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# The Effect of Aquatic Interventions in Combination with Early Start Physical Therapy Services on Gross Motor Development in a Male Child with Down Syndrome

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## INTRODUCTION

Aquatic therapy has been used in various patient populations as a modality to facilitate motor control and manage muscle tone dysfunction.<sup>1-3</sup> Despite a variety of literature addressing individuals with Down syndrome and aquatic therapy, there has been little described about the effects of aquatic therapy on early gross motor development in children with Down syndrome.

## PURPOSE

The purpose of this case study is to examine whether aquatic physical therapy interventions combined with early start physical therapy can influence gross motor developmental delay in a child with Down syndrome.

## CASE DESCRIPTION

- ❖ The patient is a 31-month-old boy with diagnosis of Down syndrome presenting with moderate-severe hypotonia and lengthy medical and surgical history related to complications secondary to his diagnosis.
- ❖ Patient began receiving early start physical therapy at 4-months-old at a frequency of one in-home session weekly.
- ❖ Peabody Developmental Motor Scales version 2 (PDMS-2) scores at 2 months (T1) and 14 months (T2) of age showed a 50% gross motor delay across all categories, and his 26 month (T3) score showed a 59% gross motor delay across all categories.<sup>4</sup>
- ❖ At 26 months old, the patient would not tolerate quadruped positioning and used rolling as his primary method of mobility. He was able to pull himself into kneeling and standing with guarding but would not maintain either position longer than 20 seconds.
- ❖ Due to his significant gross motor delay, aquatic therapy sessions were added to the patient's plan of care at a frequency of two sessions per month in addition to continuing his current in-home services. A fourth evaluation, (T4), was performed 5 months following initiation of warm water therapy.

## INTERVENTIONS



Image 1. Dynamic and reactive sitting balance on kickboard. Child seated on center of board must respond to perturbations in all directions with minimal support from therapist.



Image 2. Facilitation of quadruped position on boogie board in pool for upper extremity strengthening and reactive balance to promote creeping on land. Water provides perturbation and encourages rocking.

- ❖ In-home physical therapy once weekly for one hour, and aquatic physical therapy sessions twice a month for one hour over 5 months
- ❖ Plan of care emphasis on core stability and strength, upper and lower extremity weight bearing, and dynamic balance to facilitate gross motor skill development.
- ❖ Specific interventions include sitting balance in long, short, ring, and straddle sitting, supported standing and cruising at pool edge, sit to stands, and upper and lower extremity pushing activities.

## RESULTS

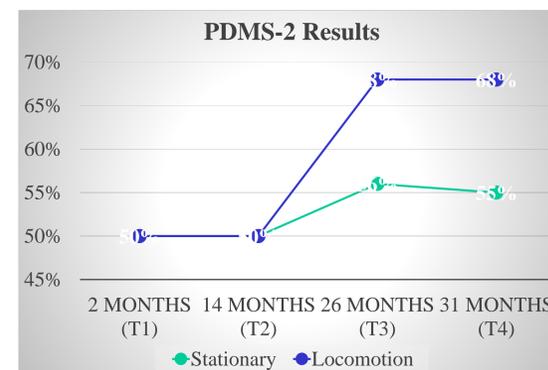


Figure 1. Percent delay described by stationary and locomotor subtests of PDMS-2. Indicates growth of delay between 14-26 months, and stabilization of scores between 26-31 months over introduction of aquatic therapy.

- ❖ PDMS-2 raw score increased 18 points between T2 to T3, and 16 points between T3 to T4. MCID for PDMS-2 raw scores is 8.39, indicating significant improvement.
- ❖ Percent of gross motor delay between T2 and T3 increased by 9%, and increased 2% between T3 and T4. MDC for percent change in developmental delay in the PDMS-2 is 8.2%, showing regression between T2 to T3 and stabilization between T3 to T4.<sup>4-5</sup>
- ❖ As of T4, patient tolerates quadruped for short periods but prefers tummy crawling for long distances, and can independently pull to stand and initiate cruising steps.

## CONCLUSION

Aquatic therapy in a child with Down syndrome was associated with improved gross motor abilities and stabilization of gross motor delay over 5 months. While gross motor delay is normal in children with Down syndrome, progression of milestones is still expected, and therefore growing gross motor delay can be cause for concern.<sup>6-7</sup> This case report supports prior research indicating that aquatic interventions can improve gross motor control.<sup>1</sup> The information gained from this case report can be utilized to help guide decision making for practitioners working with children with Down syndrome.

## CLINICAL APPLICATION

The findings of this case study suggest that aquatic interventions can be a beneficial modality within Early start physical therapy services to promote gross motor development in young children with Down syndrome.

## ACKNOWLEDGEMENTS

- ❖ Easter Seals for use of their aquatic therapy pool and access to their patient for this project
- ❖ To the patient's family, special thanks for their generosity with their time and willingness to allow myself and others to learn from their child.

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