

AQUATICS CASE STUDY

“I Can Chew Gum Now!”

A Case Study of Therapeutic Aquatics

By Jane Styer-Acevedo, PT

Water has a liberating effect on people who have difficulty moving and playing in our gravity-filled environment. Archimedes found that when a body is immersed in a fluid, it experiences a buoyant force equal to the weight of the fluid which the body has displaced. In research, this property is frequently used to measure the exact weight of a person. In clinical practice, it can be used to unweight a body—to lighten a body that is burdened with excess weight, to unload joints that are painful from arthritic conditions, and to provide an environment for strengthening of the limbs which are too weak to keep the feet in contact with the floor of the pool (buoyancy-resisted movement).

The hydrostatic pressure and viscosity of water gives the individual 14 times more somatosensory feedback than air, therefore providing information about where body parts are in relationship to one another and how the body is moving through the water. The ability to provide vestibular stimulation in a fun-filled environment has powerful effects on hypotonia and the ability to move through water and subsequently on land, more freely.



Michelle’s story is a case in point. Treated with aquatic therapy between the ages of 3 1/2 and 4 1/2 years, she learned how to go up and down a curb without assistance and assume the unilateral stance of a ballerina; she improved the intelligibility of her language and became conversational; she was able to chew gum (and spit it out); and she learned how to “swim” across the pool with support. She increased her self confidence immeasurably.

As her PT, I evaluated Michelle on January 28, 2003, when she was 3-years, 5 1/2 months old. I recommended therapeutic aquatics as the intervention of choice. Initial findings included developmental delay I felt to be secondary to significant hypotonia proximally and in all extremities, tactile hypersensitivity of legs and face, and dysarthria. She was a child who expressed her wants and needs by whining, secondary to poor communication skills.

Michelle had begun to walk independently on February 8, 2002, at age two years, six months. Between February 2002 and January 2003, Michelle’s base of support narrowed to hip width. She learned how to walk faster, but was unable to run, and she continued to retrieve toys off the floor via squatting without losing her balance. Stairs were difficult for her and she required adult assistance to go up and down stairs in a standing position throughout the year. She could throw a ball in February 2002 but could not catch the ball. No significant change in gross, fine, or oral motor skills had taken place over the previous 11 months.

Previous “land” intervention from Early

Intervention included one hour of speech therapy and another hour of PT between the ages of one and three years. An additional hour of outpatient PT was provided weekly when Michelle was two. Once she turned three years old, speech was decreased to 3/4 hour per week and a half hour of OT was added, along with continuing PT one hour per week via the Early Intervention system. An additional hour of speech therapy was added two to four times per month between February and July 2003.

Taking a Dip in the Pool

Michelle's first session in the pool occurred on February 6, 2003. Due to her anxiety, she was handed over from her mother to this PT, who lifted her into and out of the pool. She received a total of 26 visits by December 11, 2003, averaging two or three visits per month.

During her initial visit, Michelle threw a small ball with either hand and blew bubbles through her mouth for two seconds with her lips slowly submerged while she was held securely in a vertical position in the arms of the PT. She would not go into supine, was unable to kick her legs, could take only a few steps when standing in water to her nipple line (as she could not keep her feet on the floor of the pool without physical assist and verbal cueing), and was unable to squeeze the water from a small foam ball with either hand. She loved being in the water as long as she was not moved too quickly or unexpectedly and the water did not touch her face. If it did, Michelle whined for a towel to dry her face off before continuing any activity.

By the third visit, Michelle crept over the wall of the pool with stand by supervision to enter and exit the pool. By the fourth visit, she attempted to kick her legs in a suspended vertical position and attempted jumping off the PT's legs, beginning from standing with her knees flexed and only using knee extension. By the fifth visit, Michelle kicked her legs three to four times from a supported vertical position in two of four trials. It was during this session that she was able to keep her feet on



the pool floor when submerged to the nipple line with verbal cues only, such as “push your feet to the floor”.

Top: Supported by a foam “noodle” under her arms, Michelle allows herself to be suspended in the water.

Middle: Michelle explores squat and knee extension using the side wall of the pool.

Bottom: With support, Michelle is able to kick her legs in horizontal and work toward “swimming” in prone.

By Michelle’s sixth visit, she stood for five to eight seconds by herself with close supervision when submerged to the nipple line. During the seventh visit, Michelle enjoyed splashing in the water, being “thrown” into the air and caught again, and spinning with the PT. It was after this visit, by May 1st, that Michelle stepped down the outside step at her house independently for the first time without external support! She also went supine in the water, got her hair wet and ears submerged for the first time, and allowed herself to be suspended with a foam noodle (a six-foot long by three-inch diameter flexible foam cylinder) under her arms and around her chest. In this position, she was able to kick 10-12 times independently. By the 10th visit on May 15th, Michelle took two to three steps independently upon entering the pool, which increased to walking ten feet in nipple-deep water by the 12th visit.

