safely manage patient handling and not over steps. Enough space for a full turning circle whether a chair or stretcher type
  - If hydraulic hoists are used ensure adequate backflow protection within the installation
• Alarm system
• Storage provision equipment and patient mobility aids
• Rest/waiting area with drinking water
Baby Swimming Groups

• **There must be a risk assessment** to ensure the pool is safe for patients, babies and parents with agreement and oversight by the WSG

• **The risk assessment should include;**
  - pool design, facilities, space, baby changing requirements and vulnerability of the patient groups using the pool
  - implications for patient treatment and safety
  - take account of any additional pool treatment and costs

• **The pool bather load must not be exceeded** each baby, parent and instructor counts as one user

• **All babies must wear double nappies specifically designed for swimming not regular nappies**
• Essential to ensure hydrotherapy pools operate under optimal water chemistry parameters with effective filtration using a flocculent and the turnover period is within the recommended 60 minutes or less

• As with other high risk patient groups baby swimming should never take place immediately before a patient session ideally at the end of the day

• Organisers and users must be aware of the contamination procedure for the pool. Children and parents who have had diarrhoea within the previous two weeks must not enter the pool areas or the pool

• Toys with hollow insides which allow water in (eg. can squirt water) and sponge toys should not be brought into the pool as they may grow microorganisms which can contaminate the pool
In Conclusion

• The new guidelines take account of the design and operational requirements to minimise the risks to patients, staff and external user groups complying with the latest Department of Health guidance

• The Designated Aquatic Physiotherapist should have appropriate training with an understanding not just for clinical treatment but management to prevent risks to all users

• A PSOP should be developed for all pools which includes a risk assessment considering all users (internal and external)