Best Evidence Statement (BESt)

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Aquatic Therapy for Children with Hemiplegic Cerebral Palsy[1]

Clinical Question

P (population/problem):	Among children ages 0-12 years diagnosed with hemiplegic cerebral palsy
I (intervention):	does aquatic therapy
C (comparison)	
O (outcome):	improve function and/or decrease impairment?

Target Population: Children diagnosed with hemiplegic cerebral palsy, age 0-12 years

Inclusions:

- Children up to 12 years of age who present with a diagnosis of hemiplegic cerebral palsy and hemiparesis according to the DSM IV criteria.
- Children with impairments in: strength, range of motion, balance, posture, body coordination, motor control, joint mobility, pain, muscle tone, functional independence and/or gross motor skill development, secondary to a diagnosis of hemiplegic cerebral palsy.

Exclusions:

- Children with a diagnosis of hemiplegia that does not also have a diagnosis of cerebral palsy.
- Children with significant cognitive delay who are unable to follow multi-step directions or to comply with recommendations.
- Children not ambulatory by age 3.

Recommendation(s)

1. It is recommended that aquatic therapy intervention be considered for children with hemiplegic cerebral palsy who demonstrate neurological and/or musculoskeletal impairments *(Getz 2006 [1a], Hutzler 1998 [2b], Yaggie 2002 [5], Thorpe 2000 [5], Ruoti 1997 [5], Local Consensus [5]).*
2. It is recommended that aquatic therapy interventions be used with children with cerebral palsy who demonstrate endurance or energy deficits and who have goals related to improving those deficits *(Hutzler 1998 [2b], Local Consensus [5]).*
3. There is insufficient evidence and a lack of consensus to make recommendations on the duration, frequency, intensity or strategy (theoretical model) used for aquatic therapy intervention.
4. It is recommended that clinicians receive specialized training in aquatic therapy interventions prior to providing this to patients *(Sova 2000 [5], Local Consensus [5]).*

Discussion/summary of evidence

A low-quality body of evidence and local consensus supports the use of aquatic therapy interventions for children with hemiplegic cerebral palsy. In a recent systematic review *(Getz 2006 [1a])*, no specified duration, frequency, intensity or strategy was found to be associated with functional change in children with neuromotor impairments. One study by

[1] Please cite as: Conner, S., Maignan, S., Burch, C., Christensen, C., Colvin, C., Hall, K. Cincinnati Children's Hospital Medical Center: Best Evidence Statement for Aquatic Therapy for Children with Hemiplegic Cerebral Palsy; http://www.cincinnatichildrens.org/svc/alpha/h/health-policy/best.htm, BESt 029, pages 1-4, 12-17-09.

Hutzler *(Hutzler 1998 [2b])* suggests that combined land and aquatic intervention over 6 months is likely to improve respiratory function, specifically vital capacity as measured by spirometer, in children with cerebral palsy.

Other limited treatment effects have been reported. After 10-weeks of aquatic therapy (3 days per week), one adult with cerebral palsy demonstrated improved strength (dynamometer), cardiovascular function Energy-expenditure Index (EEI), functional mobility, gait, and balance Gross Motor Function Measure (GMFM) adapted dimension D and E, Timed Up & Go(TUG), Functional Reach Test (FRT), gait velocity, and the 3 Minute Walk Test. All outcomes maintained or improved with exception of the EEI, TUG and FRT at 11 week follow-up *(Thorpe 2000 [5])*. Three ambulatory children with cerebral palsy improved sagittal plane active range of motion in a 14-week combined land and aquatic play-therapy program *(Yaggie 2002 [5])*.

Health Benefits, Side Effects and Risks

No adverse effects were reported *(Getz 2006 [1a])* in a systematic review. One participant did note muscle soreness (no worse than after lifting weights) *(Thorpe 2000 [5])*. There are inherent risks when performing therapy in the water that should be considered. The enhancement of movement in the water is viewed by patients, families and therapists, as an additional benefit to this therapeutic intervention *(Local Consensus [5])*.

When considering aquatic therapy interventions, the general health of the child should be considered. In addition, medical devices should be considered and may be contraindications for aquatic therapy interventions *(Local Consensus [5])*.