The Proud Half-Way Mark

On August 21st, the 17th visit, Michelle’s father reported that Michelle walked independently in the 18-inch-deep public baby pool for the first time and was very proud of herself. By September 4th, the 18th visit, Michelle was chewing gum, just like her older sister. She was indeed proud of this new accomplishment. Her father reported on the 18th of September, that Michelle was doing one-legged stance with two hands on two support surfaces in imitation of her sister dancing.

Michelle’s speech improved markedly by July 24th, the 16th visit, when she was saying three-to-five-word sentences consistently with about 50% intelligibility. By September 4th, the 18th visit, her speech had improved to five-to-six-word sentences with 70-80% intelligibility. In November, Michelle’s speech was conversational in full sentences with the PT requesting a repeat only once in four to five sentences. She was initiating conversation and spontaneously relating stories about her two sisters to the PT.

Michelle had achieved a level of confidence in the pool by October 2003 that had allowed her to work towards “swimming” in the pool, given full support by the PT. When given full support during her 23rd visit, Michelle could combine any two of the following three skills for two to three feet: prone kicking, pulling reciprocally with her arms, and blowing bubbles through her mouth given verbal cues. On November 20, the 25th visit, Michelle repeated this activity for two to four feet in two of six trials.

Major Gains in Ten Months

By December 2003, Michelle was able

to push a kickboard six inches underwater six times and walk independently four times for eight feet in mid-ribcage deep water, touching the wall two or three times per eight-foot length. Other functional changes that occurred by the end of 2003 include an increase in her maturity and self confidence that enabled her to play with other children in the home and at preschool, inconsistent independence in self dressing with her shirts and pants once they were oriented spatially, standing on one leg with only one hand on the wall, knee-walking for up to 25 feet, and using a step-over-step gait pattern for the last three steps in a single flight when one hand was held by an adult and the other was on the wall. Previously she used a step-to pattern when negotiating the stairs.



Michelle now requests whistles to blow for fun and enjoys cutting paper and using crayons. She chews gum like her sister and knows to spit it out when finished chewing. She initiates communication and shows an improvement in her interaction with her peers at school.



The changes achieved via the therapeutic aquatics have spanned the developmental arenas and changed the way that Michelle is perceived by her family and peers as much as how she perceives herself. Her parents are very pleased and thrilled that Michelle now has a skill that she is proud of. Michelle is a happier child and loves to go to therapy. The next step is to transition her into the summer swimming program along with her sisters. What a great accomplishment that will be!



The aquatics intervention in Michelle's case led to enormous improvement in her skills. One of the greatest gifts we therapists can give is to enable an individual to achieve a level of functional independence while providing for a social outlet as well as fitness activity. In addition to effective therapy, aquatics can be a fun-filled, life-long pursuit for many individuals.

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Top: As aquatic therapy progressed, Michelle became more comfortable in the water. Here she delights in being thrown in the air.

Middle: After ten months, Michelle was able to walk independently for eight feet in mid-ribcage-deep water.

Bottom: During therapy, Michelle made significant progress in being able to squeeze water from a small foam ball with either hand.

Bibliography:

Becker & Cole. 1997. Comprehensive Aquatic Therapy. Boston: Butterworth-Heinemann Ltd. ISBN # 0-7506-9649-4.

Campion, M.R. 1997. Hydrotherapy: Principles and Practice. Oxford: Butterworth-Heinemann Ltd. ISBN # 0-7506-2261.

Davis, B.C., and R.A. Harrison. 1988. Hydrotherapy in Practice. Edinburgh: Churchill Livingstone.

Lambeck, J. 1999. Halliwick Method II, the Logic Approach to Exercise in Water. Lecture Notes from Greenville, NC September 15-18.

Licht, S. (ed). 1963. The 7th Volume of Physical Medicine Library Medical Hydrology. Baltimore: Waverly Press, Inc.

Ruoti, R.G., D. M. Morris, and A.J. Cole. 1997. Aquatic Rehabilitation, Philadelphia, PA: Lippincott-Raven. ISBN # 0-397-55152-5.

Skinner, A.T. and A.M. Thomson (ed). 1983. Duffield's Exercise in Water, 3rd ed. London: Bailliere Tindall.

Styer-Acevedo, J.L. 1995. Aquatic PT - Equipment and Clinical Decision Making. PT Magazine of Physical Therapy, January 43-46, 72.

Styer-Acevedo, J.L. 1997. Aquatic Rehabilitation in Pediatrics. In Ruoti R (ed), Aquatic Rehabilitation, Philadelphia, PA: Lippincott-Raven, 151-172.

Styer-Acevedo, J.L. 1999. Hey! Look at Me! Buoyancy Assisted Function Through Therapeutic Aquatics. In Erhardt, R. P. (ed), Parent Articles About NDT, Austin, Texas. Pro-Ed, Inc.

Styer-Acevedo, J.L. 2001. NDT Based Aquatics. NDTA Network, Laguna Beach, CA. May/June.

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