References

1. **Getz, M.; Hutzler, Y.; and Vermeer, A.:** Effects of aquatic interventions in children with neuromotor impairments: a systematic review of the literature. *Clin Rehabil*, 20(11): 927-36, 2006, *[1a]* _____ ☜ _____.
2. **Hutzler, Y.; Chacham, A.; Bergman, U.; and Szeinberg, A.:** Effects of a movement and swimming program on vital capacity and water orientation skills of children with cerebral palsy. *Dev Med Child Neurol*, 40(3): 176-81, 1998, *[2b]* _____ ☜ _____.
3. **Local Consensus:** during the guideline development timeframe. *[5]*.
4. **Ruoti, R. G.; Morris, D. M.; and Cole, A. J.:** *Aquatic Rehabilitation.* Philadelphia, PA, 1997, *[5]* _____ ☜.
5. **Sova, R.:** *Aquatics: The complete reference guide for aquatic fitness professionals.* 2000, *[5]* ☜.
6. **Thorpe, D. E., and Reilly, M.:** The effect of an aquatic resistive exercise program on lower extremity strength, energy expenditure, functional mobility, balance and self-perception in an adult with cerebral palsy: a retrospective case report. *Journal of Aquatic Physical Therapy 2000 Fall; 8(2)::18-24 (40 ref)*, 2000, *[5]* ☜.
7. **Yaggie, J. A., and Armstrong, W. J.:** Flexibility outcomes of children with spastic cerebral palsy during a semester of play-based therapy. *Clinical Kinesiology: Journal of the American Kinesiotherapy Association 2002 Summer; 56(2)::19-24 (26 ref)*, 2002, *[5]* ☜.

Note: Full tables of evidence grading system available in separate document:

- Table of Evidence Levels of Individual Studies by Domain, Study Design, & Quality (abbreviated table below)
  http://groups/ce/NewEBC/EBCFiles/Table-EvidenceLevels.pdf
- Grading a Body of Evidence to Answer a Clinical Question
  http://groups/ce/NewEBC/EBCFiles/GradingBodyOfEvidence.pdf
- Judging the Strength of a Recommendation (abbreviated table below)
  http://groups/ce/NewEBC/Judgingthestrengthofarecommendation.pdf

Table of Evidence Levels (see note above)

Quality level	***Definition***
1a† or 1b†	Systematic review, meta-analysis, or meta-synthesis of multiple studies
2a or 2b	Best study design for domain
3a or 3b	Fair study design for domain
4a or 4b	Weak study design for domain
5	Other: General review, expert opinion, case report, consensus report, or guideline

†a = good quality study; b = lesser quality study

Table of Recommendation Strength (see note above)

Strength	***Definition***
"Strongly recommended"	There is consensus that benefits clearly outweigh risks and burdens (or visa-versa for negative recommendations).
"Recommended"	There is consensus that benefits are closely balanced with risks and burdens.
No recommendation made	There is lack of consensus to direct development of a recommendation.

Dimensions: In determining the strength of a recommendation, the development group makes a considered judgment in a consensus process that incorporates critically appraised evidence, clinical experience, and other dimensions as listed below.

1. Grade of the Body of Evidence (see note above)
2. Safety / Harm
3. Health benefit to patient *(direct benefit)*
4. Burden to patient of adherence to recommendation *(cost, hassle, discomfort, pain, motivation, ability to adhere, time)*
5. Cost-effectiveness to healthcare system *(balance of cost / savings of resources, staff time, and supplies based on published studies or onsite analysis)*
6. Directness *(the extent to which the body of evidence directly answers the clinical question [population/problem, intervention, comparison, outcome])*
7. Impact on morbidity/mortality or quality of life

Supporting information

Introductory/background information

Aquatic therapy interventions are commonly utilized to treat children with neuromotor impairments. There are many proposed benefits. The water provides a buoyant medium to assist children with movement and to reduce the stressful forces and tension placed on body segments when exercising on land. The water can also be used as a resistive medium for strengthening, cardiovascular conditioning and development of control. A warm aquatic setting has also been reported to reduce muscle tone, allowing for the development of more efficient movement patterns in children with increased muscle tone *(Getz 2006 [1a])*. Hydrostatic pressure provides input to sensory receptors and increased pressure outside the lungs that may assist respiration and phonation *(Hutzler 1998 [2b])*.

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Search strategy

1. **Databases**
   OVID MEDLINE,
   OVID CINAHL

Search Terms: hydrotherap$, water therap$, physical therap$, occupational therap$, children, cerebral palsy, aquatic therap$, swim$, pool, aquatic$

2. **Limits and Filters:** English, humans; This search was opened up to include those studies that also investigated biofeedback in adults with a hemiplegic stroke diagnosis.
3. **Additional articles:** from reference lists

Known conflicts of interest:

Conflict of interest declarations were completed and none were found.

Additionally, for more information about CCHMC Best Evidence Statements and the development process, contact the ***Division of Occupational Therapy and Physical Therapy at: 513-636-4651 or OTPT@cchmc.org***

Note

This Best Evidence Statement addresses only key points of care for the target population; it is not intended to be a comprehensive practice guideline. These recommendations result from review of literature and practices current at the time of their formulation. This Best Evidence Statement does not preclude using care modalities proven efficacious in studies published subsequent to the current revision of this document. This document is not intended to impose standards of care preventing selective variances from the recommendations to meet the specific and unique requirements of individual patients. Adherence to this Statement is voluntary. The clinician in light of the individual circumstances presented by the patient must make the ultimate judgment regarding the priority of any specific procedure.

Reviewed by Cincinnati Children's Hospital Medical Center Evidence Federation